

Stages of change, psychological factors and awareness of physical activity levels in the Netherlands

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SUMMARY

The purpose of this study was to investigate physical activity levels, stages of change, awareness, and differences in psychological factors relating to physical activity in an adult Dutch population, in order to identify specific objectives for physical activity promotion. Physical activity levels, self-rated physical activity, stages of change, awareness, attitudes, social influences and self-efficacy relating to physical activity were assessed among a random sample of 2608 adults using structured questionnaires. Almost 60% of the respondents did not meet the recommended target for physical activity to promote health. Half of these respondents were in the pre-contemplation stage, and >60% were overestimating their physical activity level.

Furthermore, respondents who were not aware of their inadequate physical activity level had a less positive intention to increase their level of physical activity than those who rated their own physical activity level as low. Respondents in the pre-contemplation and maintenance stages had a less positive attitude, perceived less social support and had lower self-efficacy expectations towards increasing physical activity than those in the contemplation, preparation and action stages. The results suggest that interventions aimed at increasing physical activity in the studied population should be aimed at increasing awareness of personal activity levels and should be stage-matched.

Key words: awareness; physical activity levels; psychological factors; stages of change

INTRODUCTION

Regular physical activity is regarded as an important component of a healthy lifestyle, decreasing, for example, the risk of cardiovascular diseases, non-insulin-dependent diabetes mellitus, hypertension, colon cancer and obesity (Pate *et al.*, 1995; US Department of Health and Human Services, 1996). Also, physical activity is important for the health of muscles, bones and joints (USDHHS, 1996; Vuori, 1998). More and more health promotion efforts are therefore being initiated to persuade the public to exercise on a regular basis. Planned health promotion aimed at behavioral change should be based on empirical knowledge about present behavior, behavioral determinants and mechanisms of behavioral change (Green and Kreuter, 1991).

The present study aims to contribute to our understanding of motivation to increase physical activity levels in an adult population, in order to identify specific objectives for physical activity promotion among adults.

How much physical activity is recommended?

Until recently, the standard recommendation was to engage in moderate to high intensity (performed at 60–90% of maximum heart rate) physical exercise at least three times a week, for a continuous 20–60 min (Pate *et al.*, 1995; Van Mechelen, 1996). This advice was primarily aimed at improving or maintaining physical fitness. However, the present view is that health

promotion and disease prevention can also be achieved with regular, moderately intensive activities. Therefore, the current recommendation is that all adults should accumulate 30 min or more of moderate-intensity physical activity on at least five, but preferably all, days of the week (Pate *et al.*, 1995; Kemper *et al.*, 2000). Such activities may include, for example, gardening, brisk walking, cycling, housework and dancing (Pate *et al.*, 1995; Jones *et al.*, 1998). People who are currently physically inactive can be those who benefit most from increasing their activity to the recommended level. However, most people who are already regularly physically active can also expect health and fitness benefits from becoming more physically active (Pate *et al.*, 1995; USDHHS, 1996; Kemper *et al.*, 2000).

How physically active are the Dutch?

Only two studies have been published that investigated the prevalence of activity and inactivity among Dutch adults, based on the moderate intensity recommendations. According to these studies, 40–53% of Dutch adults met the present target (Hoeben, 1998; Hildebrandt *et al.*, 1999).

More data on physical activity levels have been collected in the US. The Surgeon General's Report on Physical Activity and Health, published in 1996, brings together what has been learned about physical activity and health from decades of research in the United States. According to this report, <40% of the American adults achieved the amount of physical activity recommended for health promotion (USDHHS, 1996). An Australian study showed that 56% of the employees of 20 worksites could be classified as physically active (Simpson *et al.*, 2000).

Why are some people sufficiently physically active while others are not?

Little is known about the reasons why Dutch adults engage in physical activity or may decide to increase their activity levels. A single Dutch study on the psychological determinants of starting participation in an employee fitness program revealed that it was important to be convinced of the advantages of the fitness program, such as improved physical condition, and of the personal ability and possibilities to participate in the program (Lechner and De Vries, 1995). However, this study did not focus on the type of physical activity referred to in the recommendations,

and was conducted among a specific population group.

