TNO Quality of Life

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Custom fit coaching based on motivation;
Personal Activity Coach Phase 1a

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Editor: M.W.A. Jongert
Author(s) E.C.P.M. Tak
I. Bakker
M. Stiggelbout
W.T.M. Ooijendijk
J. Hanemaaijer
M. Hopman-Rock

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# Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction</td>
<td>4</td>
</tr>
<tr>
<td>1.1</td>
<td>Background information</td>
<td>4</td>
</tr>
<tr>
<td>1.2</td>
<td>Personal Activity Coach project</td>
<td>4</td>
</tr>
<tr>
<td>1.3</td>
<td>Research areas</td>
<td>5</td>
</tr>
<tr>
<td>1.4</td>
<td>Project planning</td>
<td>5</td>
</tr>
<tr>
<td>1.5</td>
<td>Research Agenda phase 1a</td>
<td>6</td>
</tr>
<tr>
<td>1.6</td>
<td>Background information on the motivation area</td>
<td>6</td>
</tr>
<tr>
<td>1.7</td>
<td>Which information, regarding motivation, is essential in developing a Personal Activity Coach?</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>Background information on target groups</td>
<td>8</td>
</tr>
<tr>
<td>2.1</td>
<td>Introduction</td>
<td>8</td>
</tr>
<tr>
<td>2.2</td>
<td>Personal Activity Coach, developments in fitness industry as background for the selection of target groups</td>
<td>9</td>
</tr>
<tr>
<td>2.3</td>
<td>focus group interviews</td>
<td>12</td>
</tr>
<tr>
<td>2.4</td>
<td>Motives to start to run</td>
<td>12</td>
</tr>
<tr>
<td>2.5</td>
<td>Motives to keep up running</td>
<td>13</td>
</tr>
<tr>
<td>2.6</td>
<td>Personal Activity Coach</td>
<td>13</td>
</tr>
<tr>
<td>2.7</td>
<td>Conclusions target groups based on the information in chapter 3</td>
<td>13</td>
</tr>
<tr>
<td>3</td>
<td>Coaching process</td>
<td>15</td>
</tr>
<tr>
<td>3.1</td>
<td>Introduction</td>
<td>15</td>
</tr>
<tr>
<td>3.2</td>
<td>Coaching Process</td>
<td>16</td>
</tr>
<tr>
<td>3.3</td>
<td>Effective exercise programs</td>
<td>17</td>
</tr>
<tr>
<td>4</td>
<td>Review of the literature on Motivation: Methods</td>
<td>18</td>
</tr>
<tr>
<td>4.1</td>
<td>Search strategy of literature review</td>
<td>18</td>
</tr>
<tr>
<td>4.2</td>
<td>Selection criteria for theories/models and questionnaires</td>
<td>18</td>
</tr>
<tr>
<td>5</td>
<td>Results</td>
<td>21</td>
</tr>
<tr>
<td>5.1</td>
<td>Review of the literature</td>
<td>21</td>
</tr>
<tr>
<td>5.2</td>
<td>Selection of theories/models</td>
<td>21</td>
</tr>
<tr>
<td>5.3</td>
<td>Description of the selected theories</td>
<td>26</td>
</tr>
<tr>
<td>5.3.1</td>
<td>Self determination theory</td>
<td>26</td>
</tr>
<tr>
<td>5.3.2</td>
<td>Achievement Goal Theory</td>
<td>27</td>
</tr>
<tr>
<td>5.3.3</td>
<td>Trans Theoretical Model</td>
<td>30</td>
</tr>
<tr>
<td>5.3.4</td>
<td>Barriers and motives</td>
<td>32</td>
</tr>
<tr>
<td>5.4</td>
<td>Questionnaires</td>
<td>33</td>
</tr>
<tr>
<td>5.5</td>
<td>Possible strategies and tools for enhancing motivation and participation</td>
<td>35</td>
</tr>
<tr>
<td>6</td>
<td>Conclusions</td>
<td>38</td>
</tr>
<tr>
<td>6.1</td>
<td>Target groups</td>
<td>38</td>
</tr>
<tr>
<td>6.2</td>
<td>Motives to exercise</td>
<td>38</td>
</tr>
<tr>
<td>6.3</td>
<td>Desired PAC-functions</td>
<td>38</td>
</tr>
<tr>
<td>6.4</td>
<td>Price of PAC</td>
<td>39</td>
</tr>
<tr>
<td>6.5</td>
<td>Motivation</td>
<td>39</td>
</tr>
<tr>
<td>6.6</td>
<td>Added value motivational area to Personal Activity Coach</td>
<td>39</td>
</tr>
</tbody>
</table>
References

Appendices
A Terms
B List of questionnaires
C Overview of models
D Selected Questionnaires
E Example of coaching strategies directed at (perceived) barriers
1 Introduction

1.1 Background information

Increasing physical activity is a hot topic. Many people know that is important to exercise regularly, increasing fitness and health are important motives to start exercising. But it is difficult to fit regular exercise in to a busy schedule. Also it is difficult to change behavior over a long period of time. This leads to an increase in activities that can be fit in the daily schedules easily, like running in the lunch brake. Over the last decade there is an increase in participation in activities like fitness and running. In the Netherlands the amount of people participating in these events is estimated at more than two million people (in a population of 16 million). The large amount of people participating in these sporting activities makes it interesting for companies to develop (innovating) products and services for these target groups. The total amount of money being spent on sports products in the Netherlands is estimated at three billion euro a year, in Europe it is estimated at thirty billion euro.

1.2 Personal Activity Coach project

TNO is developing knowledge in the area of sports. Examples of such initiatives are programmes targeted at professional athletes for optimizing their training and performance. TNO combines its efforts for both professional and general sports in a business centre named TNO Sport.

Philips markets several products that are related to health, fitness and well being. These range from professional medical systems to consumer products. Philips Research locates its activities targeted at personal health, fitness and well being in the Personal Care Institute.

There is a close cooperation between TNO Sport and Philips Research in innovating technological equipment that can be used in exercise and sport. The Personal Activity Coach (PAC) is one of the projects in which TNO and Philips joint forces. The goal of the PAC-project is to develop a new generation of sports equipment that can be used to improve the training process of runners.

The current generation of sports equipment that are used by runners are devices like heart rate monitors. Beside monitoring heart rate these monitors can estimate energy expenditure, heart rate variability, running speed and –distance. The new generation products will have to help consumers to monitor their behavior and receive a personable coaching feedback.

Before the PAC device can be developed, produced and marketed, scientific knowledge in a number of research areas has to be developed. This knowledge will be developed in a project financially supported by the Dutch ministry of economics.

The PAC project will provide TNO with an internationally recognized leading position as a research and development institute for sport or fitness monitoring equipment and intelligent coaching devices.

The project will increase the technology position of TNO in the following areas:

• modeling of individual performance and fitness for amateur sportspersons;
• interpretation of multi-sensor physiological and motion measurements;
• translation of these models to a limited number of measurable parameters that can be combined into a practical product and provide real and long lasting value for the end user;
• motivational mechanisms for individual sportspersons, fitness amateurs and paramedical users;
• application of motivation mechanisms in wearable products.

The PAC-project expands the position of TNO in the area of sports, personal care, wellness and human performance modeling. Revenues will be generated through patents, licensing agreements and contract research.

1.3 Research areas

In the PAC-project the focus will be on three research areas: exercise physiology, biomechanics and motivation. A unique aspect of the PAC-project is the integration of the three mentioned research areas. The research areas will be addressed by a team from different participating organizations within TNO. Each area is directed by one of the participating organizations:
• Exercise Physiology by TNO Defense, Security and Safety (Soesterberg)
• Biomechanics by TNO Science and Industry (Eindhoven)
• Motivation by TNO Quality of Life (Leiden).

Motivation is used to summarize all aspects regarding to exercise behavior. In the PAC-project “motivation” is regarded as the stimulation of physical activity behavior by tailored coaching. Subjects that are included in this area are for instance behavioral change, attitude, social support, self-efficacy, goal setting, eliminating barriers, motivational aspects and preventing drop outs.

A number of issues is addressed as general subjects. These relate to all three main research areas. General subjects are:
• Training advice, this will be developed based on relevant parameters from all research areas;
• combined parameter interpretation, combining physiological, biomechanical and motivational parameters can lead to new information which can be useful in improving the training process;
• adaptive algorithms, can be developed to interpret data from its sensors automatically in the context of the user.

1.4 Project planning

The PAC Project is split up in three phases.
• Phase 1 basic research and development of models and algorithms;
• Phase 2 integration of parameters and models, validation and testing of models, building of a prototype that can be used in a fieldtest;
• Phase 3 product development, building of product concept and testing of these product concepts.

Phase one of this project contains two sub-phases, phase 1a and phase 1b.
1.5 Research Agenda phase 1a

In Phase 1a the focus will be on gathering background information that can be used to identify the target group and to optimize the training process. In advance the following goals have been set for the area Motivation in phase 1a of the PAC-project:

1. Identification of the target groups;
2. determination of motivational parameters in the target groups;
3. development of a model of behavioral determinants for exercise/sports participation in the target groups;

1.6 Background information on the motivation area

In the development of sport products and services the behavioral change and motivation are (at this point) aspects that are underexposed. Although runners can find useful information, like exercise schedules, and measuring devices are available there is no possibility to find custom fit coaching in which behavioral change and motivational aspects are integrated. It is a challenge in the PAC-project to integrate these aspects in the coaching process. The goal is to develop a coaching strategy in which user characterization takes place and in which the coaching style adapts to specific goals, motivational aspects, barriers, stages of change and self-efficacy. In the PAC-project we try to give a new impulse to changing exercise behavior. Innovative aspects are:

- integrating custom fit motivation in the training process;
- determining what is necessary to motivate people during a training process;
- the use of measuring instruments and feedback to change behavior and increase exercise performance.

As earlier mentioned motivational aspects will be integrated with exercise physiology and biomechanics.

1.7 Which information, regarding motivation, is essential in developing a Personal Activity Coach?

It is important to gather information of the target group. Which runners are potential PAC-user? What are the goals/motives of these runners? What information do they need, before, during and after exercising? In optimizing an exercise training one should have knowledge of the training process, to which conditions an effective exercise program should comply. It is also important to get a good insight in goals and motives of the individual PAC-user. For instance it is important to know if a user is task or goal oriented, internal or external motivated. One should know what the perceived barriers are. It is known that changing behavior is very difficult, many people who try to change exercise behavior can not comply over a long period of time. So the process of changing behavior should be planned carefully. In changing behavior aspects as attitudes, social influences and self efficacy are important. It is also known that people go through different stages in changing exercise behavior. In each stage different information is necessary. It is important to know which information should be given in which stage of change.
This report contains the deliverables of the Personal Activity Coach project phase 1a regarding motivation.

In this document you will find:
• background information of the target groups, based on both literature and on (the at this point available preliminary) results of focus group interviews;
• a description of the training process, a list of conditions to which an effective exercise program should comply;
• tips to prevent dropping out of exercise based on available knowledge;
• a review of the literature on motivation to exercise;
• an overview of questionnaires for measuring motivation;
• an overview of the possible strategies and tools for enhancing motivation and participation;
• an overview of selected questionnaires.
2 Background information on target groups

2.1 Introduction

Choosing the right target group was an import part of the first phase of the PAC-project. In the project group it was recognized that the choice of the target group is of vital importance for the success of the personal activity coach. In the PAC-project group different user profiles have been described. The profiles are based on fitness level and motivation. These profiles are positioned along two axes in figure 2.1.

After a long discussion in the PAC-project group the semi-inactives and the dissatisfied exercisers are chosen as the main target groups. These are described as those who like to exercise (or start to exercise) for at least twice a week. Running is chosen as the main sporting activity. Improving physical fitness and performance are chosen as the most important goals for exercising (in the PAC-project group).

