Motivational factors influencing intention in stroke patients to do exercises at home

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Abstract

Stroke is a major cause of death and disability. Physical exercises can help stroke patients to regain some of the physical functions they have lost. To maximize recovery, appropriate physical exercises should be done regularly. However, stroke patients often do not maintain an (regular) exercise routine when they are back home. Overall this non-compliance is believed to be caused by a lack of motivation. The current study investigated the determinants of non-compliance. Nine predefined factors were studied by means of a questionnaire. The factors were based on a framework by Fishbein et al. (2001). The paper also gave concrete guidelines to developing an appropriate questionnaire. The main conclusions of the current study are that one of the sub-dimensions of attitude and self-efficacy are important predictors of non-compliance and therefore important motivation factors. Furthermore, current results indicate that the perception of social support is important. Ideas for improvement are proposed for the Philips Rehabilitation Exerciser, which helps the physiotherapist to remotely supervise patients and which provides feedback to the user and practical implications are discussed.
Table of contents

Abstract ......................................................................................................................................ii
1 Introduction.................................................................................................................................1
  1.1 Research question ..................................................................................................................2
  1.2 Current state of knowledge .....................................................................................................4
     1.2.1 Interview studies ...........................................................................................................4
     1.2.2 Intervention studies .......................................................................................................5
  1.3 The need to make use of theories .........................................................................................7
  1.4 Theoretical framework ..........................................................................................................8
  1.5 Perceived and Received social support ...............................................................................10
  1.6 The current research ............................................................................................................10
2 Method .......................................................................................................................................12
  2.1 Participants ............................................................................................................................12
  2.2 Materials ..............................................................................................................................12
  2.3 Measures ..............................................................................................................................13
  2.4 Control measures ..................................................................................................................15
  2.5 Procedure .............................................................................................................................15
3 Results ........................................................................................................................................17
  3.1 Factor structure ....................................................................................................................17
  3.2 Regression analysis: predicting Intention ............................................................................18
  3.2 Regression analysis: predicting Obligation-attitude ..........................................................19
  3.3 Regression analysis: predicting Self-efficacy .......................................................................20
  3.4 Further results ......................................................................................................................21
     3.4.1 Interaction effect .........................................................................................................21
     3.4.2 Mediated moderation .................................................................................................22
4 Discussion ....................................................................................................................................26
  Persuasion ...................................................................................................................................29
  Limitations .................................................................................................................................30
  Recommendations for further research .....................................................................................32
References .....................................................................................................................................33
Appendix 1: List of questions (translated to English) .................................................................38
Appendix 2: List of questions (in Dutch) .....................................................................................42
Appendix 3: Pre-test ......................................................................................................................46
Factors influencing intention

Method ........................................................................................................................................46
Criteria for participation ..........................................................................................................46
Participants................................................................................................................................46
Characteristics of participants .................................................................................................46
Procedure ..................................................................................................................................47
Data analysis .............................................................................................................................48
Results.....................................................................................................................................48
Compliance: ..............................................................................................................................48
The exercises..............................................................................................................................48
Barriers.....................................................................................................................................48
Social support............................................................................................................................49
Relevant referents .....................................................................................................................50
Perceived outcomes of performing the behaviour .................................................................50
Personal characteristics of people who do and do not perform exercises.........................51
Information ................................................................................................................................51
Discussion.................................................................................................................................51
Appendix 4: Summaries variable item content.......................................................................53
Appendix 5: Demographics.......................................................................................................56
Appendix 6: Validating the measures......................................................................................58
Appendix 7: Factor analysis......................................................................................................61
1 Introduction

Lydia is a 51 year old office manager with a busy but fun life. One night, while walking to the bathroom she suddenly falls to the ground. What is happening? She tries to scream but can’t! She cannot move anymore! Luckily, her husband finds Lydia quickly and calls an ambulance. At the hospital she is told that she has had a stroke but that she can recover from her physical impairments if she keeps doing physical exercises. From that moment on, she practices and practices every day. One day, although her arm is still impaired, she is discharged from the hospital. Now, she is at home staring out of the window. Although her physiotherapist told her that she should practice more, she does not feel like doing any exercises. Actually she has not done them for a whole month. She asks herself: ‘Why is it so hard for me to do my exercises?!’

The World Health Organization (WHO, Mackay & Mensah, 2004) indicates that stroke is the third common cause of death worldwide (10%), exceeded only by heart diseases (13%) and cancer (12%). Furthermore, this organization states that the absolute number of strokes will increase because of the ageing society. Nowadays, fifteen million people worldwide suffer a stroke each year. Of these people, five million die, five million have a moderate to good recovery and the others are left with long-term disabilities (Mackay & Mensah, 2004).

A stroke is caused by the interruption of the blood supply to the brain, usually because a blood vessel breaks or is blocked by a clot. This causes damage to the brain. Which of the control, sensory or cognitive functions are lost or impaired depends on the area of the brain that is affected by the stroke. However, of those that are left with long-term disabilities, 85% has an impairment in one of the upper limbs (Loureiro, Topping, Driessen, & Harwin, 2003).

Fortunately, physical exercises can help patients regain some of the functions they have lost (Sarafino, 2006). Most stroke patients who have physical disabilities perform exercises in a polyclinic or rehabilitation centre with help from a physiotherapist. It often happens that a patient is discharged from the rehabilitation program due to costs or lack of motivation to continue from the patient-side. This happens despite the fact that the patient did not reach his full potential (Willmann et al., 2007). To achieve maximal recovery, patients must continue to do their physical exercises when they get back home.