The Surgeon General's Report on Physical Activity and Health found that confidence in one's ability to engage in regular physical activity, enjoyment of physical activity, support from others, positive beliefs concerning the benefits of physical activity, and lack of perceived barriers to being active were consistent influences on physical activity patterns among adults and young people in the US (USDHHS, 1996).

Theoretical framework

The Stages of Change concept from Prochaska and DiClemente's Transtheoretical model has been used extensively to study different health-related behaviors including exercise (Prochaska and DiClemente, 1992; Lechner and De Vries, 1995; European Commission, 1999; Laforge *et al.*, 1999). Five stages of change can be distinguished: pre-contemplation, contemplation, preparation, action and maintenance. In the pre-contemplation stage, people are not considering increasing their physical activity level, at least not within 6 months. In contemplation, people are considering increasing their physical activity level within 6 months, and in the preparation stage they intend to increase their physical activity level within 30 days and they are often making specific plans to do so. In the action stage, people have already started to exercise more, while people in maintenance are sustaining the desired level of physical activity. An important implication of stages of change is that people in different stages may need stage-matched interventions to proceed to a further stage of change, since people in earlier stages of change may differ in psychological factors, experiences, skills and abilities from people in later stages of change. The stage-matched Physician-based Assessment and Counseling for Exercise (PACE) intervention was shown to be effective in a short-term study in the United States (Calfas *et al.*, 1996).

Awareness of personal risk behavior is supposed to be especially important to proceed from pre-contemplation to contemplating behavior change. Based on Weinstein's Precaution Adoption model, it can be expected that people may only proceed to contemplation when they are aware that they personally engage in too few physical activities (Weinstein, 1988). For health risk behaviors that are clearly defined,

often dichotomous, and for all to see (like, for example, smoking), awareness is not an issue. For more complex health risk behaviors, research has shown that many people are indeed not aware of their risk behavior and consequently do not perceive a need to change. As a result, they may not be motivated to change (Brug *et al.*, 1994; Lechner *et al.*, 1997). Physical activity is a complex health-related behavior in that it consists of a large possible number of different activities and behaviors that are spread out over each day, like cycling to the mall, walking the stairs at work, jogging in the evening, etc. Therefore, evaluating the adequacy of one's own level of physical activity may be difficult, which makes awareness of personal activity level a potential determinant of the intention to increase activity levels. Awareness of personal physical activity level has not been studied as a determinant of increasing physical activity before.

Earlier studies on exercise behavior, smoking cessation and dietary change have shown that psychological factors like attitudes, perceived social influences and self-efficacy expectations may differ in subjects at different stages of change (Marcus *et al.*, 1992; De Vries and Backbier, 1994; Godin *et al.*, 1995; Lechner and De Vries, 1995; Brug *et al.*, 1997a; Brug *et al.*, 1997b; De Vries and Mudde, 1998). This may have further consequences for stage-tailored interventions.

Research questions

The present study specifically aimed to analyze stages of change and awareness levels of physical activity among the general population, utilizing an integration of the above-mentioned models. The research questions were as follows.

- (i) What proportion of Dutch adults achieve the recommended level of physical activity, and what physical activities are most common?
- (ii) How are adults distributed over the different stages of behavioral change related to physical activity, and which psychological factors are important in differentiating persons who are in the different stages of behavioral change?
- (iii) How many adults are aware of their activity levels, and does the intention to increase physical activity levels vary according to the level of awareness of physical activity?

METHODS

Respondents and procedures

Data were derived from a baseline measurement for the community-based intervention project called Hartslag Limburg (Heartbeat Limburg), which was conducted in June 1998. This project attempted to encourage the general population in Southern Limburg (a province of the Netherlands) to increase their level of physical activity, to reduce their fat intake, and to stop smoking. The project started in 1998 and will continue until at least 2003. A full description of the project has been published elsewhere (Ruland *et al.*, 1999). At baseline, a cohort research sample was selected by taking a random sample of 1000 inhabitants (aged ≥ 14 years) from the population registers of each of the five municipalities of Southern Limburg (total sample size of 5000). Data were gathered by means of structured questionnaires, sent by mail (two attempts were made). Questions were asked about physical activity, dietary habits and smoking habits, as well as about psychological determinants of these behaviors. The present study used only data with respect to physical activity from respondents aged ≥ 18 years in the five Southern Limburg municipalities. After the exclusion of respondents < 18 years of age, 2608 respondents remained. The response rate for this study population was 56%.

