Groningen Active Living Model (GALM): Stimulating Physical Activity in Sedentary Older Adults

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INTRODUCTION

Background. A significant number of Dutch older adults can be considered sedentary when it comes to regular participation in leisure-time physical activity. Sedentariness is considered a potential public health burden—all the more reason to develop a strategy for stimulating older adults toward becoming more involved in leisure-time physical activity. The Groningen Active Living Model (GALM) is a behavioral change strategy for stimulating participation in leisure-time physical activity.

Methods. The GALM strategy is based on a process model of behavioral change in which behavioral change is seen as a multidimensional and dynamic process. The strategy has three phases: recruitment, introduction, and follow-up, and lasts 18 months.

Results. Preliminary results indicate that, up until the summer of 1998, about 4000 older adults were participating in 76 local GALM projects. Further research will be done to assess the validity of the model and its effects on the leisure-time physical activity pattern, ADL performance, and health in newly active older adults.

Conclusions. The GALM strategy is a feasible strategy for stimulating leisure-time physical activity participation on a large-scale basis. The strategy is being implemented in The Netherlands on a nationwide basis.

Key Words: older adults; leisure-time physical activity; behavioral change.

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developed in order to stimulate people toward becoming physically active. Although The Netherlands Heart Foundation and the Dutch government have promoted physical activity, little or no systematic research has been done into the effectiveness of lifestyle and physical activity promotion campaigns in The Netherlands. In the United States, overall results of community-based interventions, communications strategies, and interventions in health-care settings have been limited and disappointing [4]. Despite the United States’ national health policy—which includes the goal of increasing physical activity—the best estimates indicate no change in physical activity patterns for the past decade [14]. The few interventions that have been carried out toward increasing physical activity levels among older adults in the United States and Australia show generally positive results, although the limited number of interventions would prevent us from arriving at far-reaching conclusions [4]. This article will first provide an overview of the criteria that should be met when developing a new strategy for stimulating sedentary older adults to become active in leisure-time physical activity. On the basis of these criteria we have developed a new behavioral change model for stimulating leisure-time physical activity participation, which is also described in conjunction with future research into the model’s working mechanisms.

**STIMULATING LEISURE-TIME PHYSICAL ACTIVITY: CRITERIA FOR STRATEGIES**

Past behavioral change strategies for promoting leisure-time physical activity can be very helpful toward developing and implementing an innovative strategy. In The Netherlands, four different strategies to stimulate leisure-time physical activity participation have been used: communication strategies, counseling strategies, population strategies, and community approaches. It should be noted that little or no research has been undertaken yet into the effectiveness of these strategies [12]. However, on the basis of experiences with these four strategies and international insights on the development and application of behavioral change strategies, we can list four criteria for improved strategies.

1. New strategies should be based on theoretical models rather than pragmatic principles. In The Netherlands, past behavioral change interventions have lacked a theoretical basis. In a theoretical model, the underlying theory of a program can be specified and the connections between the program’s operations and its effects can be revealed. This leads to a better theoretical understanding of behavior in the long run and provides a firmer foundation for more effective interventions [15].

2. The stimulation strategy must be based on a behavioral change model specifically designed to explain behavioral change in relation to becoming and remaining active in leisure-time physical activity.

3. The theoretical model should be multidimensional. Several studies have already indicated that no single variable or small set of variables can be considered the primary determinant of leisure-time physical activity. It is rather a wide variety of variables that have been shown to significantly correlate with or predict leisure-time physical activity [16].

4. The new theoretical model should be dynamic. Prochaska and DiClemente’s stages-of-change model [17], Sallis and Hovell’s [18] theory about the natural history of exercise, and Biddle and Mutrie’s resumption theory [19] all show that becoming and remaining physically active is a time-consuming and dynamic process of behavioral change. We may thus conclude that a process-based model approach is required in order to understand how people change over time. From this perspective, changes in health behavior are viewed as cyclical rather than linear sequences of events [20].