Unfortunately, the literature indicates that, having arrived at home, stroke patients do not maintain their prescribed exercises (Choi-Kwon, Kwon, & Kim, 2005; Loureiro et al.,
2003). In a study performed in Korea for example, patients had to perform exercises to prevent a second stroke. Choi-Kwon et al. (2005) indicated that 59% of the patients did not maintain their exercises. In a study in the Netherlands, physiotherapists estimated that only 23% of the patients persisted in doing exercises in the long run when discharged from the rehabilitation facilities program (E. Sluijs, Kok, & van der Zee, 1993). Recovery depends on compliance to physical exercises and this is a major concern of physiotherapy in general.

It is extremely important to tackle the problem of non-compliance to prescribed exercises if we, as a society, want to ensure the well-being of the elderly (IJsselsteijn, Kort, Midden, Eggen, & Hoven, 2006). Stroke is a major concern of the elderly and due to an ageing society, funds and professional help for rehabilitation might not be available in the future. For that reason, exercises have to be maintained at home without too much help from others.

Current research in (exercise-) compliance focuses mainly on the topic of motivation. Physiotherapy frequently uses the term motivation and claims that motivation is the main driver of compliance and recovery (Maclean, Pound, Wolfe, & Rudd, 2000; Shen, McLellan, & Merrill, 2000; Simpson, Joe, Rowan-Szal, & Greener, 1997). For this reason, the term motivation is believed to be an important concept. However, according to King and Barrowclough (1989), there is a lack of a shared understanding of the term motivation and research is often unclear about how motivation is measured. This suggests that there is a need for a better understanding of the concept motivation.

1.1 Research question

Philips Research recently developed the Philips Rehabilitation Exerciser (Willmann et al., 2007, see figure 1). This research program focuses on new methods for stroke patients to exercise their upper limbs at home. The Philips Rehabilitation Exerciser captures the patient’s upper body movements with motion sensors and transmits the records automatically to the remote console of the therapist.
Factors influencing intention

When a patient performs an exercise with the Philips Rehabilitation Exerciser, he does so according to pre-selected exercises by the therapist. First, the patient is shown an instruction video, followed by the patient performing the demonstrated exercise, while receiving feedback from the Philips Rehabilitation Exerciser through the series of exercises. Here, a visual representation of the movement is shown on a computer screen and sound messages are given when a predefined goal is reached. With this information, the patient knows whether the exercises are performed correctly.

It can be expected that this system has two main advantages:

1. The cost of rehabilitation will reduce because a therapist can remotely supervise many patients.
2. The patient becomes more motivated because he knows how to do the exercises properly.

The Philips Rehabilitation Exerciser project is a multidisciplinary project looking at the technical side (hardware, sensors, algorithms), the clinical relevance (how to create relevant therapy for the patient in a technology mediated setting) and the motivational aspects of the system (how do we get the patients to do the therapy that is prescribed). The current study focuses on the motivational aspects.

As outlined in paragraph 1.2, the current state of knowledge, there is insufficient knowledge about what truly causes motivation to exercise. Therefore, to improve the Philips Rehabilitation Exerciser, this research aims to obtain a better understanding of motivation to do and to continue doing exercises and its relationship with non-compliance. Doing exercises
Factors influencing intention can be interpreted in various ways. People can train a particular muscle movement or do activities like walking and cycling to train their physical condition. This study focuses on those exercises that train a particular muscle movement. The goal of this research is to find an answer to the following research question:

What are the most important motivational factors that influence intention in stroke patients to do exercises at home?

To answer this research question, this paper first deals with the current state of knowledge on stroke rehabilitation. Subsequently, the theoretical framework is outlined and is followed by the description of the method that is applied in this research. Next, the results are shown. The last section discusses the most relevant results and looks into the limitations of this research and recommendations for further research.

1.2 Current state of knowledge

There are many approaches to investigate why people are not motivated to do prescribed exercises. The results of two common approaches are discussed in this section. The first approach uses interviews and the second approach uses intervention strategies. First, the results of interviews are described followed by the results of intervention studies.

1.2.1 Interview studies

To find out how the concept of motivation is reflected in behaviour, Maclean, Pound, Wolfe and Rudd, (2000, 2002) performed interviews with two groups of people: stroke patients and stroke rehabilitation professionals.

The first interview study was performed with stroke patients, who were a priori classified by their therapists as either highly or poorly motivated (Maclean et al, 2000). The authors interviewed 22 patients to discover differences in attitude or behaviour between the highly and poorly motivated patients. In this study, Maclean and colleagues indicated that all patients believed that doing exercises is important for recovery. However, highly motivated patients were more likely to regard doing exercises as the most important means of recovery. The highly motivated patients emphasised that information about the typical process of recovery was motivating. It made them realize that an active role in their exercises is the way to recover. Highly motivated patients were also more likely to understand how their exercises contributed to their long term recovery. Furthermore, having a personal goal was mentioned...
Factors influencing intention

as motivating. Independence of family in daily activities and the desire to leave the hospital were frequently mentioned as personal goals.