From a marketing point of view the “coach potatoes”, weight management group, elderly and people with a chronic disease are not chosen in the PAC-project. From a public health point of view these target groups are however of great importance.

Useful information on target groups is found in research in the fitness industry and from a health and fitness survey in the United Kingdom. Besides the literature search we also used focus group interviews to gather information on the target groups.

Information was gathered about:
- the profile of potential PAC-users
- opinion on exercise
- motives for exercising
- barriers
- exercise frequency

But first of all we focus now on the useful information coming from research in the fitness industry.
2.2 Personal Activity Coach, developments in fitness industry as background for the selection of target groups

Fitness is ranked in the top five of most popular sports. Insight in results of research and recent developments can be helpful in selecting specific target groups for the Personal Activity Coach. It gives insight in trends and motivational aspects. It also gives valuable information about the magnitude of the potential target groups. Information is used from both Dutch and international research (ie United Kingdom).

In the Netherlands a advertising company has described recent trends in fitness. In the fitness industry there is a growing attention for the “wellness concept”, which is a combination of fitness en wellbeing. We see a growing need for individualism, which is characterized by self development and internal reflection (Vink, 2003). Social networks develop among individuals with the same interest. In these networks mobile telephones, sms, email are important means of communication, we experience events together with friends (together experience). Life is like a long exciting journey in which one adventure follows an other. There is no time for boring experiences. We use the remote control to zap to the next experience.

In the Netherlands 89% of the people considers health a very important issue (Vink, 2003). Three target groups are being defined for the Fitness industry (Vink, 2003), which differ from the earlier described target groups in the PAC-project. These Fitness target groups are:

1 Pay & Play: busy and fanatic.
This group has a need for good and fanatic individual coaching. High demands on sporting knowledge, professional equipment and a need for functional accommodation.

2 Join & Relax: exercise for fun and relaxation, it is healthy and enjoyable.
Focus on social and mental wellbeing. This group has a need for a wide range of exercise and relaxation variations. They have a need to meet other people, social interactions are important, professional equipment goes without saying. High demands on social skills of the coach. These individuals like to be part of a team.

3 Care & Cure: physical problem. Emphasis on physical and mental health.
High demands on medical knowledge, individual support and coaching towards rehabilitation or health improvement. Equipment must meet the appropriate (“medical”) standards. Accommodation must be almost medical.

In the United Kingdom findings from the Health and Fitness Omnibus Survey gives a picture of the expectations of the public when it comes to health and wellbeing (HAFOS, 2003). Hafos is being presented as the only regular survey of “non-user” opinion, 2000 samples across 23 cities throughout the United Kingdom. Sample is slightly “female” and 18-34 years biased. Exercise/activity are used interchangeable.

Important findings of the survey (www.exerciseregister.org):

What do people believe about activity/exercise?

• 84% of the population think that regular exercise is important or very important;
• older people place a greater importance on regular exercise compared to younger people. 63% of 65-74 year olds and 70% of those aged 75 rated it as very important compared tot 54% of other age groups;
• 54% of the population think that they probably or definitely don’t exercise enough at the moment (45% male, 56% female);
• 54% of the people say they would like to do more exercise/activity, this decreases with increasing age (15-24 years: 60%, > 75 years: 27%) 
• 46% of the people say they don’t want to do more. There is more information available on the motivation not to want to exercise more. The motivation differs in the different age categories.

<table>
<thead>
<tr>
<th>Age group (years):</th>
<th>Most important motivations:</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-34</td>
<td>No time</td>
<td>28%</td>
</tr>
<tr>
<td></td>
<td>Not interested</td>
<td>14%</td>
</tr>
<tr>
<td>35-54</td>
<td>No time</td>
<td>32%</td>
</tr>
<tr>
<td></td>
<td>Not interested</td>
<td>22%</td>
</tr>
<tr>
<td>55-75</td>
<td>Feel I’m doing enough already</td>
<td>28%</td>
</tr>
<tr>
<td></td>
<td>No time/ not interested</td>
<td>16%</td>
</tr>
<tr>
<td>&gt; 75</td>
<td>Health disability problems</td>
<td>44%</td>
</tr>
<tr>
<td></td>
<td>Feel I’m doing enough already</td>
<td>31%</td>
</tr>
</tbody>
</table>

**How much they exercise:**
• 9% of the people are saying they are undertaking 5 or more 30 min sessions of moderate activity per week; 
• 31% of the people are saying they are undertaking 3 or more 30 min sessions of moderate activity per week;

**Type of Exercise:**
• 46% of independent exercisers use walking/jogging (51% of woman); 
• 15% of independent exercisers use home based exercise equipment (9% male, 20% female); 
• 60% of the respondents want more exercise facilities linked to their work;

**Perception of lifestyle factors**, importance in terms of healthy lifestyle:
1. Not smoking 35 %
2. Healthy diet 29 %
3. Exercise 21 %
4. Not being stressed 11 %
5. Not drinking 4 %

Nearly 60% of the people felt it was up to them to take responsibility for their health and fitness and push for changes that would improve their lifestyle habits. Just 2% thought this was the government’s responsibility.

**Intention to increase activity/exercise levels in near future:**
• 27% of the people said it is quite or very likely 
• 58% of the people said it is quite or very unlikely
How are they going to increase exercise/activity levels?
1. Home based activity bij themselves 35% (male 30%, female 38%);
2. Local leisure centre casually 30% (male 34%, female 28%);
3. Joining a private club or fitness centre 16%

Reasons for not joining a private or fitness centre:
1. Costs 34 %
2. don’t feel the need 14 % (male 20%, female 11%)
3. not convenient 12 %
4. To much commitment 9 %
5. intimidating 8 % (male 5%, female 9%)

What factors would help you to keep using?
1. seeing results within 4 weeks 47%
2. individual personal training 32%
3. regular supervision/contact 30%

Top three massages from HAFOS:
1. the basic awareness and education job has been done, people know that it is important that they should be exercising.
2. half of the ‘non-active’ population recognize they aren’t doing enough at the moment and say they want to do more.
3. however there is still a lack of understanding about how much (or little) they need to do to gain health benefits, and how extensive those benefits are;

Technogym (Massrini, 2003) stresses the importance of the special populations for the fitness industry. The Market segment > 55 years has been growing four times as fast as the young adult segment (18-34 years) and represents 23% of the total population. Opportunities are the increasing health consciousness and the increase in free time. In the coming years (until 2010) it should be possible to double the size of the fitness market due to:
• age wave
• special populations
• the benefits of exercise
• interaction with health care industry
• easy access of facilities

Estimating numbers in percentage of the population:
Obesity 10 %
Overweight 35 %
Cardiac disease 10 %
Osteoarthritis 10 %
Diabetes 5 %
focus group interviews

Besides the information found in relevant literature we also use focus group interviews to gather information on the target groups. In this report you will find the preliminary results of these interviews. A complete report of the focus group interviews will be published during fase 1b of the PAC-project.

<table>
<thead>
<tr>
<th>Focus group</th>
<th>Age average</th>
<th>Ranging from</th>
<th>Male</th>
<th>Female</th>
<th>Activity level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual runners</td>
<td>38,4 years</td>
<td>19 to 61 years</td>
<td>9</td>
<td>8</td>
<td>The activity level of the participants is quite different. The experiences with running vary from one month to twenty years and five marathons.</td>
</tr>
<tr>
<td>Leiden Road Runners Club 1</td>
<td>59,3 years</td>
<td>40 to 77 years</td>
<td>7</td>
<td>3</td>
<td>Most of the participants run more than once in a week and are able to run ten kilometres ranging from 37 minutes to 57 minutes.</td>
</tr>
<tr>
<td>Leiden Road Runners Club 2</td>
<td>40,3 years</td>
<td>29 to 56 years</td>
<td>5</td>
<td>4</td>
<td>Most of the participants run more than once in a week and have 3 to 20 years running experience.</td>
</tr>
<tr>
<td>Loopgroep Oegstgeest</td>
<td>38,4 years</td>
<td>31 to 50 years</td>
<td>3</td>
<td>7</td>
<td>Six participants took part in one or several marathons. Most participants run twice a week and one participant started to run in November 2004.</td>
</tr>
<tr>
<td>Leiden Atletiek</td>
<td>44,8 years</td>
<td>28 to 56 years</td>
<td>9</td>
<td>4</td>
<td>Most participants are experienced runners. They run 10 up to 30 years. Half of the group did take part in a marathon. They run 10 kilometres in 35 up to 50 minutes.</td>
</tr>
<tr>
<td>Nike start to run</td>
<td>32,7 years</td>
<td>21 to 48 years</td>
<td>1</td>
<td>12</td>
<td>Half of the group started to run in September 2004, the others started in January 2005. All participants started with the help of the course Start to run, a initiative of Nike.</td>
</tr>
<tr>
<td>Total</td>
<td>44,2 years</td>
<td>19 to 77 years</td>
<td>34</td>
<td>38</td>
<td>→ 72 runners</td>
</tr>
</tbody>
</table>

Background characteristics of the participants

2.3 Motives to start to run

Each motive is mentioned as a motive to start to run. Except for the fifth and sixth motive, each motive is mentioned in each focus group.

1. To stay healthy
2. To loose weight
3. To perform
4. To enjoy running
5. To distress
6. To have a social experience
2.4 Motives to keep up running

In this phase (maintenance), the motives to run are changed. The enjoyment of running is necessary to keep it up, according to the runners. Besides, a sense of achievement has become much more important in this phase. Runners who run at Leiden Atletiek, Leiden Road Runners Club or Loopgroep Oegstgeest have great support of the sociability of running with others.

2.5 Personal Activity Coach

Many runners are not well informed about the present supply of heart rate monitors. In addition, they have little knowledge of the possibilities of these appliances. The participants are mainly interested in functions, which support the achievement and health of the runners. They would like information about their heart rate, calories, fat, dehydration, distance and speed (also resulting in lap times). Individualized trainings schedules are also in demand. Various other demanded applications are a weather report (incl. information about humidity), MP3-player and vocal support.

Trainers are interested in a product, which gives all possible information. A route planner and the possibility to upload and download trainings schedules are at the head of the list (of the trainers).

Each focus group made demands on the user-friendliness of the PAC. It must be possible to use it without reading the manual. To meet their wishes a option would be to create a modular appliance. This supports the user-friendliness and prevents buying an appliance with functions half of the people will not use (MP3-player for example).

Price
The suggested prices of the PAC differ from €100,- up to €500,-. The price is dependent of the possibilities of the appliance. Runners who are not willing to pay more than €100,- often do not like the overwhelming possibilities of the PAC. Other disagree and would pay €200,- up to €300,- if the economic life span is up to three/four years. GPS is mentioned as a extra feature for which one wants to pay extra.

The trainers are willing to pay extra for the PAC, they would pay up to €500,-.

2.6 Conclusions target groups based on the information in chapter 3

Based on results of research in the fitness industry and on results form the HAFOS it can be concluded that health is an important factor in de Fitness (Wellness) industry. Exercise is considered one of the most important lifestyle factors.

It was also recognized that there is a growing need for individualism, which gives support for the choice of a sporting activity that can be done alone (like running). Social networks develop among individuals with the same interest. The use of mobile phones, sms and email are important means of communication to share experiences.

*Potential PAC customers are the people that:*
- recognize that they are not doing enough
- know the health benefits
- want to do more
- want to do this by home based activities
54% of the population say they would like to do more exercise/activity.  
27% said it is (quite or very likely) they will increase exercise/activity level in the near future. 
35% of the latter category will increase activity by home-based activity.  
31% of the people are saying they are undertaking 3 or more 30 min sessions of moderate activity per week. Based on this information they would be part of the chosen target group of the personal activity coach.