**GRONINGEN ACTIVE LIVING MODEL**

The Groningen Active Living Model (GALM) is a behavioral change strategy for stimulating leisure-time physical activity participation. The GALM strategy aims to stimulate and monitor sedentary older adults who are willing to participate in leisure-time physical activity (again) for a period of 1 1/2 years. The strategy consists of three phases: recruitment, introduction, and follow-up. The recruitment phase consists of recruiting potential participants. In the introductory phase a fitness test and a 12-week introductory program are organized. Participants may then continue into the follow-up phase, which is a 1-year program culminating with a second fitness test.

The GALM strategy is based on a process-related model of behavioral change in which behavioral change is seen as a multidimensional dynamic process. In 1995 and 1996, the newly developed strategy was tested in a pilot project carried out in the northern part of The Netherlands. Initial results on participation rates, compliance, and fitness effects were promising. The results of this pilot project have allowed us to conclude that the GALM strategy becomes feasible and highly valued by participants when the focus lies on stimulation through the enjoyment to be drawn from participation in leisure-time physical activity. A total of 50,948 older adults have been approached to participate in the program up until the summer of 1998. Based on estimates of available demographic data [1, 2, 21], about 60% of them can be considered sedentary. In turn, about half of these qualify for GALM. The other half is not interested in leisure-time physical activity or is unable to
participate due to illness, personal circumstances, or other reasons. The strategy succeeds in stimulating a substantial number (~25%) of those sedentary adults who qualify for GALM to take up leisure-time physical activity. Of those who become active, about 80% continue to participate in the follow-up program for at least 1 year. At the moment, 3987 individuals are participating in 76 local GALM programs all over The Netherlands. Men and women are equally represented in these groups. The stimulation strategy has succeeded in improving both the participants' objective and their perceived fitness [21].

The GALM strategy was structured with the help of Chen's program evaluation theory [22]. Chen argues that insight into the theoretical premises of an intervention program is necessary for the formation of the program and an explanation of how the program works. Chen's theory offers guidelines for properly structuring interventions. He urges the development of a theoretical framework that differentiates the details of the causal processes in the program and which can serve as a basis for planning activities and their eventual evaluation—the so-called program theory. We have developed a theoretical framework to be used as the GALM stimulation strategy's program theory. This program theory explains the program's theoretical premises and describes the process between input and outcome. In fact, the program theory could be called a theory of change, as it postulates causal variables and relationships between input and output. Chen distinguishes various theoretical domains within the program theory. The GALM stimulation strategy recognizes four domains: implementation environment, treatment, intervening mechanism, and outcome.

We will start by discussing the four domains. This will provide an understanding of the program's practical aspects. We will present: (1) the implementation environment domain, in which the program preconditions are described; (2) the treatment domain, in which the actual program as presented to the participants is described; (3) the outcome domain, in which the desired program outcomes will be postulated; and (4) the intervening mechanisms domain, in which the underlying causal variables and relations that link treatment to outcome are described. These are the processes through which the treatment either succeeds or fails in producing the desired outcome. Treatment usually affects outcome through some intervening process. Research into intervening mechanisms will provide information on why a program works—or doesn't—and will help diagnose its strengths and/or weaknesses so that improvements can eventually be made [22]. Next to these four domains, Chen distinguishes a conceptual theory and an action theory (Fig. 1). The conceptual theory describes how the causal variables of the intervening mechanisms domain affect the outcome variables as specified in the outcome domain. The action theory describes how the causal variables of the intervening mechanisms domain are manipulated by program activities in the treatment domain. Baranowski et al. [15] make a comparable distinction in their mediating variables model, giving priority to research that improves the understanding of the impact of interventions on mediating variables and of the relations between mediating variables and outcomes.

IMPLEMENTATION ENVIRONMENT DOMAIN

In the implementation environment domain we illustrate the environment and conditions in which the treatment is implemented [22]. Winett [23] claims that researchers often neglect the environment in which an intervention is implemented. The GALM strategy recognizes four subdomains within the implementation environment domain. Chen [22] distinguishes participants, microcontext, delivery mode, and implementing organization. Together, these subdomains form the environmental conditions in which the program is presented to the participants (Fig. 1).