Questionnaire

Physical activity

Physical activity levels were assessed with a newly developed, short questionnaire based on the recommended levels of physical activity to promote health. Respondents were asked to indicate on how many days a week they engaged in various physical activities for at least 5 min at a time. Respondents were further asked to indicate for how many minutes a day, on average, they engaged in these activities. The examined physical activities are listed in Table 1.

This questionnaire allowed a physical activity score to be calculated in minutes and in sessions per week. In addition, respondents were asked to indicate directly on how many days a week they were physically active for at least 30 min. Respondents who had a physical activity score of at least 150 min per week and at least five sessions per week, and who indicated that they were

Table 1: Percentages of respondents engaged in the various activities on at least 1 day a week, for at least 5 min at a time ($n = 2608$)

Activity	Percentage
Stairwalking	76
Heavy housework (like washing floors)	62
Brisk walking	61
Bicycling	52
Gardening	52
Home repair/do-it-yourself	37
Gymnastics/aerobics/fitness and such	22
Swimming	12
Other activities, like dancing	12
Indoor and outdoor team sports	9
Jogging/running	8
Tennis/squash	7
Skating/roller-skating	2
Combat sports	1
Rowing/canoeing	1

physically active for at least 5 days a week for at least 30 min a day, were classified as meeting the recommended target.

The relative validity of the questionnaire was investigated by comparison with a 7-day physical activity record. The Spearman rank order coefficient between the two methods was 0.50 and Cohens kappa was 0.33. The Spearman rank order coefficient for the test-retest reliability was 0.73 and Cohens kappa was 0.58 (Koremans *et al.*, 2000). These relative validity data are in the same order as those reported in other studies with respect to physical activity (Richardson *et al.*, 1995; Pols *et al.*, 1996; Pols *et al.*, 1997).

Psychological factors

Attitudes towards increasing physical activity levels were measured with two items. Respondents were asked to evaluate their attitude towards increasing their physical activity level on a five-point 'bad-good' scale and on a five-point 'unpleasant-pleasant' scale ($\alpha = 0.53$). Because an alpha value of >0.5 can be considered to be sufficient for summation of item scores in explorative research (Nunnally, 1967), one attitude score was calculated by computing the mean score of the two items. Perceived behavior of others was measured by asking respondents to assess how physically active other people in their direct social environment ('important others', e.g. spouse, family, friends, colleagues) were on average on a five-point scale, with answers ranging from 'hardly active' to 'highly active'. Perceived social support was measured by asking

respondents how much support they received from these important others to increase their physical activity level on a three-point scale, with answers ranging from 'no support' to 'much support'. Self-efficacy towards increasing physical activity levels was assessed by asking respondents how confident they were about their ability to increase their physical activity level on a five-point scale, with answers ranging from 'not confident' to 'very confident'. Intention to increase physical activity levels was assessed by asking respondents whether they intended to increase their physical activity level in the future on a five-point scale, with answers ranging from 'certainly not' to 'certainly'.

Self-rated physical activity was assessed by asking respondents whether they rated their physical activity level as low or high on a five-point scale (low, rather low, intermediate, rather high, high). Respondents were allocated to four categories of awareness, based on their self-rated physical activity level as compared with the results of the more objective assessment from the physical activity questionnaire (Figure 1). Respondents who met the recommended physical activity target, but who rated their activity levels as (rather) low were classified as underestimators. Respondents who did not meet the recommendations and rated their physical activity level as intermediate or higher were classified as overestimators. The remaining respondents had realistic self-assessments about their adequate or inadequate activity level.