The results of the focus group show that motives to start running differ from the motives to keep on running. So in time the motives of potential PAC-users are likely to change.
Increasing performance is mentioned as one of the most important motives, but not as the most important. Therefore it should not be regarded as the main focus in the PAC-project.  
User-friendliness is mentioned as an important factor, easy to use, not getting redundant information is being mentioned.

The potential PAC-users mentioned a wide variety of desired functions. The most important functions are those who are useful in improving performance and health. Also mentioned are functions like weather report, music (MP3), vocal support. Trainers are in need of devices with extended functions. It could be an option to develop a special PAC for trainers, which is able to communicate with the PAC of pupils.

The amount of money the potential PAC-users are willing to spent ranges from €100 to €300 euros. Trainers are willing to spent more, up to €500 euros. If advanced features like MP3 or GPS is included one is willing to spent more, about €50 more.

Based on the information of the focus group interviews it should be wise to consider a range of products with different prices and features in stead of one PAC. This situation is comparable with the product line of heart rate monitors.

At the end of this chapter we can conclude that the choices made by the project group are partially confirmed by the information found in focus group interviews and literature.

It is important however to state that staying healthy and losing weight are important exercise motives. The chosen target groups are important and represent a significant part of the population. However one should not forgot that also target groups like the weight management group, elderly and people with a chronic disease are of interest. Both from a public health point of view and from a marketing point of view. Maybe these target group could be focused on in a other project.
3 Coaching process

3.1 Introduction

The coaching of athletes is a difficult process, especially when one tries to individualize the training process. The coaching process has been simplified a little by limiting the goals to improving sports performance. Improving health, losing weight, distressing and the need for social contacts are not chosen as the main targets of exercising. However improving performance is still a very complex process. The performance of an athlete is the result of a complex blend of factors (McDougall et al, 1990). A simplified model summarizing some of these factors is presented in figure 3.1

*Figure 3.1. Factors in Athletic Performance (McDougall et al, 1990)*

Perhaps the major factor determining athletes potential to excel is genetic endowment, which includes factors like anthropometric characteristics, inherited capacities (endurance and strength), muscle fiber proportions but also the capacity to improve with training. Besides that training and also nutritional status, injuries en fatigue are factors of importance (McDougal, 1990).

Although little can be done to alter what has been determined by heredity one can optimize the training process. The personal activity coach is being developed to suggest optimal training strategies for athletes according to their goals, motivation and present performance.
3.2 Coaching Process

In this report the focus is on changing exercise behavior and motivational aspects. However to optimize coaching it is necessary to describe the coaching process in more detail.

At the start of the training process it is necessary to determine the starting point in an intake. This intake includes determining:

- present level of physical activities;
- goals/motives for exercising;
- barriers;
- stages of change (see later in this report);
- level of self-determination (see later in this report);
- motivation type: task/ego orientation, internal/external motivation (see later in this report);
- self-efficacy;
- available time;
- exercise preferences.

Based on the results realistic goals will be formulated and exercise activities will be chosen.

If necessary barriers will be eliminated. Information will be given based on the present stage of change. Based on the available information a exercise schedule will be designed. This will contain a description of exercise variables like, frequency, duration and intensity of training.

Also the coaching style and type of feedback will be chosen. This means that it should be determined on what parameters the feedback should be focused, both during and after exercising. Also it should be determined what the optimal way is to give the desired feedback.

The total effort of training sessions, the training “dose”, should be quantified and if possible be related to the training response. In quantifying the total effort factors like duration and intensity of the effort should be included.

In the longer run improvements in performance should be monitored and drop out should be prevented. A important reason for drop outs seem to interruptions lasting several weeks. These interruptions can be caused by holidays, disease, lack of time to exercise and injuries.

The training process is presented in figure 3.2.

Figure 3.2 a description of the training process

The training process will be described in more detail in phase 1b of the PA-project. In Phase 1b we will also describe specific scenario’s based on different results of baseline measurements.
3.3 Effective exercise programs

An effective exercise program is a program which leads to the desired goals with a minimal amount of effort. To optimize the training process guidelines can be used to design an effective exercise program. Especially for this purpose a check list is designed. This check list contains conditions to which a effective exercise program should comply. This list is based on scientific research (Leon, 1997). An effective exercise program should:

- connect to the stage of change
- increase the self-efficacy
- eliminate barriers
- increase social support
- feel save
- have the right intensity, training intensity must not be to high
- avoid injuries and other causes of drop out
- be enjoyable
- give insight in the improvements
- be easy to comply
- give possibilities to train together with other people (buddies)
- be easy to fit in to the daily schedule
- not have much negative consequences (unacceptable time loss, negative reactions)
- not ask for unacceptable offers (financially and socially)

This checklist can be used to check the exercise programs, which are designed by the PAC.

Some of the key aspects described in this checklist will be explained in more detail in the review of the literature on motivation (see chapter three).
4 Review of the literature on Motivation: Methods

4.1 Search strategy of literature review

In order to find the relevant literature on motivation for exercise a search strategy was developed which consisted of:

1. Development of a list of relevant terms for physical activity/exercise, motivation (including possible determinants) and contents (model/theory and questionnaires).
   For a complete description of the list of terms see appendix A.

2. Selecting relevant sources
   a. electronic databases: Medline, Psyclit, internet
   b. search by hand in own database on PA
   c. cross-references of selected references
   d. recent handbooks

3. Selection criteria to include articles
   a. in English or Dutch
   b. review (systematic review, meta analysis or general review) or comparative studies of theory of motivation and/or behavioral determinants for physical activity/exercise
   c. development or validation of a questionnaire to evaluate motivation and/or behavioral determinants for physical activity/exercise
   d. concerning target groups

4. On the basis of the information mentioned in the abstract relevant articles were selected for further review and were categorized according to the theories/models evaluated.

4.2 Selection criteria for theories/models and questionnaires

The findings of all relevant articles were summarized. Selection of relevant models/theories and questionnaires was made according to the flowchart in figure 4.1.

First, a list was compiled of all theories/models and questionnaires mentioned in the selected articles. Secondly, information concerning these theories/models was summarized according to six relevant characteristics. When not enough information was available in the selected articles theories/models were dropped from the review.

Third, when there was sufficient evidence of the applicability of the theory/model in the field of motivation for physical activity, information was gathered to evaluate each theory according to the criteria set by the PAC project. These criteria are mentioned in box 4.1.
Figure 4.1  Flowchart for selecting theories/models and questionnaires

<table>
<thead>
<tr>
<th>Questionnaires</th>
<th>Theory/Model</th>
<th>Selection Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>All mentioned questionnaires</td>
<td>All mentioned theories/models</td>
<td>Evidence on PA</td>
</tr>
<tr>
<td></td>
<td>Described Theories/Models</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. approach</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. main (or first) author</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. determinants of behavior</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. evidence in the field of physical activity</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. factors that influence targeted behavior</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6. relevant instruments to measure determinants of the theory/model</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Relevant Theories/Models</td>
<td></td>
</tr>
</tbody>
</table>
**Box 4.1 criteria for applicability of theory/model in the PAC project**

<table>
<thead>
<tr>
<th>Criteria for theory/ model</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Scientific evidence on validity of theory/ model must be available</td>
<td></td>
</tr>
<tr>
<td>2. Theory/ model must be useful with target group (exclusion of couch potatoes, elite runners, non-contemplators, amotivators)</td>
<td></td>
</tr>
<tr>
<td>3. Information on coaching-strategy and/or tools within the theory/ model must be available</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Criteria for measurements</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Valid and useful measurements based on the theory/ model must be available</td>
<td></td>
</tr>
<tr>
<td>5. Practical use of the measurement(s) based on the theory/ model:</td>
<td></td>
</tr>
<tr>
<td>a. Restricted amount of questions:</td>
<td></td>
</tr>
<tr>
<td>i. At baseline (exceptional): maximum of 15 minutes needed for answering questions (current state of fitness, current state of motivation, etc)</td>
<td></td>
</tr>
<tr>
<td>ii. After/ before each training session (regular): maximum of 5 minutes needed for answering questions</td>
<td></td>
</tr>
<tr>
<td>b. Questions are comprehensible for the majority of the PAC interested subjects</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Criteria for Computer Adaptive Testing</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>6. Option for a 1-dimensional interpretation of (part) of theory/model for CAT use</td>
<td></td>
</tr>
<tr>
<td>7. Useful databases (no copyright) containing data from questions based on the theory/ model must be available</td>
<td></td>
</tr>
<tr>
<td>8. CAT database must contain sufficient items (&gt;30) that are sufficiently discriminating, to be able to select the best predictive and discriminating items</td>
<td></td>
</tr>
</tbody>
</table>

Theories that complied with these criteria were then selected and described in further detail. At this stage, questionnaires were evaluated, that measured relevant determinants of the selected theories/models.
5 Results

5.1 Review of the literature

In total 1000 citations were identified via the several sources of which around 200 articles were selected for inclusion in the review. In table 5.1 theories and models are stated that were mentioned in the selected literature. Appendix B contains mentioned questionnaires. Next theories/models were further described according to relevant characteristics if enough information could be found in the selected literature. Appendix C contains this overview.

<table>
<thead>
<tr>
<th>Models and theories mentioned in the selected literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Achievement Goal Theory</td>
</tr>
<tr>
<td>Elaboration Likelihood Model</td>
</tr>
<tr>
<td>Equity Theory of Motivation</td>
</tr>
<tr>
<td>Exercise and Self-Esteem Model</td>
</tr>
<tr>
<td>Health Belief Model</td>
</tr>
<tr>
<td>Hierarchical Model of intrinsic and extrinsic Motivation</td>
</tr>
<tr>
<td>Locus of Control</td>
</tr>
<tr>
<td>Protection Motivation Theory</td>
</tr>
<tr>
<td>Reversal Theory</td>
</tr>
<tr>
<td>Self Determination Theory</td>
</tr>
<tr>
<td>Self Efficacy</td>
</tr>
<tr>
<td>Social Cognitive Theory</td>
</tr>
<tr>
<td>Stages of Change</td>
</tr>
<tr>
<td>Subjective Expected Utility Theory</td>
</tr>
<tr>
<td>Theory of Reasoned Action and Planned Behavior</td>
</tr>
<tr>
<td>Trans Contextual Model</td>
</tr>
<tr>
<td>Trans Theoretical Model</td>
</tr>
<tr>
<td>Triandis Model</td>
</tr>
</tbody>
</table>

Italic printed models were not further described because of lack of information

5.2 Selection of theories/models

On the basis of the available evidence in the field of physical activity a second selection was made. This selection second contained four models which all had been extensively studied in the field of physical activity, exercise and sports. The four theories are:

- The Theory of Reasoned Action and Planned Behavior (TRA/TPB) by Ajzen (1988)
- The Trans Theoretical Model (TTM) by Prochaska and DiClemente (1983)
- The Self Determination Theory (SDT) by Deci and Ryan (1985)
- The Achievement Goal Theory (AGT) by Nicholls (1984)

Next to these theories, the a-theoretical approach of motives and barriers was also further looked into. A list was compiled with the most mentioned motives and barriers for physical activity and exercise.