In contrast, poorly motivated patients did not understand how the different tasks they were given contributed to their long term recovery. Moreover, they did not mention information as motivating but they mentioned that the lack of information made them feel anxious. Furthermore, overprotection was mentioned by some patients as diminishing motivation: it made them feel stupid.

In the second study, Maclean et al. (2002) conducted interviews with rehabilitation professionals to find out how they interpret motivation and how this affects their everyday practice. The study revealed that professionals classified patients as motivated or poorly motivated on the basis of their appropriate forms of behaviour. For example, patients were seen as motivated by the rehabilitation professionals when they asked relevant questions or when they showed understanding of what the therapy staff told them, or when they interacted with the therapy staff. The professionals said that discussing relevant rehabilitation goals with the patient and providing (personalized) information about the normal process of rehabilitation was motivating. Additionally, they mentioned encouragement from the social environment as another reason that motivated patients.

The results of these studies suggest that information about the typical process of rehabilitation, social support and goal setting can be motivating. However, it is important to notice that especially motivated patients engaged in the appropriate forms of behaviour. They were more likely to accept social support and to understand the information given by both the professionals and the social environment. However, it is unclear whether highly motivated patients were motivated by information and/or social support or whether they were already motivated to accept information and/or social support and to do was necessary for their recovery. This unresolved cause-effect issue holds for the unmotivated patients as well. What follows is the second approach to studying motivation in stroke rehabilitation: intervention studies.

1.2.2 Intervention studies

With the recent development in sensors and interactive displays, and the promise of tele-rehabilitation, there is an increased interest in rehabilitation of stroke patients with the help of technology. In these intervention studies, movements are monitored with sensors and the effects of feedback on physical outcomes are explored. Example systems are: MIT-MANUS (Krebs, Hogan, Aisen, & Volpe, 1998), MIME (Lum, Burgar, Shor, & van der
Factors influencing intention

Loosm, 2002), T-WREX (Reinkensmeyer, Pang, & Painter, 2002), SMART (Mountain et al., 2006) and AutoCite (Taub, Lum, Hardin, Mark, & Usватte, 2005). These intervention studies are mainly approached from a technical perspective, motivational qualities of the systems are assumed and little knowledge about human factors is integrated. Some research suggests that rehabilitation with help of technology can be motivating (Harris & Reid, 2005; Jack, Boian, & Merians, 2001; Loureiro et al., 2003; Merians et al., 2002; Reinkensmeyer et al., 2002). However, valid research has not yet been performed on how technology can increase motivation in stroke patients to do exercises (Saini, 2007). Thus, it is unclear how to effectively use technology to increase the motivation of stroke patients to perform their exercises.

A very important goal of technology that supports rehabilitation is tele-rehabilitation. Tele-rehabilitation is the delivery of rehabilitation at remote distance. Tele-rehabilitation might reduce costs because it allows a therapist to remotely supervise many patients (Carignan & Krebs, 2006). Supervising patients from a distance is feasible because patients’ movements can be recorded by sensors and be transmitted to a remote distance. Despite the fact that the technology is feasible, clinical benefit still has to be proven (Brennan, Georgeadis, Baron, & Barker, 2004).

In the last decade, innumerable intervention studies have been performed that are not based on technology. Several meta-analyses tried to find the most effective interventions to increase compliance in general (Sluijs et al., 2007) and to increase compliance to exercise therapy (Burke, Dunbar-Jacob, & Hill, 1997; Newell, Bowman, & Cockburn, 2000). Some interventions appear to significantly affect compliance. Examples of such interventions are: enhancing self-efficacy, feedback, supervised exercises, memory aids and incentives. However, the meta-analyses by Burke et al., 1997; Newell et al., 2000 and Sluijs et al., 2007 were not able to determine which intervention is most effective. Several reasons for this are: The studies had different follow-up periods, for instance, a few days or half a year. The studies were rather short (i.e. most studies had a follow-up period of less than half a year). The interventions were often complex. That is, a mixture of interventions was investigated (e.g. counselling in combination with self-monitoring, McDonald et al, 2002). As a result, the mechanisms responsible for effective interventions remain undiscovered. Finally, there are differences in adherence measures, for instance: blood pressure, self-reported behaviour or attendance to appointments. In conclusion, it is hard to compare these interventions.

Despite the fact that it is not possible to determine which intervention is most effective and which are durable, intervention studies provide us with detailed insights into the
Factors influencing intention

topic of compliance. The studies indicate that some strategies and circumstances can increase compliance. Furthermore, the studies show that compliance can be measured in several ways. However, these studies usually do not study the determinants of being unmotivated. As a result, we do not have a comprehensive overview of why specific intervention strategies increase motivation, under which conditions and how large the effect is or should be.

To summarize, a large number of studies have been performed in the field of motivation and compliance to prescribed exercises. Each of these studies give one piece of the puzzle of motivation, but this puzzle is not yet complete. The results of two common approaches were discussed. In the next paragraphs, it is explained why I believe that theories are necessary for progress in interventions and is followed by a description of the theoretical framework that is used in this study.

1.3 The need to make use of theories

As shown in paragraph 2.1 (Interview studies), the term motivation is an important concept in the field of rehabilitation. Also in behavioural research in general, motivation is seen as an important concept and as a major mediator of human behaviour.

Several theoretical models discuss motivation (among others; social learning theory, Rotter, 1982, goal setting theory, Locke, 1990, theory of planned behaviour, Ajzen, 1991). Each model gives some explanation on how behaviour is influenced and has a large body of empirical research supporting their utility (Kasprzyk, Montana, & Fishbein, 1998).