The algorithm used to categorize respondents into stages of change is presented in Figure 2. First, respondents were asked if they intended to increase their physical activity level within the next 6 months (yes/no) and, if so, whether they planned to do this within the next 30 days (yes/no). In addition, respondents were asked if they had changed their level of physical activity in the past 6 months (increase/decrease/no change). Respondents who met the recommended physical activity target were classified as being in action if they indicated they had increased their physical activity level in the past 6 months. Otherwise, they were classified as being in maintenance. The remaining respondents were classified as being in preparation if they reported the intention to increase their physical activity level within 30 days, in contemplation if they intended to increase their physical activity level within 6 months, and in pre-contemplation if they had no intentions to increase their physical activity level.

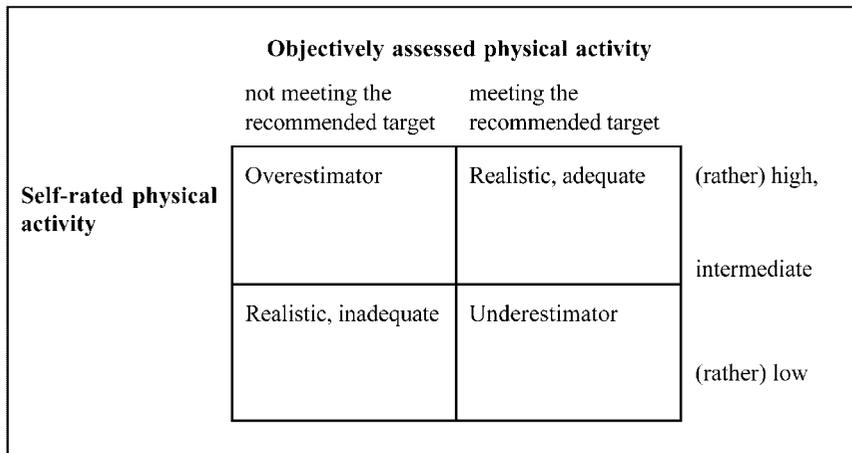


Fig. 1: Classification of respondents into categories of awareness.