A second overview was made on basis of criteria to identify useful theories for the goal of the project. Table 5.2 compares the four selected theories on these criteria.
### Table 5.2  Comparison of four theories on criteria for the PAC project

<table>
<thead>
<tr>
<th>Model/theory</th>
<th>CAT compatible</th>
<th>Evidence in PA</th>
<th>Target Population</th>
<th>Possible intervention strategies</th>
<th>Instruments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Self Determination Theory (SDT)</strong></td>
<td>Both extrinsic and intrinsic are viewed as multidimensional constructs. With regard to the continuum of self-determination the BREQ also allows for combining subscales into a Relative Autonomy Index (Ryan &amp; Connell, 1989) which can be viewed as an one-dimensional instrument although this is not equal to the concept of motivation. The SDT has been reviewed and evaluated with large scale studies, albeit with different instruments. Availability is not yet known. No information on number or quality of items in databases</td>
<td>Intrinsic motivations increase in later stages of change, extrinsic in earlier; Internal motives lead to a stronger intention and higher level of PA</td>
<td>Self determination (intrinsic motivation and/or identified/integrated regulation); Self-determined regulation (=intrinsic or integrated/identified regulation) lead to positive cognitive (e.g. high concentration), affective (e.g. enjoyment) and behavioral (e.g. persistence) outcomes</td>
<td>Intervention Internalization enhancing strategies Autonomy-supportive social contexts Tools Interest enhancing strategies (IES) Future intrinsic goal framing</td>
<td>BREQ (Mullan e.a., 1997); SMS (Pelletier et al. 1995).</td>
</tr>
</tbody>
</table>

According to Ntoumanis (2001) none of the existing sport motivation questionnaires assesses the integrated regulation dimension.
<table>
<thead>
<tr>
<th>Model/theory</th>
<th>CAT compatible</th>
<th>Evidence in PA</th>
<th>Target Population</th>
<th>Possible intervention strategies</th>
<th>Instruments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trans Theoretical Model (TTM)</td>
<td>the level of physical activity as categorized in the stages of change could be considered 1-dimensional no information on availability and quality of databases</td>
<td>Pros increase across stages, con's decrease SE increases in later stages Successfully applied to exercise behavior change</td>
<td>preparators, actioners, maintainers (excl. the elite runners); Enable interventions to attune to stage of readiness for exercise</td>
<td>Intervention Use of cognitive/ experiential and behavioral processes for obtaining a forward move in stages (see processes of change document) See table 2 hand-out feb 17: stages of change model (interventions for each stage, processes of change and decisional balance)</td>
<td>SOES (Cardinal, 1995). GLTEQ (Godin &amp; Shephard, 1985);</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Tools See table 2 hand-out feb 17</td>
<td></td>
</tr>
<tr>
<td>Model/theory</td>
<td>CAT compatible</td>
<td>Evidence in PA</td>
<td>Target Population</td>
<td>Possible intervention strategies</td>
<td>Instruments</td>
</tr>
<tr>
<td>--------------</td>
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<td>--------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Achievement Goal Theory (AGT)</td>
<td>With regard to the continuum of Task and/or Ego orientation – using the TEOSQ – individuals may be high on Task and low on Ego, but also High on Task and high on Ego orientation. It is a multidimensional interpretation. No information on availability or quality of databases.</td>
<td>Task oriented individuals tend to exert more effort, choose moderately difficult tasks and persist more, even in failure conditions. Ego oriented individuals tend to withhold effort when success appears not to be within reach, choose tasks that are too easy or too difficult and quit after failure.</td>
<td>An individual adopts the goal that most closely reflects his or her cognitive belief about what is required to maximize achievement in that specific social context.</td>
<td>Intervention&lt;br&gt;Mental imagery:&lt;br&gt;↑ modify cognitions&lt;br&gt;↑ regulate arousal&lt;br&gt;↑ regulate anxiety levels&lt;br&gt;↑ influence skills and performance of skills &amp; strategies&lt;br&gt;Description of mastery (task-oriented) and performance (ego-oriented) climates (TARGET)&lt;br&gt;Goal profiling&lt;br&gt;Tools&lt;br&gt;Cluster analysis is used to create goal profile groups&lt;br&gt;Application of the TARGET structure&lt;br&gt;Tasks / Authority / Recognition / Grouping / Evaluation / Time (Ntaumanis &amp; Biddle, 1999)</td>
<td>AGQ: S (Conroy e.a., 2003);&lt;br&gt;BACSSQ (White e.a., 2004);&lt;br&gt;TEOSQ (Duda &amp; Nichols);&lt;br&gt;PMCSQ-2 (Seifriz e.a., 1992);&lt;br&gt;POSQ (Roberts e.a., 1998)</td>
</tr>
<tr>
<td>Model/theory</td>
<td>CAT compatible</td>
<td>Evidence in PA</td>
<td>Target Population</td>
<td>Possible intervention strategies</td>
<td>Instruments</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
<td>-----------------------------------------------------</td>
<td>-----------------------------------------------------</td>
<td>-------------------</td>
<td>----------------------------------</td>
<td>------------------------------------------------</td>
</tr>
<tr>
<td>Theory of reasoned action and planned behavior</td>
<td>databases available but not for target population</td>
<td>Meta-analysis (Hausenblas e.a., 1997) + Hagger e.a., 2002)</td>
<td>?</td>
<td>?</td>
<td>Scale for measuring attitude, beliefs, perception of control and intention to exercise (Kemer &amp; Grossman, 2001)</td>
</tr>
<tr>
<td></td>
<td>1-dimensionality of ‘intention’ not known</td>
<td>Intention most strongly affected by attitude PBC direct influence on behavior if actual control involved 25-25% intention explained variance</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
This second comparison revealed that with the exception of the Theory of Reasoned Action and Planned Behaviour (TRA/TPB) all the theories complied with the criteria in the PAC project. The TRA/TPB is an extensive and reliable theory in explaining health behaviour but did not have a direct link with available intervention and strategies. Furthermore no instrument could be identified which could be easily administered to evaluate the determinants of physical activity. It also proved to be difficult to identify the target population of the PAC project in terms of the determinants.

The other three theories could well be used in the project. Of the three theories only the SDT showed a possible compatibility with the CAT system although the construct of self determination is not equal to motivation. All three theories will be more extensively explained in the next section.

5.3 Description of the selected theories

5.3.1 Self determination theory

Figure 5.2 summarizes the central concepts of the Self Determination Theory.

Figure 5.2  Self Determination (Theory Deci & Ryan, 1985)

<table>
<thead>
<tr>
<th>Amotivation</th>
<th>Extrinsic motivation</th>
<th>Intrinsic motivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>The absence of motivation towards an activity</td>
<td>External regulation</td>
<td>Introjected regulation</td>
</tr>
<tr>
<td>• capacity-ability beliefs</td>
<td>To receive a reward or avoid punishment</td>
<td>Incomplete internalization of a regulation that was previously solely external</td>
</tr>
<tr>
<td>• strategy beliefs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• capacity-effort beliefs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• helplessness beliefs</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O.K. I’ll exercise if I really must</td>
<td>I feel guilty if I don’t exercise</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Continuum of self determination

Low………………………………………………………………………………………………………………………High

According to the theory people can be characterized by their level of self determination to perform a certain activity. In self-determination theory, extrinsic and intrinsic motivation are assumed to fall along a continuum. At the one end lies amotivation, the absence of motivation toward an activity. In the middle lies extrinsic motivation, this is viewed as a multi-dimensional construct existing of four stages. The purest form of external motivation is called external regulation and indicates that an individual engages in a behavior solely to receive a reward or avoid punishment. In the field of physical activity this could be a person who exercises because his physician told him so. Introjected regulation represents the incomplete internalization and identified regulation
the introduction of free choice but for external reasons. Intrinsic motivation represents complete self determination and doing activities solely for it’s pleasure. This has been divided in three forms why people enjoy activities: to learn something new (knowledge), to accomplish some task and to get stimulated (e.g. experience pleasant sensations derived from the activity itself). Research has shown that intrinsic motives lead to a stronger intention and higher level of PA and a longer time spent (Chatzisarantis & Biddle, 1998).

Intrinsic goals are theorized to be congruent with actualizing and growth tendencies and SDT proposes that intrinsic goal pursuits have positive effects on well-being because they promote satisfaction of the basic psychological needs for:

- autonomy: efforts to determine ones own behavior
- competence: striving to experience effectance
- relatedness: attempting to have a satisfying and coherent involvement with others

In contrast, extrinsic goal pursuits are often oriented toward the attainment of external indicators of worth in order to compensate for a lack of basic need satisfaction. As a consequence, extrinsic goal striving often entails stressful interpersonal comparisons and may require the contingent approval of others, both of which are likely to undermine ones sense of well-being. Various studies have shown that intrinsic (relative to extrinsic) goal pursuit is associated with various benefits to well-being (Kasser & Ryan, 1996, McHoskey, 1999).

Autonomy supportive contexts are associated with:

- higher exercise enjoyment
- more effort expenditure
- a stronger intention to exercise
- better performance
- more intensive voluntary persistence at exercises (Vansteenkiste e.a., 2004)

**Implications of Self Determination Theory for Exercise and Physical Activity/PAC**

Individuals are intrinsically motivated to move toward situations and experiences that will satisfy basic needs of autonomy, competence and relatedness. Social factors that are generally perceived as supportive of ones feelings of autonomy, competence and relatedness will have a positive impact on one’s motivation vice versa. Increasing athletes motivation can be done by modifying social factors known to affect motivation such as coaching style behavior (e.g. autonomy supportive). (Vallerand & Losier, 1999)

Duda (1992) claimed that the extrinsic motivation is the most important motivation in sport involvement. It will have a relatively high probability in the formal setting (club/association-based sports participation). Extrinsic motivation has a relatively lower probability in the informal settings (informal sports participation). (Recours et al., 2004)

**5.3.2 Achievement Goal Theory**

Achievement behaviour is a function of the personal meaning an individual assigns to perceived success and failure. Nicholls identified two achievement goals that determine the kind of experiences individuals have in achievement settings:
A. goal orientations: an individuals’ personal definitions of success
   1) task orientation (a.k.a. task goal, mastery goal): view that success is achieved when a person exhibits maximal effort and focuses on personal improvement and mastery of tasks over time. characterised by:
      a. when effort is implied, competence will be achieved;
      b. orients an individual toward the development of potential which can be measured though personal improvement, learning and mastery of the task;
      c. improve their competence for intrinsic values;
      d. individuals tend to exert more effort, choose moderately difficult tasks and persist more, even in failure conditions.
   2) ego orientation (a.k.a. ego goal, performance goal): view that success is dependent upon favourable normative standing among peers. Winning and favourable outcomes (demonstrating superiority or showing high normative ability with low effort) rather than effort and improvement are the important markers of success for these individuals. Underlying concern with the demonstration of competence or the avoidance of being judged. Characterised by:
      a. demonstration of ones high ability and avoidance of demonstrating comparative low ability
      b. positive evaluation of ones competence is only possible if ones performance compares favourably with that of others
      c. success stems primarily from the possession of comparatively high ability (and less from effort)
      d. most threatening is expending maximum effort, with failure as a result
      e. protecting self worth is important
      f. individuals tend to withhold effort when success appears not to be within reach, choose tasks that are too easy or too difficult and quit after failure

Goal orientation is a relative stable, orthogonal construct (an athlete can be high in both, low in both or high in the one and low in the other).

B. perceptions of the motivational climate: refers to the situational goal structures perceived by the participants to be emphasized in a particular setting
   1) task-involving motivational climate: emphasize competitive outcome, focus on differences in ability, base recognition and rewards on effort and task mastery, and sharing of power;
   2) ego-involving motivational climate: emphasize competitive outcome, focus on differences in ability, base recognition and rewards on ability, and have a unilateral power base.

Situations involving direct or indirect competition, social comparison or normative evaluation are more likely to induce a state of ego involvement. Social surroundings promoting learning mastery as an end in itself tend to induce a state of task involvement.

Nicholls predicted (1984) that a task orientation, but not an ego orientation, would be associated with adaptive patterns of behaviour, and a high task orientation is positively associated with high enjoyment (Hom et al., 1993; Kim & Gill, 1997), intrinsic motivation (Duda et al., 1995; Ntoumanis, 2001), and adaptive moral values and behaviours (Duda et al., 1991). This means we should do whatever is possible to make sure an athletes task orientation is robust (Duda, 2001).