As outlined in the current state of knowledge, the research and development of interventions is not yet complete. A possible explanation for this is that theory-based research on motivation is rarely applied in the development and implementation of interventions (Gielen & Sleet, 2003; Saini, 2002). The main advantage of using theories is that it helps us to understand and analyse the determinants of problems and they allow us to identify underlying mechanisms of behaviour. Therefore, these theories should be used in intervention studies when compliance has to increase. However, a theoretical problem exists. Several behavioural models are available and offer more than one suggestion on how to improve health. As a consequence, different theoretical approaches may be appropriate for different types of situations (Sluijs & Knibbe, 1991). However, in the case that a situation gets more complex, more theories become relevant and it becomes unclear which theory is most suitable and how it can be applied (Sluijs et al., 2007). Although it is very interesting to explore how motivation is constituted, due to the practical and complex nature of the current
research, a more fruitful approach is to look for the most important determinants of motivation according to several important theories.

Multiple behavioural models are used to explain health behaviour. The most common models are the Health Belief Model (Becker, 1974), the Social Cognitive Theory (Bandura, 1986), the Theory of Self-regulation (Kanfer, 1970) and the Theory of Planned Behaviour (I. Ajzen, 1991). Most theories are, to a certain extent, complementary to each other (Saini, 2002). Therefore, several integrated approaches that combine theories in one framework have been proposed (Fishbein et al., 1992; Saini, 2002). An advantage of an integrated approach is that by integrating the most influencing theories in one framework, it creates a limited set of factors to investigate. Thus, when investigating this limited set, it is expected that the most important determinants of being non-compliant will be revealed.

### 1.4 Theoretical framework

In 1991, the National Institute of Mental Health (NIMH) organized a theorists’ workshop that brought together behavioural scientists to develop a unifying framework that could be applied to the prevention of HIV infection (Fishbein et al., 1992). The focus of the workshop was to identify factors that predict and understand behaviour. The discussions led to the integration of five theories in one framework that contains the most important factors that influence behaviour. This framework is outlined in Fishbein et al. (2001)

The framework integrates the following five theories:

1. The Health Belief Model (Becker, 1974)
2. The Social Cognitive Theory (Bandura, 1986)
4. The Theory of Self-regulation (Kanfer, 1970)
5. The Theory of Subjective Culture and Interpersonal Relations (Triandis, 1980)

When the five theories were integrated, the behavioural scientists agreed on eight factors that appear to account for most of the variation in health behaviour. These eight factors are:

1. Intention: Behaviour is more likely to occur if a person has formed a strong positive intention (or commitment) to perform the behaviour. The behavioural scientists agreed that this factor is most proximal to behaviour and is therefore suitable to use as a predictor of behaviour. The concept is derived from the theory of planned behaviour (Ajzen, 1991) and although not explicitly mentioned in the proposed framework, according to Ajzen (1991),
Intention can be seen as capturing motivation: “Intentions are assumed to capture the motivational factors that influence a behavior; they are indications of how hard people are willing to try, of how much of an effort they are planning to exert, to perform the behavior” (Ajzen, 1991, p. 181).

2. Social norms: Behaviour is more likely to occur if a person perceives more social (normative) pressure to perform the behaviour than to not perform the behaviour.

3. Self-standards: Behaviour is more likely to occur if a person perceives that performance of the behaviour is more consistent than inconsistent with his self-image.

4. Emotional reaction: When someone’s emotional reaction to performing a behaviour is more positive than negative, then, this behaviour is more likely to occur.

5. Outcome expectancies: If a person believes that the advantages of performing the behaviour outweigh the disadvantages, then, behaviour is more likely to occur. Within social psychology, such a cost-benefit analysis has often been viewed as a measure of one’s attitude towards performing the target behaviour (Fishbein & Ajzen, 1975).

6. Self-efficacy: In different circumstances, behaviour is more likely to occur if a person perceives that he has the capabilities to perform the behaviour. Such circumstances can be external to the person (see Barriers and Facilitators) as well as internal to the person, for instance, concentration.

7. Barriers and Facilitators: It is more likely that a person performs the target behaviour if there are no external circumstances that make behaviour impossible and if there are external circumstances available that make behaviour easier.

8. Skills: Behaviour can only occur if a person has the skills necessary for performance.

The first three factors are seen as necessary and sufficient for producing any behaviour. The remaining five are viewed as modifying factors influencing the strength and direction of the intention. Additionally, the framework recognizes that feedback influences one or more of these five factors, which is expected to result in an increase or decrease in Intention.

Furthermore, according to Fishbein et al. (2001), the factors that best predict Intention are the most important reasons for not complying with prescribed exercises. Therefore, it is expected that the impact of a persuasive attempt will be largest and most relevant when focusing on factors that predict intention. Consequently, it is less important to focus on other factors that do not predict Intention.
Factors influencing intention

1.5 Perceived and Received social support

The relationship between social support and health has often been found (House, Landis, & Umberson, 1988). However, limited progress has been made in understanding the more specific mechanisms that influence health through social support (Sarason, Sarason, & Gurung, 2001). According to Fishbein et al. (2001), social influences are captured in the concept ‘Social norm’, with which is meant social pressure. However, some researchers have argued that the operational definition of the Social norm insufficiently captures social influences because the concept does not include all perceived behaviours of others (Grube, Morgan, & McCne, 1986). According to Cohen, Gottlieb, & Underwood (2000), “Social support is a broad term encompassing a variety of more specific characteristics of an individual’s social world”. Clearly, there is no agreement on how social support is defined and therefore it is difficult to measure how it is influencing behaviour.