Participants

The participants' subdomain concerns the relationships between participants and the program [22]. The GALM strategy was developed for 55- to 65-year-old sedentary men and women. The demographic variables of age, gender, and socioeconomic status are consistently and strongly associated with sedentary behavior. Costs are kept down in a higher socioeconomic status. People with a low socioeconomic status are less likely to participate in leisure-time physical activity than those with a higher socioeconomic status. Costs are kept down in order to ensure that the GALM strategy is also accessible to people with low incomes, thus reducing financial impediments to structural participation. Those who may still have a problem with the fee usually qualify for an additional allowance from their municipality.
Microcontext

The microcontext subdomain refers to the immediate social units—such as family and peer groups—within which participants live during or after the treatment [22]. Within this microenvironment, one of the major variables affecting older adults’ decision to become active in leisure-time physical activity is the measure of perceived social support. Research has indicated that support of family and friends can be a relevant variable for becoming and staying active [25,29]. Typically, a lot of older adults indicate that they would like to be active in leisure-time physical activity, but preferably not by themselves. For this reason, those who want to participate in GALM are invited to bring someone along.

Delivery Mode

The delivery mode subdomain refers to the structural and the administrative and/or social climates which convey the treatment to the participants [22]. GALM can be described as a community-based strategy to stimulate leisure-time physical activity. A neighborhood is selected and the strategy is carried out. By organizing the fitness tests as well as the introductory and follow-up programs in the participants’ own neighborhood, an important barrier to participation—distance to the facilities—is lifted, thus maximizing the chance of people becoming and remaining active in leisure-time physical activity. The introductory and follow-up programs offer participants a variety of popular leisure-time physical activities. Most participants
enjoy these activities and like doing a different one every week.

Implementing Organization

The implementing organization subdomain is defined as the organization responsible for coordinating, training, and supporting the program implementers as well as structuring the delivery mode [22].

The GALM strategy was developed by the Department of Human Movement Sciences of the University of Groningen in cooperation with the More Exercise for the Elderly National Foundation [Landelijke Stichting Meer Bewegen voor Ouderen] and has succeeded in stimulating a substantial number of sedentary adults to become active in leisure-time physical activity [21]. On the basis of the experiences and results of the pilot project, a manual has been written for use by the local authorities so that planning and execution of the GALM strategy can be done independently [3]. The manual can also be used to train interviewers who are recruiting participants for the program and provides protocols for the motor fitness tests, lessons for the 12-week introductory program, and guidelines for the follow-up program. There is also an instructive videotape for the motor fitness tests. Instructors for the introductory and follow-up programs are qualified physical education teachers who have followed a special 3-day course for GALM. To support the implementation, 12 fitness tests have been regionally distributed.

Two-thirds of the costs of a local GALM strategy are paid by the participants themselves, and one-third is subsidized by municipal and provincial governments. This subsidy is crucial to the execution of the recruitment and the two fitness tests. With an eye on continuing the strategy, the introductory and follow-up programs are cost-effective. A GALM team composed of employees of the Department of Human Movement Sciences and the More Exercise for the Elderly National Foundation operates nationwide supporting local authorities in the implementation of local projects.

TREATMENT DOMAIN

The treatment domain constitutes the basic, essential element that produces the intended changes in a program [22]. The treatment of GALM consists of three phases: recruitment, introduction, and follow-up (Fig. 1. Together they make up the GALM strategy and last 1 1/2 years.