The motivational climate refers to the situational goal structures perceived by the participants to be emphasized in a particular setting (Nicholls, 1989). Perceptions of
different goal structures derive from how tasks are organized, the criteria used to evaluate participation, how participants are grouped, the source and power of authority, the extent of social comparison, and expectations regarding how participants are to work with each other (Newton et al., 2000)

Descriptions of mastery and performance climate in accordance with the TARGET structures (Ntoumanis & Biddle, 1999; adapted from Ames et al., 1992)

<table>
<thead>
<tr>
<th>Mastery</th>
<th>Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tasks</strong></td>
<td><strong>Performance</strong></td>
</tr>
<tr>
<td>Challenging and diverse</td>
<td>Absence of variety and challenge</td>
</tr>
<tr>
<td><strong>Authority</strong></td>
<td><strong>Performance</strong></td>
</tr>
<tr>
<td>Students are given choices</td>
<td>Students do not take part in</td>
</tr>
<tr>
<td>And leadership roles</td>
<td>the decision-making part</td>
</tr>
<tr>
<td><strong>Recognition</strong></td>
<td><strong>Performance</strong></td>
</tr>
<tr>
<td>Private and based on individual progress</td>
<td>Public and based on social comparison</td>
</tr>
<tr>
<td><strong>Grouping</strong></td>
<td><strong>Performance</strong></td>
</tr>
<tr>
<td>Promotion of cooperative learning and peer interaction</td>
<td>Groups are formed on the basis of ability</td>
</tr>
<tr>
<td><strong>Evaluation</strong></td>
<td><strong>Performance</strong></td>
</tr>
<tr>
<td>Based on mastery tasks and</td>
<td>Based on winning or</td>
</tr>
<tr>
<td>On individual improvement</td>
<td>outperforming others</td>
</tr>
<tr>
<td><strong>Time</strong></td>
<td><strong>Performance</strong></td>
</tr>
<tr>
<td>Time requirements are adjusted to personal capacities</td>
<td>Time allocated for learning is uniform to all students</td>
</tr>
</tbody>
</table>

Implications of the Achievement Goal Theory for motivating PAC users

- promoting a motivational climate
- Participants are more likely to have positive attitudes and are therefore more likely to exert more effort, enjoy their participation, be more likely to continue in the program and optimize their potential ability; preserving and maintaining motivation.
5.3.3 Trans Theoretical Model

The TTM is based on the idea that health behaviour change is a dynamic process that occurs through a series of interrelated stages that represent different levels of readiness for a given behaviour.

The stages of change and their definitions with respect to PA change are:

1) **precontemplation**: not participating in PA and not thinking about starting, usually in the next six months -> need very convincing information, strong enough to make them believe they are at risk; provide them with written information about the description, benefits, and community resources of available exercise programs and facilities; health education is a primary intervention technique

2) **contemplation**: not participating in PA but thinking about starting, usually in the next six months -> are ambivalent and respond well to marketing strategies regarding the benefits of exercise, clear guidelines for beginning exercise programs, and positive role models; health education is a primary intervention technique

3) **preparation**: doing some PA but below a criterion level -> useful interventions include assessments, evaluation of the pros and cons of exercise, exercise prescriptions, goal setting and exercise behaviour contracts

4) **action**: started participating in PA above a criterion level in the last six months -> useful interventions include social support, stimulus control to prevent relapse, self-reinforcement and self-monitoring.

5) **maintenance**: participating in PA above a criterion level for longer than last six months -> continued social support, self-regulating skills, the review and revision of goals, and periodic assessments.

Three additional constructs:

1) **process of change**: cognitive and behavioural techniques and strategies that individuals may employ to modify thoughts, feelings and behaviours: consciousness raising, dramatic relief, self-evaluation, environmental re-evaluation, helping relationships, counter conditioning, self-liberation, contingency management, stimulus control, and social liberation

2) **self-efficacy**: a person’s belief that he or she can enact a specific behaviour

3) **decisional balance**: based on cost-benefit analysis of a given behaviour change. The assumption is that an individual will not change his or her behaviour unless he or she perceives the benefits of change (pros) to outweigh the negatives (cons)

*Figure 5.3 Transtheoretical Model: Variables by Stage*
Implications of the Trans Theoretical Model for motivating PAC users

Table 5.3 summarizes the implications of the TTM for the target groups of PAC users defined as the stages preparation, action and maintenance.

<table>
<thead>
<tr>
<th>Stage</th>
<th>Preparation</th>
<th>Action</th>
<th>Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Processes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Consciousness</td>
<td>Self-Liberation</td>
<td>Stimulus Control</td>
</tr>
<tr>
<td></td>
<td>Raising</td>
<td>Stimulus Control</td>
<td>Reinforcement Mgmt</td>
</tr>
<tr>
<td></td>
<td>Social Liberation</td>
<td>Reinforcement Mgmt</td>
<td>Counter conditioning</td>
</tr>
<tr>
<td></td>
<td>Dramatic Relief</td>
<td>Helping Relationships</td>
<td>Helping Relationships</td>
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<tr>
<td></td>
<td>Self-reevaluation</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Self-liberation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stimulus Control</td>
<td>Pros &gt; Cons</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reinforcement Mgmt</td>
<td>Increases more rapidly</td>
<td>Pros &gt; Cons</td>
</tr>
<tr>
<td></td>
<td>Counter conditioning</td>
<td>Action oriented programs,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Helping Relationships</td>
<td>Social support, stimulus</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>control, self reinforcement,</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>self-monitoring, review/evaluate goals</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Decisional balance</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pros ≥ Cons</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Increasing SE</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Increasing SE</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Interventions</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Assessments evaluate pros &amp; cons</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>goal setting, behavioral</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>contracts</td>
<td></td>
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</tr>
</tbody>
</table>

Concerning the processes of change, depending on the stage of change, the following tools can be used:

Experiential (mainly Preparation)
1) Increasing knowledge (consciousness raising) by increasing the available information about oneself and about the exercise;
   - Talking with others about exercise; observing others in exercise; learning about the benefits of exercise.
2) Warning of risks (dramatic relief) by experiencing and expressing feelings about (non) exercising;
   - Discussion; role-play.
3) Caring about consequences (self re-evaluation) by assessing how one feels about oneself and the exercise;
   - Clarification of values and attitudes associated with exercise and other competing behaviors; imagery of exercise.
4) Increasing health alternatives (social liberation) by increasing alternatives for the exercise or for the training program;
   - e.g. running to work.
5) Understanding benefits (self liberation) by providing commitment to exercise and belief that one can exercise;
   - Resolutions to exercise; contracting to exercise.
Behavioural (mainly Action/Maintenance)
1) Helping relationships by being open and trusting to someone about your exercise;
   - Eliciting social support for your exercise involvement.
2) Substituting alternatives (counterconditioning) by substituting alternatives for
   sedentary behaviour;
   - Increasing habitual activity.
3) Environmental re-evaluation by assessing how (non)exercising is related to the
   physical environment;
   - Learning about running opportunities in the community.
4) Creating active opportunities (stimulus control) by countering stimuli that increase
   the probability of sedentary behavior;
   - Removing some labor-saving devices; making exercise clothes or equipment
     prominent.
5) Rewarding yourself (reinforcement (contingency) management) by giving oneself a
   reward or receiving a reward from others;
   - Rewarding running.

5.3.4 Barriers and motives

5.3.4.1 (Perceived) barriers
The utility of the process of identification of barriers and the subsequent application of
structured statements of intention to exercise lies in the recognition of contrived barriers
(excuses) and the discovery of actual barriers that require solutions. Identification of
barriers (resulting in the establishment of priorities) is necessary before stated intentions
to act become bona fide intentions.

Perceived barriers to exercise (ref: Heesch KC, Brown DR, Blanton CJ. Perceived
barriers to exercise and stage of exercise adoption in older women of different
racial/ethnic groups. Women & Health 2000;30(4):61-76):
1) Lacking time: providing non-exercisers with ways to integrate exercise into their
daily routines could help move them to become exercisers.
2) Lacking energy and being too tired: information on the energy-boosting benefits of
exercise may help move women to begin to try an exercise program
3) Bad health: educating precontemplators on the benefits of exercise in managing
health problems and providing skills-training in exercises that can help alleviate
these problems
4) Lacking a safe place to exercise: offer more save locations to exercise before many
contemplators are willing to begin exercise programs
5) Having care-giving duties and time devoted to family obligation: availability of
inexpensive child care centers, and other resources that will allow women time
away from their care duty responsibilities may be necessary before the women
attempt to begin to exercise
6) Being self-conscious about one’s look: communities may need to offer not only
safe places to exercise but also ones where women would feel comfortable
exercising

Not important barriers:
7) Bad weather: women find viable exercise options indoors
8) Discouragement from others: discouraging remarks about exercise are absent or do
not affect their desire to exercise

Perceived barriers become less threatening and are viewed as more manageable as
strategies for circumventing them were explored in a discussion session. Practitioners
need to engage clients in identification of barriers (resulting in the establishment of priorities) before stated intentions to act become bona fide intentions (Huddy DC, Hebert JL, Hyner GC, Johnson RL. Facilitating changes in exercise behaviour: effect of structured statements of intention on perceived barriers to action. *Psychological Reports* 1995;76:867-75).

### 5.3.4.2 Motivational factors

Motivational factors for being physically active are: enjoyment/fun; fitness/health; feel in good shape physically; weight control; physical appearance; energy release; social contacts/friendship; team orientation; competition; skill improvement; status/achievement; independence; power; aggression; positive situational surroundings; time for myself.

A general strategy for improvement of motivation for exercise is shifting from extrinsic motives (e.g. weight loss, health needs) to intrinsic motives (e.g. mental well-being, sense of fun and achievement, and relaxation).

### 5.4 Questionnaires

The review revealed the following questionnaires as candidates for measuring motivation and determinants of the selected models:

<table>
<thead>
<tr>
<th>SDT</th>
<th>BREQ (Mullan e.a., 1997); SMS (Pelletier et al. 1995). EMI (Marklans e.a., 1997); IMI (McCauley e.a., 1989)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TTM</td>
<td>SOES (Cardinal, 1995). GLTEQ (Godin &amp; Shephard, 1985); Scale for measuring stages of change</td>
</tr>
<tr>
<td>AGT</td>
<td>AGQ-S (Conroy e.a., 2003); BACSSQ (White e.a., 2004); TEOSQ (Duda &amp; Nichols); PMCSQ-2 (Seifriz e.a., 1992); POSQ (Roberts e.a., 1998)</td>
</tr>
</tbody>
</table>

The following questionnaires were selected as the best options for measuring the different determinants of the three selected theories.

**SDT**

Sport Motivation Scale (Pelletier et al. 1995)

Respondents are asked why they practice their sport; they then respond to items reflecting the different types of motivation.

The scale measures:

1. Three different types of intrinsic motivation (each 4 items):
   - to know (e.g. for the pleasure of discovering new training techniques)
   - to accomplish (e.g. for the pleasure I feel while improving some of my weak points)
   - to experience stimulation (e.g. for the pleasure I feel in living exciting experiences)
2. Three types of extrinsic motivation (each 4 items):
   - identified regulation (e.g. because it is a good way to learn lots of things which could be useful to me in other areas of my life)
   - introjected regulation (e.g. because I must do sports to feel good about myself)
   - external regulation (e.g. because people around me think it is important to be in shape)

3. Amotivation (4 items) (e.g. I used to have good reasons for doing sports, but now I am asking myself if I should continue doing it)

Items are measured on a 7-point likert scale from 1 (does not correspond at all/strongly disagree) to 7 (corresponds exactly/strongly agree).
Reliability and Validity have been shown extensively (Vallerand and Fortier, 1998). Alpha coefficients run between 0.72 to 0.84 for the seven scales (Ntoumanis, 2001).
Although intrinsic motivation is now viewed as a multidimensional construct (Vallerand et al. 1992) some authors compose one scale of the three intrinsic subscales.

Behavioral Regulation in Exercise Questionnaire (BREQ) (Mullan, Markland and Ingledew: 1997)
The BREQ comprises of four subscales which represent a graded conceptualization of exercise motivation that are consistent with SDT and labeled accordingly. Scores on the BREQ discriminated between people at different stages of exercise adoption (with maintenance/action more intrinsically).