Two general measures of social support are often linked to recovery from a stroke, namely Perceived and Received social support. Some research indicates Received social support to be related to recovery from a stroke (Glass, Matchar, & Belyed, 1993; Tsouna-Hadjis, Vemmos, Zakopoulos, & Stamatelopoulos, 2000). These researchers asked the patients about the frequency of occurrence of social actions of people around them. Other researchers have found a relation between Perceived social support and increased functional status of stroke patients (Chang & Mackenzie, 1998). These researchers asked the patients about the satisfaction of the social support provided by people around them. Thus, Received social support concerns the amount of social support someone gets, and Perceived social support concerns the perceived quality and availability of social support. Since both measures seem to be important in stroke rehabilitation, both measures are used in this study and added to the framework. A study performed by Wethington & Kessler (1986) used both measures in a non-stroke related study. In this study the psychological distress of life events in married participants between the age of 21 and 65 was measured in relation to Perceived and Received social support. This study found perceived social support to be having a mediating effect on the relation between Received social support and psychological distress. The current research aims to find an explanation for the somewhat contradicting effects described above.

1.6 The current research

To determine which factors predict intention in stroke patients to do exercises at home, this study performed interviews and distributed questionnaires among stroke patients
in the Netherlands and in Belgium. Because the theoretical framework of Fishbein et al. (2001) gives us a complete overview of the most important determinants, this framework is used in this study.

In addition to identifying eight factors that are expected to influence behaviour, Fishbein et al. suggested to use questionnaires to assess each of the eight factors. Each measure of a factor consists out of one or more statements (items) on which participants have to rate their level of agreement (Likert scales). To find differences in ratings, the measures are compared with each other. However, first of all, Fishbein and colleagues distinguished between items that have ‘fixed’ content and those that have ‘variable’ content. For example, for Intention, the content is ‘fixed’ and for Self-efficacy, the content depends on the population being studied. That is, the item ‘I intend to do my exercises’ is rather fixed compared to ‘I can ensure that I am not too tired to start exercises and/or actions’. This is because the latter example is specified to a population that is studied, in this case disabled stroke patients. Thus, to be able to investigate the framework with a fixed item questionnaire, it was recommended by Fishbein et al. to obtain variable item content from the population under study by the means of open-ended elicitation questions (Fishbein et al, 2001). Therefore, in a pre-test, variable item content was obtained by the means of interviews with eleven disabled stroke patients. See appendix 3 for the report.

To determine how stroke patients can be motivated to comply with their prescribed exercises, this study investigated which of the factors of the framework proposed by Fishbein et al. (2001), Perceived and Received social support best predicted Intention.
2 Method

2.1 Participants

The address file of the Dutch stroke association ‘Samen Verder’ (900 members) and the Belgium stroke association ‘Stroke’ (200 members) was used to find participants for our questionnaires. In total 205 respondents filled in a questionnaire. However, only 56 participants filled in the questionnaires appropriately. Of the 56 participants who filled in the questionnaire correctly, 15 performed only deliberate actions, that is, they performed everyday activities with the aim of training a particular muscle movement. For example, doing the dishes or eating with cutlery. 12 only did exercises to train a muscle movement and 29 performed both. 16 questionnaires were removed from the total sample because they were not filled in by the patient himself or herself and 129 people had been advised not to do exercises or did not perform any deliberate action to train a particular muscle movement.

The remaining 56 participants had a mean age of 53 years. 24 of the 56 were men; 32 were woman. 7 Belgian people and 49 Dutch people participated. 24 people suffered a stroke within three years and 28 participants had a meeting with a physiotherapist once a week or more. Further information about demographics can be found in appendix 5.

2.2 Materials

Because most of the members of both associations (Samen Verder and Stroke) were active on the internet and capable of handling a computer, an online questionnaire was considered suitable. This online questionnaire was programmed in a program language that is suitable for building web pages (PHP).

The questionnaire started with questions about which exercises were prescribed by the physiotherapist. Next, questions followed about which deliberate actions the participants intended to perform daily. Additionally, questions were asked about which exercises they intended to perform to improve or to maintain their physical condition. Because the questionnaire was programmed in PHP, it created the possibility to make the questionnaire adaptive. To create clarity, only those exercises that were filled in as prescribed or performed appeared on the top of later pages whenever of use. If the filled in exercises appeared on top of the page, the questions referred to them. An example is “I intend to do these exercises tomorrow.”
2.3 Measures

Because variable item content was added to the fixed item questionnaire (see pre-test, appendix 3), seven of the eight factors out of the framework could be covered with the questionnaire: Barriers, Attitude, Social norms, Self-standards, Emotional reaction, Self-efficacy and Intention. And, as mentioned in the introduction, two additional factors were added: Received and Perceived social support. This resulted in a total of nine factors. To be mentioned, there is one factor missing out of the framework, namely, Skills. According to Fishbein et al. (2001), when measuring Skills, people should be observed. However, because it was expected that anonymity would improve the response rate and reduce any influences by the researcher, this factor was left out of this study. Thus, in total nine factors were covered in the questionnaire.