Recruitment Phase

The main objective of this first phase of the GALM strategy is recruiting the target group, which consists of 55- to 65-year-old sedentary individuals. Within the context of stimulating leisure-time physical activity participation, it is essential to get through to those people who are truly sedentary and stand to benefit most from the program. To successfully recruit this target group, we have developed a special recruitment and screening strategy which comprises a population strategy and a network strategy. In the population strategy, about 1000 older adults in a selected municipal area receive a written invitation and are visited at home by a member of the local GALM team, as face-to-face approaches have been shown to increase participation [34,35,30]. Based on estimates of available demographic data [1,2,21], about 60% of those who receive an invitation can be considered sedentary, and in turn half of these qualify for GALM. The other half is not interested in leisure-time physical activity or is unable to participate due to illness, personal circumstances, or other reasons. Since attending by oneself is often a barrier, potential participants are invited to bring someone along, even if that person is not sedentary: this would be the network strategy, which will be used again in the course of GALM. As participants become acquainted with the program, they are invited again to recruit other sedentary adults. During the home visit, potential participants are screened using a short questionnaire based on physical activity recommendations by Pate et al. [31] and Mensink [32] in order to determine whether they really are sedentary (Stevens et al., unpublished observations). Those qualifying for the GALM strategy are invited to participate in the program. Preliminary results indicate that about 100–125 (±25%) eligible individuals are willing to participate.

Introductory Phase

People who decide to join the GALM strategy take the Groningen Fitness Test for the Elderly (GFE) before entering the introductory program. The GFE measures motor fitness in adults over the age of 55 who are living on their own, is suitable for testing large groups simultaneously, and consists of eight components which objectively measure motor abilities. These abilities are flexibility, aerobic endurance, strength, and coordination. Motor abilities are necessary for daily and leisure-time activities. The GFE also includes a questionnaire which measures perceived motor fitness. This test has proven to be feasible, reliable, and valid in research [34,35].

The 12-week introductory program forms the second part of the introductory phase. Available research and insights from social marketing theories stress the importance of tailoring the type, format, intensity, frequency, and location of the leisure-time physical activity regimen to meet the needs of different population subgroups [4,24,25]. The GALM strategy incorporates people’s wishes and needs into the program, thus lifting
an important perceived barrier to participation. The major aim of the introductory program is to allow participants to (re)gain enjoyment during leisure-time physical activity. The contents of the introductory program are based on an evolutionary-biological play theory [36] and can be characterized as a moderately intensive [32] leisure-time physical activity program with an accent on recreational activities [4].

In The Netherlands, two major organizations offer leisure-time physical activity programs for older adults. The More Exercise for the Elderly National Foundation offers a wide variety of leisure-time physical activities for individuals ages 65 years or older; most participants are female, and activities include gymnastics, aerobics, and folk-dance. The second organization is the HIB [Heart in Movement], which offers leisure-time physical activities for adults with a history of cardiovascular disease. Most participants in the HIB program are male: activities include games like volleyball, basketball, and soccer. After examining both programs we developed an introductory and follow-up program that appeals to both men and women. This program offers a variety of recreational leisure-time physical activities such as volleyball, basketball, aerobics, gymnastics, and badminton and can be adjusted to the group's wishes. In addition to these activities in the gymnasium, people are invited once during the 12-week introductory program to swimming and fitness programs. Sessions are held once a week and last 1 h.

The introductory phase is rounded off with a personal leisure-time physical activity recommendation based on the participant's GFE results, personal leisure-time physical activity history, and medical status. This recommendation, together with the experiences of the introductory program, may help participants decide how to continue their leisure-time physical activities.

Follow-up Phase

Following the 12-week introductory program and the personal leisure-time physical activity recommendation, participants may decide to engage in an already existing activity, continue with the GALM follow-up program, or combine GALM with an additional activity. The GALM follow-up program covers a period of 1 year and, like the introductory program, offers a variety of recreational leisure-time physical activities. In addition to sessions in the gymnasium, participants are invited once more to join swimming and fitness programs. Next to the main goal, which is ensuring that participants enjoy their leisure-time physical activities, a greater emphasis is laid on improving physical ability and motor fitness. The follow-up phase is rounded off with a second fitness test, 1½ years after the first fitness test. The results of this second fitness test can help illustrate the influence of physical activity on motor fitness.