An ongoing discussion is whether this is multidimensional instrument with separate scores for each subscale or an one-dimensional index of the degree of self-determination (known as the Relative Autonomy Index (Ryan & Connell, 1989) by weighting and summing each subscale. Positive scores indicate more autonomous (self-determined) regulation and negative scores indicate more controlling (less self-determined) regulation.

Consists of the following scales:
1. External reasons (4 items; $\alpha = .93$)
2. introjected reasons (3 items; $\alpha = .82$)
3. identified reasons (4 items; $\alpha = .88$)
4. intrinsic reasons (4 items; $\alpha = .95$)

Items are measured on a 4 point likert scale ranging from 1 (not at all) to 4 (very much).

Markland & Tobin (2004) developed a extended version of the instrument which includes a separate subscale comprising amotivation called the BREQ-2.

AGT
Task and Ego Orientation in Sport Questionnaire (TEOSQ) Duda & Nicholls (1992)
The TEOSQ exists of 13 questions which assesses two dimensions of achievement goal orientation in sport that comprise the two subscales:

1. task orientation (7 items) which focuses on task mastery or personal improvement
   (“I learn a new skill and it makes me want to practice more”)
2. ego orientation (6 items) which delineates the importance of superiority over others
   (“I’m the only one who can do the play or skill”)

Items are rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Factor analysis confirmed the two-factor orthogonal structure representing the underlying task and ego orientations according to the theory.
Internal reliability is good with alpha’s for both subscales between .72 and .83 (Duda et al., 1995).

The AGQ-S is a specification of the AGQ by McGregor (2001) which was developed for use in the academic domain. It consists of four subscales that represent the 2 X 2 achievement goal framework. The subscales represent the four distinct achievement goals (each consists of three items):

1. mastery approach (MAp): striving to approach absolute or intrapersonal competence e.g. to master a task
2. mastery avoidance (MAv): striving to avoid absolute or intrapersonal incompetence e.g. to striving to do not worse than one has done previously
3. performance approach (PAp): striving to approach normative competence e.g. striving to do better than others
4. performance avoidance (PAv): striving to avoid incompetence e.g. striving to avoid doing worse than others

Internal consistency for the four scales ranges between .70 (Map) and .88 (PAp). Each of these four goals has empirically been shown to have a distinct antecedent and consequence profile (Elliot & McGregor, 2001).

TTM
At TNO Quality of Life a simple scale for measuring stages of change has been made. This scale is being used in a Physical Fitness test used by Physiotherapists in the Netherlands. This scale, however, is not validated and therefore it is not represented in this report. In phase 1b validation of this scale might be necessary.

5.5 Possible strategies and tools for enhancing motivation and participation

After establishing which theories/models could be used to describe and enhance motivation of the target population, information concerning possible strategies and interventions was gathered from the previously selected literature. Mainly studies evaluating theories in practice were used for this purpose.

A list was compiled of possible strategies and tools to enhance motivation and participation that were mentioned in the reviewed literature. Some of these strategies were already mentioned with the selected theories.

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Tool</th>
</tr>
</thead>
</table>
| 1 Arousal regulation or reduce anxiety | progressive relaxation  
breath control  
Biofeedback |
| 2 Imagery: (re)creating an experience  
Mental imagery is an important strategy for sports achievement, given that it has been found to motivate athletes, modify cognitions, regulate arousal and anxiety levels, and influence the learning and performance of skills and strategies (Hall, 2001). | Cognitive specific imagery involves the rehearsal of specific executions, and athletes commonly use this function to aid in learning of new skills by working on technique and making corrections.  
Cognitive general function of imagery is the rehearsal of game plans, strategies of play, and routines, and athletes use this function to learn strategies and rehearse how they will perform them in training |
Motivational specific imagery is the imagery function athletes use to image outcome goals and the activities necessary for achieving those goals. Motivational general imagery, a function related to general physiological arousal and affect, can be subdivided into two specific components. The motivational general arousal function of imagery is associated with arousal and stress and is used by athletes to get ‘psyched-up’, maintain composition, or stay relaxed and calm. Motivational general mastery imagery, on the other hand, is associated with being in control, mentally tough, and self-confident and is used by athletes to remain focused and positive, particularly in tough situations (Harwood et al., 2003).

<table>
<thead>
<tr>
<th>3</th>
<th>Enhance self-confidence or self efficacy</th>
<th>setting an easier task, but perform a more difficult one</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Goal setting</td>
<td>specific of general goals</td>
</tr>
<tr>
<td>5</td>
<td>Prompting frequency and prompting structure</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Interest enhancing strategies</td>
<td>- challenge enhancement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- exploitation of extrinsic stimulation to task performance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- introduction of variety within the task</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- provision of self-relevant rationales and long term goals</td>
</tr>
<tr>
<td>7</td>
<td>Stimulus control intervention</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Coaching behaviors</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Motivational climate</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Motivational interviewing</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Future goal framing</td>
<td>Future intrinsic goal framing: e.g. doing exercises at a younger age is instrumental for attaining the future goal of physical health and fitness. Future extrinsic goal framing: e.g. doing exercises is instrumental for becoming or remaining physically attractive to others</td>
</tr>
<tr>
<td>12</td>
<td>Using <strong>stage based</strong> interventions</td>
<td><strong>Earlier stages</strong>: cognitive processes:</td>
</tr>
<tr>
<td></td>
<td>Multi-strategy approach based on stage</td>
<td>- Consciousness rising</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Dramatic relief</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Environmental reevaluation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Self reevaluation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Social liberation</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Action stage</strong>: behavioral processes:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Counter conditioning</td>
</tr>
</tbody>
</table>
|   | Providing choices in setting/location | - Helping relationships  
|   | Providing choices in intensity level | - Reinforcement management  
|   | Improving self efficacy | - Self liberation  
|   | Reducing the risk of relapse | - Stimulus control  
|   | Improving self efficacy | provision of small, but incremental  
|   |                          | tastes of success with exercise  
|   | Reducing the risk of relapse | focus initially on reducing the cons;  
|   |                          | than shift focus and highlight the pros  
|   |                          | associated with PA to maintain  
|   |                          | participants’ motivational level  
|   | Changing persuasion and attitude | - Communicator of the message:  
|   |                          | attractiveness and expertise  
|   |                          | - message: difficulty, repetition,  
|   |                          | relationship with existing beliefs  
|   |                          | and attitudes  
|   |                          | - audience involvement: degree of  
|   |                          | cognitive engagement required  
|   | Social support | Providing empathy to exercise problems  
|   | Listening support | Providing technical advice, education  
|   | Informational support | and assistance  
|   | Challenge support | Encouragement and motivation provided  
|   | Punitive support | by an exercise partner or leader  
|   | Punitive support | Preventing discouragement by e.g. an  
|   |                        | envious colleague or neglected partner  
|   | Increasing pros and decreasing cons | High motivators: exhaustion  
|   | Inducing the right feeling-state for level of | Low motivators: energy increase  
|   | motivation | Creating the right context | Controlling social context: forcing  
|   |                          | people to do exercises by using  
|   |                          | controlling phrases like ‘you are obliged,  
|   |                          | should, have to’.  
|   |                          | Autonomy supportive context: using  
|   |                          | phrases as ‘we ask you to, you can,  
|   |                          | might’.  

6 Conclusions

6.1 Target groups

After a long discussion in the PAC-project group the semi-inactives and the dissatisfied exercisers are chosen as the main target groups. These are described as those who like to exercise (or start to exercise) for at least twice a week. Running is chosen as the main sporting activity. Improving physical fitness and performance are chosen as the most important goals for exercising (in the PAC-project group).

From a marketing point of view the “coach potatoes”, weight management group, elderly and people with a chronic disease are not chosen in the PAC-project. From a public health point of view these target groups are however of great importance.

The target groups, that are chosen by the PAC-project group, are important and represent a significant part of the population. However one should not forgot that also target groups like the weight management group, elderly and people with a chronic disease are of interest. Both from a public health point of view and from a marketing point of view.

Based on the literature potential PAC customers can be described as people who:
- recognize that they are not doing enough
- know the health benefits
- want to do more
- want to do this by home based activities

54% of the population say they would like to do more exercise/activity.

27% said it is (quite or very likely) they will increase exercise/activity level in the near future.

35% of the latter category (9% of the total population) will increase activity by home based activity.

31% of the people are saying they are undertaking 3 or more 30 min sessions of moderate activity per week. Based on this information they would be part of the chosen target group of the personal activity coach.

6.2 Motives to exercise

The most important motives to start exercising are improving health, losing weight, improving performance. Increasing performance is mentioned as one of the most important motives, but not as the most important. Therefore it should not be regarded as the main focus in the PAC-project.

Motives to start running differ from the motives to keep on running. So in time the motives of potential PAC-users are likely to change.

6.3 Desired PAC-functions

User-friendliness is mentioned as an import factor, easy to use, not getting redundant information is being mentioned.

The most important functions are those who are useful in improving performance and health. Also mentioned are functions like weather report, music (MP3), vocal support. Trainers are in need of devices with extended functions. It could be an option to
develop a special PAC for trainers, which is able to communicate with the PAC of pupils. Based on the information of the focus group interviews it should be wise to consider a range of products with different prices and features in stead of one PAC.

6.4 **Price of PAC**

The amount of money the potential PAC-users are willing to spent ranges from €100 to €300 euros. Trainers are willing to spent more, up to €500 euros. If a advanced features like GPS is included one is willing to spent more, about €50 euros more.

6.5 **Motivation**

The literature review has revealed that there are several evidence based behavioral models which can be used to describe and enhance motivation for physical activity. We have selected the best available options. These are:

- The Trans Theoretical Model (TTM) by Prochaska and DiClemente (1983)
- The Self Determination Theory (SDT) by Deci and Ryan (1985)
- The Achievement Goal Theory (AGT) by Nicholls (1984)

These validated models can be integrated into one coherent model for the PAC-project. Based on the gathered information it is also possible to include individuals that engage in physical activity because of health related motives. This will enlarge the group of potential PAC-users. The selected models provide opportunities to enhance the motivation for other reasons like the original target groups. The following questionnaires were selected as the best options for measuring the different determinants of behaviour of the three selected theories:

- Sport Motivation Scale (Pelletier et al. 1995);
- Behavioral Regulation in Exercise Questionnaire (BREQ) (Mullan, Markland and Ingledev; 1997);
- Task and Ego Orientation in Sport Questionnaire (TEOSQ) Duda & Nicholls (1992);
- Achievement Goals Questionnaire for Sport (AGQ-S) Conroy e.a. (2003);
- Scale for measuring stages of change.

6.6 **Added value motivational area to Personal Activity Coach**

The added value of the information in the motivational area to the Personal Activity Coach can be summarized as follows. Based on the information in this document it is possible to characterize the (individual) PAC-user based on:

- goals/motives
- barriers
- stages of change
- level of self-determination
- motivation type (task/ego orientation)
- level of motivation (low/high)
Knowledge of these characteristics leads to useful information which can be used to:

1. increase the target group by
   a. eliminating barriers which can lead to an enlargement of the PAC-target group (potential users);
   b. adding value to the PAC, offering more than just a measuring device like a heart rate monitor;
   c. developing a first in class product, offering a better product than other companies;
   d. adjusting coaching style to motivation (type and level) which leads to an increase in the target group.

2. optimize the coaching process (custom fit coaching) by
   a. a more effective coaching, because personal goals/motives, barriers are known and used in designing the exercise training;
   b. adjusting coaching style and feedback to motivation type and level which leads to an increase in user satisfaction;
   c. adjusting coaching information and exercise schedules to motivation, i.e. only relevant information is given to the PAC-user.