The measures are based on guidelines that were given by Fishbein et al. (2001) and an example item is given for each measure. However, the sample items are translated to English since the questionnaire was written in Dutch. The total questionnaire can be found in appendix 1, for a Dutch version of the questionnaire see appendix 2. Only for Intention, the same items were asked twice, once referring to exercises and once referring to deliberate actions.

Factor 1: Intention (dependent variable) was measured by rating each of four 7-point Likert type scales anchored by “unlikely” (1) to “likely” (7) in response to items. A sample item is “I intend to do these exercises tomorrow”. In addition, one item was added about intention performance “How often are you going to do these exercises each week?” anchored by “1” to “7”. The Intention items were internally consistent for each group of participants (Intention-deliberate actions, α = .850; Intention-exercises, α = .860; Intention-combined, α = .941).

Factor 2: Received social support was measured by rating each of nine 5-point scales anchored by “never” (1) to “always” (5) in response to items. A sample item is “Somebody watches over my safety during the exercises and/or the actions.” The Received social support measure was internally consistent (α = .863)

Factor 3: Social norm was measured by rating one 7-point Likert type scale anchored by “disagree” (1) to “agree” (7) in response to the phrase “most people who are important to me think that I should do my exercises and/or actions” followed by one 7-point Likert type scale anchored by “disagree” (1) to “agree” (7) in response to phrase “When it comes to exercises or actions I want to do what those people that are important to me think that I should do”. The
score on the response to the pressure exerted by the people was multiplied by the score on the response to the motivation to comply with those people. Therefore, the range of the score was 1 to 49.

Factor 4: Self-standards were measured by rating five bipolar 7-point scales ranging from “disagree” (1) to “agree” (7) in response to items. A sample item is “I am responsible”. The Self-standard measure was internally consistent ($\alpha = .837$)

Factor 5: Emotional reaction was measured by rating eight bipolar 7-point Likert type scales anchored by bipolar adjectives in response to the opening phrase “When I do these exercises and/or actions, I feel...” An example item is “sad” (1) to “happy” (7). The Emotional reaction measure was internally consistent ($\alpha = .894$)

Factor 6: Perceived social support was measured by rating each of four 5-point scales anchored by “very uncertain” (1) to “very certain” (5) in response to items. A sample item is “I feel that I can ask people close to me for an explanation on the right way to do exercises or an action.” followed by the phrase “How certain are you that you can do this?” The Perceived social support measure was internally consistent ($\alpha = .894$)

Factor analyses, which included all items, indicated that each measure loaded on a separate dimension for the measures above. However, for Attitude and Self-efficacy related items, not all the items that were posed loaded on clear dimensions. Factor analysis, which included only attitude related items, indicated that Attitude was indexed along three main dimensions, which were interpreted by the researcher as a Utility-attitude, an Affective-attitude and a Obligation-attitude dimension. A similar distinction has also been proposed by Bagozzi (1989). Factor analyses, which included all items, indicated that Affective-attitude items were loading on the same dimension Emotional reaction items were loading on. This suggested that the affective component was already captured in our framework. Therefore, based on these analyses, an additional Attitude measure was added. See appendix 5 for more details. This resulted in a total of three attitude measures; a Utility-attitude, an Affective-attitude, named Emotional reaction, and a Obligation-attitude.

Factor 7: Utility-attitude was measured by rating each of three 7-point Likert type scales anchored by bipolar adjectives in response to the opening phrase “I find these exercises and/or actions...” A sample item is “harmful” (1) to “beneficial” (7). The Utility-attitude measure was internally consistent ($\alpha = .828$).

Factor 8: Obligation-attitude was measured by rating two 7-point Likert type scales anchored by bipolar adjectives in response to the opening phrase “I find these exercises and/or actions...” The bipolar adjectives used are: “foolish” (1) to “wise” (7) and “incorrect” (1) to
Factors influencing intention

“correct” (7). The Obligation-attitude measure was reasonably internally consistent ($\alpha = .736$).

Furthermore, based on factor analyses, which included all items, the following Self-efficacy measure was constructed:

Factor 9: Self-efficacy was measured by rating three 5-point scales anchored by “very uncertain” (1) to “very certain” (5) in response to items. A sample item is “I can ensure that I am not too distracted by television, radio, telephone and/or Internet.” followed by the phrase “How certain are you that you can do this?” The Self-efficacy measure was reasonable internally consistent ($\alpha = .737$).

Because the Barrier items are linked to the Self-efficacy items, that is, the external circumstances are those situations wherein a person perceives he or she has the capabilities to perform the target behaviour. Thus, it is required to use only those items concerning the same situations.

Factor 10: Barriers were measured by rating each of three 5-point scales anchored by “never” (5) to “always” (1) in response to the opening phrase “I do not get around to these exercises and/or actions” A sample item is “… because I forget about them.” The measure for Barriers was reasonable internally consistent ($\alpha = .713$).

2.4 Control measures

To increase the reliability of the questionnaire, several control measures were included in the questionnaire. First, because this study made use of an online questionnaire, it was possible to record the IP-address of the sender. Whenever a double IP-address was detected, the earlier questionnaire(s) with the same IP-address(es) were removed from the sample.