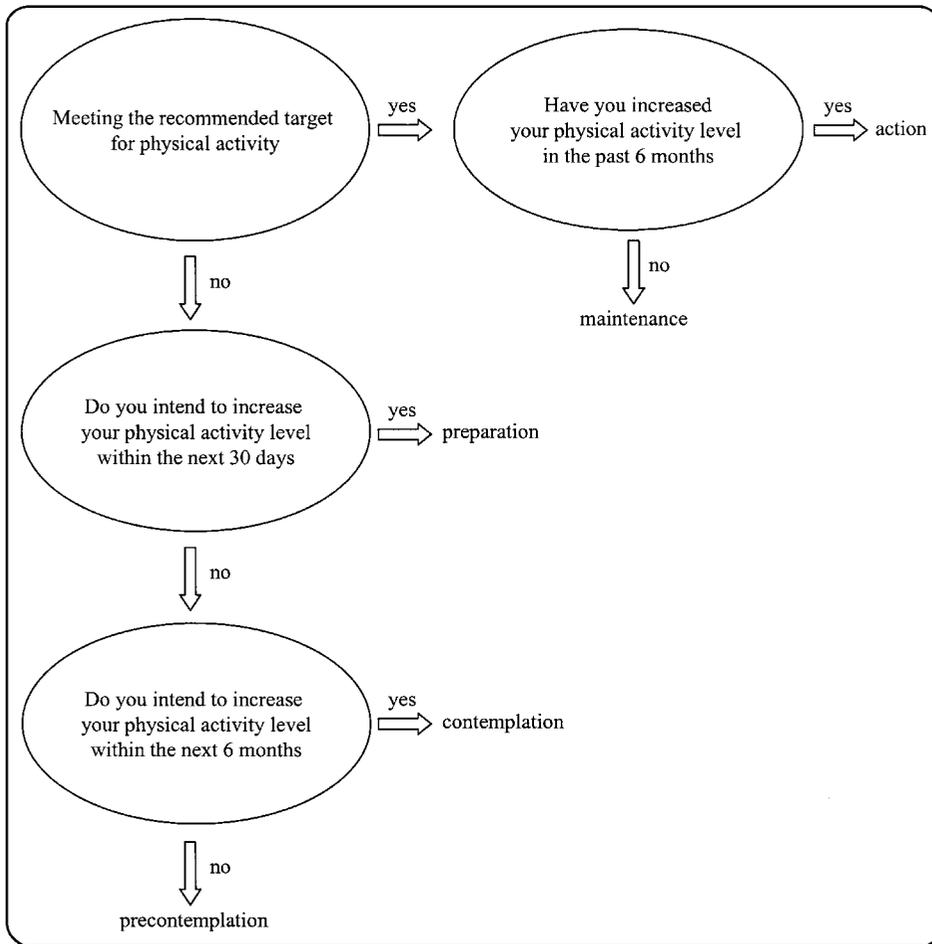


Fig. 2: Classification of respondents into stages of change.

Finally, questions about sex, age and education were included in the questionnaire.

Statistical analysis

Descriptive statistics (frequencies) were used to answer the question 'how many Dutch adults achieve the recommended level of physical activity, and what physical activities are most common?', and to compute the distribution over stages of change and different awareness categories. One-way analysis of variance (ANOVA) with Scheffé's multiple comparison test was used to test for significant differences in mean scores for attitude, perceived behavior of others, perceived social support, self-efficacy expectations, and self-rated physical activity between the five stages of change. Furthermore, one-way ANOVA with Scheffé's multiple comparison test was used to test for significant differences in the intention to increase physical activity levels between the four categories of awareness. Differences were considered to be statistically significant when $p < 0.05$. All analyses were performed using the SPSS 7.5 statistical package (SPSS, 1997).

RESULTS

Respondents

Mean age was 46 years ($SD = 16$), ranging from 18 to 95. There were marginally more women (53%) than men among the respondents. Thirty-one percent of the respondents had a low level of education (primary or basic vocational school), 45% a medium level (secondary vocational school or high school degree), and 24% a high level of

education (higher vocational school, college degree or university degree). Compared with the general Dutch adult population, the better educated were somewhat (5%) over-represented in the present sample (Statistics Netherlands, 1997).

Physical activity

Although 51.4% of the respondents reported being physically active for 30 min on at least 5 days a week, not all of these respondents had a physical activity score of at least 150 min per week distributed over at least five weekly sessions. Therefore, after corrections for all three criteria, 41.7% met the recommended physical activity levels.

Table 1 shows the proportions of respondents engaged in various physical activities. The most common activities were stairwalking (76%), heavy housework (62%), brisk walking (61%), bicycling (52%) and gardening (52%).

Stages of change and differences in psychological factors and self-rated physical activity between subjects at different stages

Of the respondents, 29.6% were in the pre-contemplation stage, 10.4% in contemplation, 18.3% in preparation, 10.1% in action and 31.6% in the maintenance stage. Approximately half of the respondents (50.8%) with an inadequate activity level (i.e. they were not meeting the recommended target) did not intend to increase their levels of physical activity (i.e. they were in pre-contemplation).

Table 2 shows that respondents in the pre-contemplation stage had a significantly less positive attitude, perceived significantly less social support and had significantly lower self-efficacy

Table 2: Mean scores on psychological factors and self-rated physical activity for the five stages of behavioral change: pre-contemplation (P), contemplation (C), preparation (PR), action (A) and maintenance (M) ($n = 2380$)

Psychological factors	P	C	PR	A	M	Scheffé's multiple comparison test ($p < 0.05$)
Attitude ^a	0.83	1.38	1.56	1.27	0.99	P < M < C, PR, A; A < PR
Perceived behavior of others ^b	0.04	0.08	0.05	0.16	0.17	
Perceived social support ^c	0.42	0.57	0.67	0.7	0.47	P, M < PR, A; P < C
Self-efficacy ^a	0.67	1.16	1.32	1.35	1.01	P < M < PR, A; P < C
Self-rated activity ^b	0.01	-0.48	-0.44	0.48	0.36	C, PR < P < A, M

^aScore ranges from -2 (most negative answer towards increasing physical activity) to +2 (most positive answer towards increasing physical activity).