3. increase continuity if the use of the PAC by
   a. increasing user satisfaction
   b. adapting the training process and coaching throughout the time, the PAC device can remain useful even when the goals and motivation changes over the time;
   c. brand loyalty.
7 References


HEESCH KC, BROWN DR, BLANTON CJ. Perceived barriers to exercise and stage of exercise adoption in older women of different racial/ethnic groups. Women Health 2000; 30:(4):61-76.


TECHNOGYM, Congresmap Welness convention 2003, Papendal, Anhem, 24-10-2003


Websites:
www. Exerciseregister.org  HAFOS Health and Fitness Omnibus Survey (HAFOS)
A Terms

Trefwoorden literatuursearch ‘Motivation’ voor de Personal Activity Coach

Doel: achterhalen literatuur met betrekking tot motivatie voor fysieke activiteit.
Bronnen: Medline en Psychlit

Hierbij gaat het om de volgende groepen van trefwoorden

1. Fysieke activiteit
   - physical activity
   - exercise
   - sports
   - physical education and training
   - health behavior
   - physical fitness
   - participation

2. Motivatie
   A. algemeen - motivation
      - motives
   B. specifiek - intention
      - attitude
      - self efficacy
      - beliefs
      - orientation
      - control
      - goal
      - determination
      - attribution
      - cognitive

3. Soort artikelen
   A. - model
      - theory
   B. - questionnaire(s)
      - instrument(s)
      - measurement(s)
B List of questionnaires

Achievement Goals Questionnaire for Sport (AGQ-S)
Conroy e.a.

Behavioral Regulation in Exercise Questionnaire (BREQ) psy7a psy4a
Mullan, Markland and Ingledew (1997)

Beliefs About Causes of Success in Sport Questionnaire (BACSSQ)

Coaching Behavior Questionnaire (CBQ)
Kenow & Williams (1992)

Exercise Motivations Inventory (EMI)
Markland and Hardy, 1993

Exercise Self-Efficacy Questionnaire/Scale (ESE)
Marcus BH, Selby VC, Niaura RS, Rossi JS, 1992

Intrinsic Motivation Inventory (IMI)
div, zie map

Participation Motivation Questionnaire (PMQ) psy51a
Gill, Gross & Huddleston, 1983

Perceptions of Success Questionnaire (POS) psy45a

Personal Incentives for Exercise Questionnaire (PIEQ)
Duda & Tappe (1989)

Physical Self-perception Profile (PSPP)
Fox & Corbin, 1989

Reasons for Exercise Inventory (REI)

Self Efficacy for Exercise Scale (SEE)

Sport Imagery Questionnaire (SIQ)
Hall e.a., (1998)

Sports Motivation Scale (SMS)

Sports Orientation Questionnaire (SOQ)
Gill & Deeter 1998, Karteroliotis, 1995

Task and Ego Orientation in Sport Questionnaire (TEOSQ)
Duda & Nicholls
Exercise Thoughts Questionnaire (ETQ)

Perceived Competence Scale (PCS)
Harter (1980)

Questionnaire for Initiation Maintenance, Change and Desertion of Sports (MIMCA)

Sport Motivation Questionnaire (SMQ)
Li & Harmer (1996)

Sports Attributional Style Scale (SASS)
Hanrahan & Grove, 1990

Stages of Exercise Scale (SOES)
Cardinal (1995)

The assessment of behavioral change as a means for gaining insight into the development of more effective programs for promoting physical activity in women
Nies et al., 2001

GALM-scale
NL vertaling, samengesteld uit de LIVAS (Bosscher et al. 1987), McAuley’s Self efficacy scale (barriers + task)
Stevens e.a., 2001

Perceived Physical Ability Scale (PPAS)
Ryckman e.a. (1982)

Exercise Motivation Questionnaire (EMQ)
Keele-Smith (1999); alleen via Keele-Smith & Leon (2003)

Brunel Music Rating Inventory (BMRI)
Karageorghis e.a. (1999)

Physical Activity Enjoyment Scale (PACES)

Coach-Athlete Relationship Questionnaire (CART-Q)

Motivations of Marathoners Scales (MOMS)
Masters e.a. (1993)

Scale for measuring attitude, beliefs, perception of control and intention to exercise
Kerner & Grossman (2001)
C Overview of models
<table>
<thead>
<tr>
<th>Approach</th>
<th>Model/theory</th>
<th>Authors</th>
<th>Determinants</th>
<th>Evidence in PA</th>
<th>Influenced by</th>
<th>Instruments</th>
</tr>
</thead>
</table>
| a-theoretical                 | Descriptive motives and barriers |           | • Barriers: time, physical, exercise environment  
• Motives: enjoyment, health, challenge, social motives, appearance          | Only offer a surface level of analysis of motivation  
Prone to self serving rationality                                                  | Age: younger mostly time barrier and enjoyment, challenge motives; older mostly physical barrier and health motive |             |
| Belief Attitude theories      | Health Belief Model (HBM)        | Becker (1977) | • Level of health motivation and knowledge  
• perceived threat of disease (susceptibility & seriousness)  
• perceived efficacy of treatment  
• perceived barriers             | Mainly limited to illness/sick role behavior which are not the prime reasons for exercise behavior  
Few and little evidence in exercise                                                | Socioeconomic  
Demographic  
Cues to action                                                                     |             |
|                               | Protection Motivation Theory (PMT)| Rogers (1983) | • threat appraisal (perception of vulnerability and possible severity of health outcome)  
• coping appraisal (perception of efficacy and cost of undertaking action)       | Few studies; PA mostly not based on fear/health threats  
More favorable towards role of SE than health threats                            | Age: older more influence PBC and SN compared to attitude less                   |             |
| Theory of Reasoned Action and Planned | Ajzen (1988)                  |           | • Intention  
• attitude (beliefs and evaluation or value of the outcome)                   | Meta-analysis (Hausenblas e.a., 1997) + Hagger e.a.,                             | Age: older more influence PBC and SN compared to attitude less                   |             |
<table>
<thead>
<tr>
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<th>Instruments</th>
</tr>
</thead>
</table>
| Behavior (TRA/TPB)       |                       |                          | • subjective norm (beliefs of significant others + motivation to comply with them)  
  • Perceived Behavioral Control (only PB; perceived ease or difficulty of performing) | 2002) Intention most strongly affected by attitude  
  PBC direct influence on behavior if actual control involved  
  25-25% intention verklaarde variantie | Past behavior                                      | Past behavior                                      |
| Trans-contextual model   | Hagger et al, 2003    | Combination of:          | • Self-determination theory  
  • Theory of planned behavior |                                                      |                                                |                                      |
| Competence Based theories| Self Efficacy Theory (SET) | Bandura (1997)       | • self efficacy  
  • outcome expectations: mastery experiences (behavioral), modeling (cognitive), verbal persuasion (social), interpretation of emotional/physiological (physiological) | Strongly related to exercise behavior  
  Successfully added to other models (TTM, PMT, HBM)  
  Weak assessment across studies |                                                |                                      |
| Control Based Theories   | Locus of Control (LOC) | Rotter (1966)          | • internal beliefs (own behavior/characteristics)  
  • external beliefs (result of luck, chance, fate, powerful others) | Weak support in predicting fitness/exercise behaviors |                                                |                                      |
|                          | Self Determination    | Deci and Ryan (1985)    | • Level of self-determination  
  • Extrinsic motivation ->: amotivation external | Intrinsic motivations increase in later stages |                                                | BREQ (Mullan e.a., 1997); |
<table>
<thead>
<tr>
<th>Approach</th>
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<th>Influenced by</th>
<th>Instruments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory (SDT)</td>
<td></td>
<td>('must'), introjected ('ought to'), identified ('want'), integrated regulation, intrinsic ('for itself'); Intrinsic motivation</td>
<td>of change, extrinsic in earlier; Internal motives lead to a stronger intention and higher level of PA</td>
<td>EMI (Marklans e.a., 1997); SMS (Li &amp; Harmer, 1996)</td>
<td></td>
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</tr>
<tr>
<td>Decision Making Theory</td>
<td>Trans Theoretical Model TTM</td>
<td>Prochaska &amp; Diclemente (1983)</td>
<td>stages of change (precontemplation, contemplation, preparation, action and maintenance)</td>
<td>Pros increase across stages, con’s decrease</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>relapses (cyclical)</td>
<td>SE increases in later stages</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>experiential (experiences) and behavioral processes (environment and action) to change stages</td>
<td>Successfully applied to exercise behavior change</td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>decisional balance: pro’s (approval, gains) and cons (disapproval, losses)</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>self efficacy</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>*</td>
<td>Hierarchical Model of Intrinsic and Extrinsic Motivation</td>
<td>Vallerand (1997)</td>
<td>Three levels of generability: global, contextual and situational</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>intrinsic motivation: to know, to accomplish and to experience stimulation</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>extrinsic motivation: external, introjected regulation, identified regulation, integrated regulation</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>amotivation</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Achievement Goal Theory</td>
<td>Nicholls (1984)</td>
<td>Achievement behavior is a function of the personal meaning an individual assigns to perceived success and failure: task goal; a focus on the development of</td>
<td>Task oriented individuals tend to exert more effort, choose moderately</td>
<td>Gender; Social group</td>
<td>AGQ-S (Conroy e.a., 2003); TEOSQ</td>
</tr>
<tr>
<td>Approach</td>
<td>Model/theory</td>
<td>Authors</td>
<td>Determinants</td>
<td>Evidence in PA</td>
<td>Influenced by</td>
<td>Instruments</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>competence</td>
<td>difficult tasks and persist more, even in failure conditions</td>
<td>Age</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• ego goal: an underlying concern with the demonstration of competence or the avoidance of being judged</td>
<td>Ego oriented individuals tend to withhold effort when success appears not to be within reach, choose tasks that are too easy or too difficult and quit after failure</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Perceived competence</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

sources: Biddle & Nigg (2000); Biddle & Fox (1998)
## D Selected Questionnaires

### Achievement Goals Questionnaire for Sport (AGQ-S)

Consider your thoughts and feelings about the present activity when responding to the items.
1=not at all like me – 7=completely like me

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>It is important to me to perform as well as I possibly can</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>I want to perform as well as it is possible for me to perform</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>It is important for me to master all aspects of my performance</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>I worry that I may not perform as well as I possibly can</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>Sometimes I’m afraid that I may not perform as well as I’d like</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>I’m often concerned that I may not perform as well as I can perform</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>It is important to me to do well compared to others</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>It is important for me to perform better than others</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>9</td>
<td>My goal is to do better than most other performers</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>10</td>
<td>I just want to avoid performing worse than others</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>11</td>
<td>My goal is to avoid performing worse than everyone else</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>12</td>
<td>It is important for me to avoid being one of the worst performers in the group</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
### Sport Motivation Scale

**Why do you Practise your Sport?**

Using the scale below, please indicate to what extent each of the following items corresponds to one of the reasons for which you are presently practising your sport.

1 = does not correspond at all, 4 = corresponds moderately, 7 = corresponds exactly.