Secondly, although it was emphasized, before filling in the questionnaire, that patients should have filled in the questionnaire without any help from others, this was checked in the end by the question “Did you fill in the questionnaire without any help or did someone help?” To prevent any social influences, whenever someone helped, these questionnaires were removed from the sample.

2.5 Procedure

Initially, the stroke patients were invited to fill in the questionnaire via newsletters that were sent by email by both associations. However, the response rate on these newsletters
was extremely low and therefore the association ‘Samen Verder’ decided to send a direct email to all of their members with the question to fill in the questionnaire. In both the email and newsletters a link to the online questionnaire could be found.

In the email and the newsletter, the goal of the project (to developed technical aids) was explained and contact details were added. Furthermore, it was told that the questionnaire took about 20 to 30 minutes and that a summary of the results was going to be placed at the homepage of their association. When arriving at the questionnaire and before they had to fill in any answer, they were told that they had to fill in the questionnaire independently and that anonymity was assured.

After the introduction, several questions about their disease were asked: when they had had the stroke, how much contact they had with their physiotherapist, and which disabilities they suffered from. Next, people had to fill in which exercises were prescribed, which deliberate actions they performed daily and which exercises they did for improving their physical condition. Whenever patients filled in that they had been advised to do exercises for training a particular muscle movement or when they performed any deliberate actions, they got the measures presented. Next, at the last page, demographical questions (e.g. age, gender) were asked and people had the possibility to make comments. The average time to complete the questionnaire was 25 minutes.

Whenever patients filled in that they did only do sports for improving their physical condition, they arrived at a page that told the patients that their effort was appreciated but that they did not belong to the target population.
3 Results

The current study investigated which of eight motivation related factors best predicts Intention. The factors of interest were: Barriers, Obligation-attitude and Utility-attitude\(^1\), Emotional reaction, Social norms, Self-standards, Self-efficacy, Received and Perceived social support.

3.1 Factor structure

To be able to find an answer to our research question I first had to check whether the developed measures indeed loaded on the proposed dimensions in a factor analysis. The Social norm was assessed with only one item. Because the influence on any dimension of the item was minimal, it was decided to remove it from further factor analyses. Next, as mentioned in paragraph 1.3 (The theoretical framework), Intention is the dependent variable. Therefore, it was removed from further factor analyses as well. To summarize, it was expected to find eight factors in further factor analyses.

A principal factor analysis confirmed that eight factors could be found in the structure (the eight factors accounted for 60.69 % of the total variance). The technique that was used is called a confirmatory factor analysis, which looks for the number of factors that are predefined. Both Varimax (orthogonal, i.e. assuming the factors are independent of each other) and Oblique (oblimin, i.e. assuming the factors are dependent on each other) were performed. The two solutions were identical, and the mean correlation among the oblique factors was poor (R < 0.30). This suggests that the Varimax rotation offered a good fit for this data. The above described factor analysis can be found in appendix 7. The mean factor scores were used for further analyses.

\(^1\) Note. In a factor analysis, the attitude measure turned out to be multidimensional. Therefore, an additional measure has been added. As a result, we now have three different attitude measures: Utility-attitude, Obligation-attitude and an Affective-attitude, which is called Emotional reaction.
3.2 Regression analysis: predicting Intention

This study was set up to give an answer to the following research question: *What are the most important motivational factors that influence intention in stroke patients to do exercises at home?* In particular, which factor is the best predictor of Intention? To find an answer to this question all nine factors were entered in a regression analysis. This analysis showed that Obligation-attitude is the only significant predictor (Beta = .304, \( t(46) = 2.048, p = .046 \)). Also Self-efficacy turned out to be an important predictor and shows a trend (Beta = .315, \( t(46) = 1.876, p = .067 \)). All other factors are non-significant or do not show a trend. See Table 1 for details.

Table 1  
*Coefficients from regression equation: Factors predicting Intention (N=56)*

<table>
<thead>
<tr>
<th>Variable</th>
<th>( \beta )</th>
<th>SE B</th>
<th>( p )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>.529</td>
<td>1.177</td>
<td>.655</td>
</tr>
<tr>
<td>Social norm</td>
<td>.021</td>
<td>.019</td>
<td>.254</td>
</tr>
<tr>
<td>Barriers</td>
<td>.223</td>
<td>.149</td>
<td>.142</td>
</tr>
<tr>
<td>Received social support</td>
<td>-.085</td>
<td>.182</td>
<td>.643</td>
</tr>
<tr>
<td>Perceived social support</td>
<td>-.182</td>
<td>.160</td>
<td>.260</td>
</tr>
<tr>
<td>Self-standards</td>
<td>.161</td>
<td>.154</td>
<td>.302</td>
</tr>
<tr>
<td><strong>Self-efficacy</strong></td>
<td><strong>.315</strong></td>
<td><strong>.168</strong></td>
<td><strong>.067</strong></td>
</tr>
<tr>
<td>Emotional reaction</td>
<td>.078</td>
<td>.129</td>
<td>.545</td>
</tr>
<tr>
<td><strong>Obligation-attitude</strong></td>
<td><strong>.303</strong></td>
<td><strong>.148</strong></td>
<td><strong>.046</strong></td>
</tr>
<tr>
<td>Utility-attitude</td>
<td>.186</td>
<td>.131</td>
<td>.162</td>
</tr>
</tbody>
</table>

*Note.* \( R^2 = .408; F_{9,46} = 3.526, p = .002. \)
3.2 Regression analysis: predicting Obligation-attitude

In a further exploration, which factors predict Obligation-attitude was studied as well. To find which factor other than attitude related measures are the best predictor of Obligation-attitude, the remaining six independent measures were entered in a regression analysis\(^2\). That is, Utility-attitude and Emotional reaction were removed from the regression analysis. Next, Obligation-attitude was removed as independent variable and was used as dependent variable (instead of Intention). This analysis showed that Perceived social support is the best predictor of Obligation-attitude (Beta = .323, \(t(49) = 2.261, p = .028\)). All other factors turned out to be non-significant. See Table 2 for details.