^bScore ranges from -2 (low physical activity level) to +2 (high physical activity level).

^cScore ranges from 0 (no support towards increasing physical activity) to 2 (much support towards increasing physical activity).

expectations towards increasing their physical activity level than respondents in the contemplation, preparation and action stages. Furthermore, self-rated physical activity in pre-contemplation was significantly higher than in the contemplation and preparation stages.

Awareness and differences in intention according to awareness

Most respondents were realistic about their level of physical activity (57.1%) (34.5% were realistic about their adequate physical activity level and 22.6% about their inadequate level) but a substantial proportion of the respondents (35.6%) were overestimating their physical activity level, and a small minority (7.2%) underestimated their physical activity level. Among respondents with an inadequate activity level, a majority (61.1%) overestimated their physical activity.

Respondents who overestimated their physical activity level were significantly less likely to intend to increase their activities than respondents who were aware of their inadequate level of physical activity (Table 3).

DISCUSSION

Almost 60% of the respondents in the present study did not meet the current recommendations for physical activity to promote health. Half of these respondents were in the pre-contemplation stage, and >60% of those who did not meet the recommendation were overestimating their physical activity level. Furthermore, respondents who were not aware of their inadequate physical activity level had a less positive intention to increase their level of physical activity than those who rated their own physical activity level as low, which was also reflected in the higher self-rated

physical activity levels among pre-contemplators. Some further differences were found in psychological factors between respondents in different stages of change. Generally, respondents in the pre-contemplation and maintenance stages had a less positive attitude, perceived less social support and had lower self-efficacy expectations than those in the contemplation, preparation and action stages.

Despite the different methods used to assess moderate physical activity participation rates, the physical activity levels that were found in the present study were in line with the results of the two earlier studies in the Netherlands (Hoeben, 1998; Hildebrandt *et al.*, 1999). As in the present study, walking, cycling and gardening were found to be popular physical activities in the pan-EU (European Union) consumer attitudinal survey (European Commission, 1999). Stairwalking and heavy housework were not assessed in the pan-EU survey. However, it seems unlikely that so many (76%) respondents in the present study walked stairs for at least 5 min at a time. A probable explanation for this high proportion of intensive stairwalking might be that respondents accumulated their stairwalking time throughout the day.

Two studies that used the same descriptions of the stages of change, but somewhat different definitions of regular exercise behavior, found that approximately half of the respondents were in the pre-action stages (pre-contemplation, contemplation or preparation), and that a substantial proportion of these respondents were in the pre-contemplation stage (European Commission, 1999; Laforge *et al.*, 1999). The present study suggests that awareness of the adequacy of personal activity levels is important for the motivation to increase activity levels. Among inactive people, self-rated physical activity was highest in subjects in pre-contemplation. Unrealistic self-assessment may be an important barrier to encourage pre-contemplators to move forward in the behavioral change process. This finding is in line with earlier studies on different complex health-related behaviors like fat intake and fruit and vegetable consumption (Brug *et al.*, 1997a; Lechner *et al.*, 1997).

The differences in psychological factors that were found in subjects being in different stages of change further imply that health education aimed at physical activity should be stage-matched. Differences in psychological factors between subjects in the different stages of behavioral change

Table 3: Mean scores of intention to increase physical activity levels for the four categories of awareness ($n = 2428$)

Category of awareness	Intention ^a Score ranges from -2 (certainly not) to +2 (certainly)
Realistic, inadequate (RI)	0.66
Underestimator (U)	0.70
Overestimator (O)	0.33
Realistic, adequate (RA)	0.23

^aSignificant differences in Scheffé's multiple comparison test ($p < 0.05$): RA, O < RI, U.

were also found in other studies of exercise behavior (Marcus *et al.*, 1992; Godin *et al.*, 1995; Lechner and De Vries, 1995). However, such a comparison should be interpreted with caution, since different staging algorithms were used, partly because the behaviors of interest were not the same and because different population groups were studied. Nevertheless, these studies also found the lowest scores on attitude and self-efficacy measures in persons in the pre-contemplation stage. In the present study, psychological scores of respondents in maintenance were quite similar to those in pre-contemplation. Psychological factors were measured in relation to behavior change (increasing physical activity) and not in relation to present behavior. Therefore, respondents in maintenance might not be motivated to increase their physical activity level since their physical activity level is already in line with the current recommendations, which might cause their psychological scores to be quite similar to those in pre-contemplation.