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>For the pleasure I feel in living exciting experiences</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2</td>
<td>For the pleasure it gives me to know more about the sport that I practise</td>
<td></td>
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<tr>
<td>3</td>
<td>I used to have good reasons for doing sports, but now I am asking myself if I should continue doing it</td>
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<tr>
<td>4</td>
<td>For the pleasure of discovering new training techniques</td>
<td></td>
<td></td>
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<tr>
<td>5</td>
<td>I don’t know anymore; I have the impression that I am incapable of succeeding in this sport</td>
<td></td>
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<tr>
<td>6</td>
<td>Because it allows me to be well regarded by the people that I know</td>
<td></td>
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<tr>
<td>7</td>
<td>Because, in my opinion, it is one of the best ways to meet people</td>
<td></td>
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<tr>
<td>8</td>
<td>Because I feel a lot of personal satisfaction while mastering certain difficult training techniques</td>
<td></td>
<td></td>
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<tr>
<td>9</td>
<td>Because it is absolutely necessary to do sports if one wants to be in shape</td>
<td></td>
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<tr>
<td>10</td>
<td>For the prestige of being an athlete</td>
<td></td>
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<tr>
<td>11</td>
<td>Because it is one of the best ways I have chosen to develop other aspects of myself</td>
<td></td>
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<tr>
<td>12</td>
<td>For the pleasure I feel while improving some of my weak points</td>
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<tr>
<td>13</td>
<td>For the excitement I feel when I am really involved in the activity</td>
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<tr>
<td>14</td>
<td>Because I must do sports to feel good about myself</td>
<td></td>
<td></td>
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<tr>
<td>15</td>
<td>For the satisfaction I experience while I am perfecting my abilities</td>
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<tr>
<td>16</td>
<td>Because people around me think it is important to be in shape</td>
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<tr>
<td>17</td>
<td>Because it is a good way to learn lots of things which could be useful to me in other areas of my life</td>
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<tr>
<td>18</td>
<td>For the intense emotions that I feel while I am doing a sport that I like</td>
<td></td>
<td></td>
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<tr>
<td>19</td>
<td>It is not clear to me anymore; I don’t really think my place is in sport</td>
<td></td>
<td></td>
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<tr>
<td>20</td>
<td>For the pleasure that I feel while executing certain difficult movements</td>
<td></td>
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<tr>
<td>21</td>
<td>Because I would feel bad if I was not taking time to do it</td>
<td></td>
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<tr>
<td>22</td>
<td>To show others how good I am at my sport</td>
<td></td>
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</tr>
<tr>
<td>23</td>
<td>For the pleasure that I feel while learning training techniques that I have never tried before</td>
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<td></td>
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<td></td>
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<tr>
<td></td>
<td>Because it is one of the best ways to maintain good relationships with my friends</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
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<td>24/</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26/</td>
<td>Because I must do sports regularly</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>27/</td>
<td>For the pleasure of discovering new performance strategies</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>28/</td>
<td>I often ask myself; I can’t seem to achieve the goals that I set for myself</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>
The Behavioral Regulation in Exercise Questionnaire (BREQ-2)

Age:…………….years   Sex:

Why do you engage in exercise?
We are interested in the reasons underlying peoples’ decisions to engage, or not engage in physical exercise. Using the scale below, please indicate to what extent each of the following items is true for you. Please note that there are no right or wrong answers and no trick questions. We simply want to know how you personally feel about exercise. Your responses will be held in confidence and only used for our research purposes.

<table>
<thead>
<tr>
<th></th>
<th>Not true for me</th>
<th>Sometimes true for me</th>
<th>Very true for me</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I exercise because other people say I should</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>I feel guilty when I don’t exercise</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>I value the benefits of exercise</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>I exercise because it’s fun</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>I don’t see why I should have to exercise</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>I take part in exercise because my friends/family/partner say I should</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>I feel ashamed when I miss an exercise session</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>It’s important to me to exercise regularly</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>I can’t see why I should bother exercising</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>I enjoy my exercise sessions</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>I exercise because others will not be pleased with me if I don’t</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>I don’t see the point in exercising</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>I feel like a failure when I haven’t exercised in a while</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>I think it is important to make the effort to exercise regularly</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>I find exercise a pleasurable activity</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>I feel under pressure from my friends/family to exercise</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>I get restless if I don’t exercise regularly</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>I get pleasure and satisfaction form participating in exercise</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>I think exercising is a waste of time</td>
<td>0 1 2 3 4</td>
<td></td>
</tr>
</tbody>
</table>
Task and Ego Orientation in Sport Questionnaire (TEOSQ)

Please read each of the following statements listed below and indicate how much you personally agree with each statement by circling the appropriate response.

When do you feel most successful in sport? In other words, when do you feel a sport activity has gone really good for you?

*I feel most successful in sport when...*

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1</td>
<td>I’m the only one who can do the play or skill</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>T1</td>
<td>I learn a new skill and it makes me want to practice more</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>E2</td>
<td>I can do better than my friends</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>E3</td>
<td>The others can’t do as well as me</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>T2</td>
<td>I learn something that is fun to do</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>E4</td>
<td>Others mess up “and” I don’t</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>T3</td>
<td>I learn a new skill by trying hard</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>T4</td>
<td>I work really hard</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>E5</td>
<td>I score the most points/goals/hits, etc.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>T5</td>
<td>Something I learn makes me want to go practice more</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>E6</td>
<td>I’m the best</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>T6</td>
<td>A skill I learn really feels right</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>T7</td>
<td>I do my very best</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
Example of coaching strategies directed at (perceived) barriers

An example (in Dutch) of coaching strategies directed at (perceived) barriers:

Hindernissen overwinnen! Smoezen oplossen!

Introtekst:
We weten dat lichaamsbeweging goed is voor onze gezondheid, en toch bewegen we niet altijd voldoende. Daar kunnen vele redenen voor zijn, zoals een drukke baan, gezin, hobby’s, enzovoorts. Voor veel van die belemmeringen is echter ook een oplossing of een mogelijk alternatief te bedenken. Kijk eens naar de voorbeelden bij een voor u geldende hindernis of smoes!

1. Ik heb geen tijd/te druk
Probeer eens:
- Om kleine veranderingen in uw dagelijkse routine in te voeren, zoals tijdens lunchtijd een stukje wandelen.
- Iets actiever te zijn met dingen die u nu ook al doet, neem de trap in plaats van de lift, gebruik een handgrasmaaier in plaats van een elektrische maaier.
- Afspraken met collega’s, vrienden of familie te maken waarbij tegelijkertijd wat lichaamsbeweging mogelijk is, bijvoorbeeld samen zwemmen, wandelen of fietsen.

2. Ik wil geen blessures
Blessures kunt u voorkomen door:
- Bewegen langzaam op te bouwen; veel blessures ontstaan door té snel té veel willen.
- Meteen te stoppen als u voelt aankomen dat het teveel wordt.
- Vormen van bewegen te kiezen met een lage kans op blessures zoals wandelen, fietsen, zwemmen.

3. Mijn gezondheid laat het niet toe
Ook als u niet helemaal gezond bent kunt u (meer) bewegen:
- Misschien moet u wel op een aangepaste manier gaan bewegen. Vraag dat aan uw huisarts of specialist.
- Regelmatisch bewegen is juist positief bij veel chronische aandoeningen (diabetes, hart- en vaatziekten, rugpijn enzovoorts) en leidt tot minder klachten.

4. Ik vind zweten niet prettig
Je kunt er wel iets aan doen:
- Kies voor lichte, goed absorberende (sport-)kleding.
- Neem een lekkere douche na afloop.
- Trek schone, droge kleren aan.

5. Bewegen is niet leuk
Bewegen kan op talloze manieren, er is altijd wel een manier die bij u past:
- Probeer eens verschillende dingen uit, zorg voor afwisseling.
- Soms moet je even wennen aan het andere leefritme.
6. Ik ben al zo moe
Twijfelt u serieus aan uw gezondheid, raadpleeg dan eerst uw huisarts.
Starten kost even inspanning, maar:
• Mensen die regelmatig meer bewegen zeggen dat ze er juist meer energie door krijgen.
• Als je iets doet wat je heel leuk vindt, voel je de vermoeidheid niet.
• Als je geleidelijk aan opbouwt kun je het makkelijker volhouden.
• Bewegen is voor veel mensen een manier om geestelijk bij te tanken, misschien geldt dat ook voor u.

7. Het weer is te koud/te warm of het regent
Kijk naar alternatieven die passen bij de situatie, zoals:
• Binnen sporten of bewegen.
• Kies om juist binnen of buiten te zwemmen.
• Neem een paraplu mee tijdens het wandelen.
• Verander het tijdstip van de activiteit.

8. Ik ben geen sportief type
Dat geeft niets, want:
• U hoeft niet persé aan sport te doen om actief te zijn, matig lichamelijk inspannende activiteit is al voldoende.
• Er zijn genoeg activiteiten waaruit mensen van verschillende leeftijden uit kunnen kiezen.
• Voor veel activiteiten hoeft u niet speciaal iets te kunnen of speciale spullen voor te hebben (denk aan wandelen).

9. Ik ben alleen
Dat hoeft u niet te blijven.
• Als u lid wordt van een vereniging krijgt u al snel de mogelijkheid om contacten met anderen te leggen. Vaak wordt er na afloop bij de bar gezellig nagekletst.
• Heeft u een buurman/vrouw, een collega of kennis wel eens gevraagd om samen wat te gaan doen?

10. Een sportschool/-vereniging is duur
Bewegen kan ook goedkoper:
• Veel sportscholen hebben zogeheten daluren die goedkoper zijn (overdag).
• Sommige gemeenten geven extra subsidie voor minder dragkrachtigen om toch te kunnen sporten.
• U kunt ook kiezen voor beweegvormen die weinig geld kosten, zoals wandelen en fietsen, tuinieren, klussen, enzovoorts.
• Door te bewegen kunt u ook geld uitsparen, denk bijvoorbeeld aan wandelen of fietsen naar het werk.

11. Ik wil er niet voor de deur uit
Dat hoeft ook niet per sé:
• Er zijn op tv programma’s en videobanden met aerobics- en fitnessoefeningen waar u thuis aan mee kunt doen.
• U kunt fitness attributen zoals losse gewichten, een springtouw of een fitnessapparaat voor thuis aanschaffen. Let er dan wel op dat u er iets mee kunt gaan doen wat u leuk vindt! Kijk ook of u ruimte heeft om het apparaat op te slaan en dat het veilig, betrouwbaar en solide is en niet veel onderhoud vraagt.
• Wat dacht u van allerhande huishoudelijke karweitjes en kluswerk waarmee u toch de nodige lichaamsbeweging krijgt?
12. Ik zit met (kleine) kinderen (geen oppas)
Beweeg samen met uw kind(eren)!
- Ga joggen terwijl uw kind in de “jogger” zit (dit is een sportieve driewiel-buggy met handremmen).
- Maak een stevige wandeling met uw kind in de kinderwagen of buggy.
- Ga met uw kind een eindje fietsen. Afhankelijk van de leeftijd van het kind kan het kind bij u op de fiets of zelf fietsen.
- Doe actieve spelletjes: tikkertje, hinkelen, touwtje springen, voetballen etc.

13. Ik ben (voel me) te oud voor sport
Niemand is te oud om te bewegen.
- U hoeft niet te sporten, stevig wandelen en fietsen kan ook.
- Er zijn vast genoeg leeftijdgenoten die samen met u nog iets willen doen.

14. Mijn conditie is (te) slecht
Die verbetert juist door bewegen!
- Probeer eerst eens wat meer te gaan wandelen. Bouw dat rustig op door bijvoorbeeld de eerste week elke dag 5 minuten te lopen, de tweede week dagelijks 10 minuten, enzovoorts.
- Als het niet meer gaat stopt u en probeert het een andere keer weer.

15. De auto is sneller en gemakkelijker
Dat is niet altijd zo.
- In de stad, zeker op zaterdag, bent u vaak sneller op de fiets.
- U kunt ook overwegen met de bus, tram en/of trein te gaan en wat meer te lopen.
- Parkeer de auto iets verder weg (vaak meer plek en goedkoper) en loop het laatste stuk.
- Met fietstassen op de fiets krijgt u de boodschappen ook thuis.

16. Door mijn werk kan ik niet méér bewegen
Hoe kunt u daar een mouw aan passen?
- Beweeg meer vóór werktijd: ga met de fiets naar het werk als dat kan of ga al vroeg (hard-)lopen of zwemmen.
- Neem de lunch van thuis mee, zodat u hem al wandelend in de pauze kunt nuttigen.
- Neem altijd de trap in plaats van de lift.
- Er bestaat software met rekoefeningen die u op de computer kunt installeren.