The GALM program theory's intervening mechanism domain describes the underlying causal processes linking treatment to outcome [22] (Fig. 1). GALM is primarily based on insights of the social cognitive theory [37]. The purpose of the strategy is to alter causal variables of leisure-time physical activity. For this purpose, four relevant causal variables have been selected for our intervening mechanism on the basis of previous research and insights on social cognitive theory: self-efficacy, social support, perceived fitness, and enjoyment [4, 25, 38]. With regard to enjoyment being a causal variable in the GALM model, we should mention that it distinguishes itself from other behavioral change models in the field of social cognitive theory.

Self-efficacy is a key concept in Bandura's [37] social-cognitive theory and has been consistently related to leisure-time physical activity [25]. Self-efficacy theory suggests that behavioral change is affected by environmental influences, personal factors, and behavioral attributes [37]. Each may influence or in turn be influenced by either one. A person must believe in his ability to perform the behavior (i.e., must possess self-efficacy) and must perceive an incentive to do so (i.e., positive expectations must outweigh the negative), as well as value the outcomes or consequences that he believes will occur as a result of performing a specific behavior. Outcomes may be classified as having immediate benefits (e.g., feeling invigorated after leisure-time physical activity) or long-term benefits (e.g., improved cardiovascular health as a result of leisure-time physical activity). Since these expected outcomes are filtered through a person's expectations or perceptions of being able to perform the behavior in the first place, self-efficacy is believed to be the single most important characteristic that determines a person's behavior change.
Social support from family and friends has been linked by many studies to health-enhancing behaviors such as participation in leisure-time physical activity [25]. Social interaction can give participants information about their own efficacy and can facilitate successful coping behaviors [37]. Buddy systems, spousal participation, and encouragement and positive feedback from exercise instructors [39] and fellow participants have all been suggested to play a role in continued participation in leisure-time physical activity. Perceived fitness is a stable, positively related variable of leisure-time physical activity [25]. Caspersen et al. [40] conclude that the positive influence of leisure-time physical activity on perceived fitness is well established. McAuley and Rudolph [41] reviewed 38 studies on older adults (average age 57) who participated in 10- to 20-week physical activity programs. In general, reports of physical well-being were enhanced; this change was independent of both gender and age. Van Heuvelen et al. [42] found a low- to moderate association between perceived fitness and objective fitness, suggesting that people's feelings about their fitness are not always congruent with their actual fitness level.

Several researchers have suggested that feelings of enjoyment and well-being may play an important role in leisure-time physical activity participation [4,24,43]. Wankel et al. [43] found that, although participants reported health-related goals as being most important, these goals could not tell continuing program participants from dropouts. On the other hand, non-health-related goals—such as developing recreational skills and social relationships, going out, satisfying one's competitive drive and curiosity—even though rated less highly, did significantly distinguish adherers from dropouts. This suggests that secondary, non-health-related goals may be more readily attainable and more useful for facilitating continued involvement [44]. Knowledge of and belief in the health benefits of leisure-time physical activity may motivate initial involvement, but feelings of enjoyment and well-being may be stronger motives for older adults to continue participating in leisure-time physical activity programs. An absence of enjoyment is a main reason for dropping out [45].

CONCEPTUAL THEORY

The conceptual theory describes how the causal variables of the intervening mechanism domain affect outcome variables, which are specified in the outcome domain [22] (Fig. 1). The GALM conceptual theory assumes behavioral change to be a multidimensional and dynamic process. This conceptual theory combines insights from different theoretical perspectives to create motivating conditions in which the chances that sedentary elderly will change their lifestyle are increased. In order to structure this theory's multidimensionality, causal variables are divided into static and dynamic variables. Static variables are taken into account but cannot be manipulated and are part of the implementation environment domain. Dynamic variables can be manipulated and are part of both the implementation environment and the intervening mechanism domains. The intervening mechanism domain contains four causal variables of behavioral change. Self-efficacy, social support, and perceived fitness are considered conditional to the central causal variable in the conceptual theory, which is the enjoyment of leisure-time physical activity.