It is important to note some limitations of the present study. First, the present study had a cross-sectional design, so no conclusions about causality can be drawn. Secondly, the results were based on self-reports. For example, no objective measures of energy expenditure were obtained. However, using instruments like the accelerometer to assess long-term physical activity patterns may be asking too much from study participants, and may result in selection and response bias. The validity and reliability of the instrument used in the present study was reasonable. The results were comparable with those found in other studies with respect to physical activity (Richardson *et al.*, 1995; Pols *et al.*, 1996; Pols *et al.*, 1997).

Furthermore, the psychological factors were measured with a very short questionnaire with single items. However, secondary analysis showed that these single-item assessments had significant and quite strong associations with exercise intentions (e.g. the correlation between self-efficacy and intention was 0.44). This is a clear indication of the relative validity of the assessments of the psychological factors. Self-rated physical activity was also assessed in a rather crude manner. Further research is therefore warranted to confirm the present findings with more extensive assessment instruments. Finally, the results were based on inhabitants of the Southern Limburg region and the response was not optimal. Our results may therefore not be representative of the general Dutch population, although regional differences

within a relatively small and generally affluent country like the Netherlands do not tend to be large. Furthermore, a response rate of 56% is quite acceptable for a mail survey (Miller, 1994).

Practical implications

Despite the above-mentioned limitations, some practical implications of the present study can be suggested. First of all, the substantial proportion of people who do not meet the minimum recommended physical activity levels confirms the need for public health initiatives aimed at getting people to increase their physical activity. But people who overestimate their level of physical activity may not be susceptible to interventions aimed at increasing their level of physical activity because they see no need to change. For this reason, improving physical activity awareness may be an important first step in physical activity interventions. Communication about the present recommendations accompanied by a self-test to assess one's own physical activity level may offer a good strategy for increasing this awareness. Furthermore, so-called computer tailored interventions are used nowadays to give people personalized advice on physical activity. Feedback on adequacy of current personal activity levels is often part of these tailored interventions (De Vries and Brug, 1999).

Further, health education aimed at encouraging people to increase physical activity levels should be aimed at more positive attitudes, at coping with an unsupportive social environment, and at increasing self-efficacy expectations, especially for people in the earlier stages of change. Attitudes may be influenced by communicating the possible benefits of physical activity. Apart from the longer-term health consequences, possible short-term benefits in particular should be emphasized (Baranowski *et al.*, 1997). This could include communications about physical activity, e.g. as a good way to meet people, and as a good way to cope with work stress and to feel better. In order to negate possible negative beliefs about physical activity, it may be important to emphasize that it is not necessary to engage in vigorous, continuous exercise to gain health benefits. As a way of increasing self-efficacy expectations, we may communicate that a moderate amount of physical activity can be achieved in a variety of ways, and that people may select activities that they enjoy, that fit into their daily routines, and for which no specific skills are

necessary. The above-mentioned implications for attitudes and self-efficacy expectations are very much in line with the recommendations based on data from the pan-EU consumer attitudinal survey (European Commission, 1999).

It has been postulated that the low and declining levels of physical activity in our modern society is caused primarily by environmental changes. Mechanization and automatization of transportation and labor, and urbanization with lack of opportunities to exercise in city environments have reduced our daily energy expenditure (Hill and Peters, 1998). Increasing awareness of individual exercise levels may motivate people in pre-contemplation, but in order to proceed to action and maintenance, environmental changes may also be essential.

In conclusion, the present study has provided some insights into the physical activity habits and the psychological determinants of increasing physical activity levels in an adult Dutch population. The study provides starting points for interventions aimed at increasing physical activity levels, and a base-line level from which to evaluate these interventions.

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