For the structuring of the dynamics of the behavioral change process we have used insights from the stages of change model by Prochaska and DiClemente [17]. Marcus and Owen [46] adapted the original stages-of-change measure developed for smoking cessation to describe exercise behavior. The GALM strategy comprises three phases: recruitment, introduction, and follow-up. In terms of the stages-of-change model, the recruitment phase matches the contemplation/preparation phase. In this phase, potential participants receive a written invitation and are visited at home by a member of the local GALM team. This procedure is the best guarantee that people who had considered becoming active but not yet taken the step to do so are recruited. People who are not interested in leisure-time physical activity at all (precontemplators) are not considered the strategy's primary target group. During the introductory phase participants make their first real effort to become involved in leisure-time physical activity on a regular basis. In the follow-up phase, the newly active individuals incorporate their leisure-time physical activity into their normal daily routine. In terms of the stages-of-change model, the introductory and follow-up phases compare with the action and maintenance phases, respectively.

Past research has shown that causal variables influencing behavioral change may not be consistent across the various stages. Causal variables predicting adherence rates at one stage do not necessarily do so at other stages [47]. Social cognitive factors (social support, self-efficacy, and perceived fitness) are considered important initiators of health behavior and positively influence the early period of maintenance, but may become less important with repeated performance [48]. McAuley [47] argues that, as individuals adapt physiologically and psychologically to the demands placed upon them by leisure-time physical activity participation, and as leisure-time physical activity becomes part of their daily schedule and possibly becomes less demanding, the role of efficacy cognitions is diminished. This perspective is in keeping with Bandura's [49] contention that cognitive control systems play their most important role in the acquisition of behavioral proficiencies. When behaviors are less demanding and more easily engaged in, cognitive control systems such as
self-efficacy give way to regulation by lower control systems. Enjoyment can be considered one of such lower control systems. Several researchers suggest that feelings of enjoyment and well-being may play an important role in exercise adherence \[4,24,43\]. Research by Csikszentmihalyi \[50\], Csikszentmihalyi and Rathunde \[51\], Wankel \[44\], Scanlan and Simons \[52\], Scanlan and Lewthwaite \[53\], and Bult and Rispens \[36\] suggest that social support, self-efficacy, and perceived fitness may be key conditions for (regaining enjoyment in leisure-time physical activity. By manipulating self-efficacy, social support, and perceived fitness during the different phases of the GALM strategy, participants are eventually able to experience enjoyment in leisure-time physical activity and will therefore continue their physically active lifestyle.

**ACTION THEORY**

In the action theory we describe how the causal variables in the intervening mechanism domain are manipulated in the different phases of the treatment domain \[22\] (Fig. 1).

In the recruitment phase, social support is the main manipulated causal variable. Many older adults say that they would like to be active in leisure-time physical activity but don't see the fun of doing it by themselves. This is why those who want to participate in GALM are invited to take someone along. A buddy system in which partners support each other is thus created.

To allow participants in the strategy of (re)gaining enjoyment in leisure-time physical activity, we have structured the introductory and follow-up programs along an evolutionary-biological theory of play behavior \[36\]. This theory states three conditions for play behavior: first of all, a low motivation condition of all behavior systems. This means that an environment must be created in which participants feel safe. Second, a slight ambivalence between some motivations— for instance between fear and aggression. Play behavior will occur in safe but exciting situations. Finally, curiosity: participants in the program must be stimulated to explore a variety of new activities. Together, these three conditions create favorable conditions in which self-efficacy, social support, and perceived fitness can be manipulated effectively and eventually lead to enhanced enjoyment.

Social support is influenced in several ways in the introductory phase. First of all, participants share the fact that they are all beginners when it comes to leisure-time physical activity. This feeling of being in the same boat generates support. Second, the introductory program is organized in a way that it emphasizes social support. Besides the social interaction during the various activities, every lesson ends with coffee and tea, and participants who drop out of the program are contacted and invited to return. Finally, by offering leisure-time physical activities that appeal both to men and women, married couples can support each other.

Self-efficacy is the second causal variable manipulated in the introductory phase. The four main sources of efficacy information described by Bandura in the social learning theory \[37\]—past and present levels of performance \(1\), vicarious experience of observing others perform \(2\), verbal persuasion \(3\), and states of physiological arousal \(4\)—are incorporated into the introductory phase, especially in the introductory program, with the purpose of allowing participants to get a taste of success. Exercise instructors help participants develop feelings of self-efficacy through activities designed to provide successful mastery experiences. In the first place, the introductory program has a low starting level with respect to the intensity and difficulty of the activities presented to participants, thus making almost everyone feel at ease about their ability to participate. Second, the GALM introductory program was designed to allow differentiation in the difficulty, intensity, and duration of the activities so that every participant can be active on his own level and thus experience success. Third, game rules and materials needed \(e.g., \) balls are adjusted to participants' capabilities when necessary. Another potential source of efficacy information is generated through socially induced methods. In GALM, neophyte exercisers are socially integrated in a group of peers who are also trying to develop a physically active lifestyle. The introductory group thus represents a realistic vicarious experience in which social modeling and persuasion are stimulated and may result in efficacy information, encouraging the individual to adhere to the exercise regime.

Finally, participation in the introductory program not only leads to improved objective fitness but also enhances perceived fitness; in other words, participants feel better about themselves and this results in an enhanced feeling of self-efficacy \[54\].

The follow-up program has the same structure as the introductory program. Its main objective is to continue the experience of enjoyment. Secondary objectives are the development of technical skills and the improvement of motor fitness.

**RESEARCH**

Our current research efforts are focused on validating the GALM behavioral change model. In order to validate the model, a distinction is made between the validation of the action theory and the conceptual theory. A programs overall accomplishments require success in both action theory and conceptual theory \[22\]. By validating the action theory we hope to obtain information on whether the treatment as described effectively...
manipulates the causal variables as described in the intervening mechanism domain. It is our hypothesis that, by enhancing self-efficacy, social support, and perceived fitness, formerly sedentary participants will eventually be able to experience enjoyment in leisure-time physical activity. By validating the conceptual theory we want to find out whether the causal variables and their mutual relationships as described in the intervening mechanism domain influence the outcome variables as specified in the outcome domain. It is our hypothesis that enjoyment experienced in leisure-time physical activity will eventually lead to a continued physically active lifestyle.

Measurements of the causal variables will take place at three moments along the course of the project. These measurements must reveal information with respect to the dynamic nature of the model and the influence of the causal variables during the different phases of the project. The first measurement will take place during the recruitment phase; participants as well as nonparticipants are asked to participate in the research, since both groups’ information is necessary in order to validate the model. The group of nonparticipants is made up of sedentary as well as already active older adults. The second measurement will be held after completing the introductory program and the last measurement after completing the follow-up program, $1\frac{1}{2}$ years after the start of the program. The second and third measurements only focus on project participants and dropouts. Existing instruments for measuring causal variables have been translated from English into Dutch and research has been done into instrument validity and reliability. In order to measure self-efficacy, we use a Dutch version [55] of the 10-item Perceived Physical Ability subscale of the Physical Self-Efficacy scale developed by Ryckman et al. [56] and a Dutch translation of the self-efficacy questionnaire by McAuley [47]. The scales for measuring Social Support for Diet and Exercise Behaviors [29] are used to measure social support with respect to leisure-time physical activity participation. Lemmink’s perceived fitness questionnaire [35] will be used to measure perceived fitness. A new questionnaire, the Groningen Enjoyment Questionnaire (Stevens et al., unpublished observations), has been developed to measure enjoyment experienced in leisure-time physical activity. To measure the outcome variables, program adherence will be checked by the instructors of the introductory and follow-up program, and leisure-time physical activity will be measured by means of the Physical Activity Questionnaire for the Elderly by Voorrips et al. [58]. Measurements of motor fitness with the help of the GFE after completing the follow-up program will provide additional information on whether changes in activity patterns also lead to changes in motor fitness.

Validation will be done with the help of multivariate techniques such as structural equation techniques (LISREL). By validating the GALM behavioral change model we are attempting to enlarge our insight into the multidimensionality and the dynamic of the model.

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