Table 2

Coefficients from regression equation:
Factors predicting Obligation-attitude (N=56)

<table>
<thead>
<tr>
<th>Variable</th>
<th>(\beta)</th>
<th>SE B</th>
<th>(p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>3.393</td>
<td>.949</td>
<td>.001</td>
</tr>
<tr>
<td>Social norm</td>
<td>.017</td>
<td>.017</td>
<td>.344</td>
</tr>
<tr>
<td>Barriers</td>
<td>.031</td>
<td>.147</td>
<td>.833</td>
</tr>
<tr>
<td>Received social support</td>
<td>-.032</td>
<td>.170</td>
<td>.853</td>
</tr>
<tr>
<td>Perceived social support</td>
<td>.323</td>
<td>.143</td>
<td><strong>.028</strong></td>
</tr>
<tr>
<td>Self-standards</td>
<td>.118</td>
<td>.130</td>
<td>.368</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>.065</td>
<td>.166</td>
<td>.696</td>
</tr>
</tbody>
</table>

*Note: \(R^2 = .195;\) \(F_{6,49} = 1.975, p = .087\).*

\(^2\) Note. To be able to investigate which factors predict Obligation-attitude, all independent measures were entered in a factor analysis, however, without the attitude measures. A principal factor analysis confirmed that six factors could be found in the structure (the six factors accounted for 56.62 % of the total variance). The same items were clustered together as when the attitude measures were excluded. The mean factor scores were used for further analyses.
Factors influencing intention

3.3 Regression analysis: predicting Self-efficacy

Which factors predicted Self-efficacy was also studied. Therefore, the seven remaining factors were entered in a regression analysis\(^3\). That is, Self-efficacy was removed as independent variable and used as the dependent variable (instead of Intention). This analysis showed that also here Perceived social support was the best predictor of Self-efficacy (Beta = .227, \(t(47) = 1.680, \ p = .100\)) and shows a trend. See Table 3 for details.

Table 3

Coefficients from regression equation:
Factors predicting Self-efficacy (N=56)

<table>
<thead>
<tr>
<th>Variable</th>
<th>(\beta)</th>
<th>SE B</th>
<th>(p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>1.323</td>
<td>.016</td>
<td>.194</td>
</tr>
<tr>
<td>Social norm</td>
<td>-.008</td>
<td>.126</td>
<td>.639</td>
</tr>
<tr>
<td>Barriers</td>
<td>.198</td>
<td>.158</td>
<td>.123</td>
</tr>
<tr>
<td>Received social support</td>
<td>-.070</td>
<td>.135</td>
<td>.658</td>
</tr>
<tr>
<td><strong>Perceived social support</strong></td>
<td><strong>.226</strong></td>
<td><strong>.130</strong></td>
<td><strong>.100</strong></td>
</tr>
<tr>
<td>Self-standards</td>
<td>.209</td>
<td>.016</td>
<td>.116</td>
</tr>
<tr>
<td>Emotional reaction</td>
<td>-.026</td>
<td>.114</td>
<td>.770</td>
</tr>
<tr>
<td>Obligation-attitude</td>
<td>.059</td>
<td>.114</td>
<td>.770</td>
</tr>
<tr>
<td>Utility-attitude</td>
<td>-.033</td>
<td>.112</td>
<td>.816</td>
</tr>
</tbody>
</table>

Note. \(R^2 = .236; \ F_{8,47} = 1.817, \ p = .097.\)

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\(^3\) Note. To be able to investigate which factors predict Self-efficacy, all independent measures were entered in a factor analysis, however, without the Self-efficacy measure. A principal factor analysis confirmed that seven factors could be found in the structure (the explained variance of the seven factors was 59.88%). The same items were clustered together as when the Self-efficacy was excluded. The mean factor scores were used for further analyses.
3.4 Further results

Because perceived social support predicted Obligation-attitude and Self-efficacy, more explorative analyses were performed. For the clarity of the effects, only those factors that appeared to be important in the earlier results and the social measures were analysed, that is, only Obligation-attitude, Self-efficacy and Perceived and Received social support were used for further analyses. Before I was able to investigate interaction effects, it was required to standardize the measures (Baron & Kenny, 1986).

3.4.1 Interaction effect

In contrast to what was expected on the basis of the results of Glass et al. (1993) and Tsounahadjis et al. (2000), I did not find a relation between Received social support and Intention. However, I did find an interaction between Received and Perceived social support to significantly predict Intention (Beta = .389, t(52) = 2.956, p = .005). I used regression analysis to test for the interaction effect between Perceived and Received social support (Baron & Kenny, 1986). As shown in Table 4 (step 2), there are three independent variables, received social support (independent variable), perceived social support (moderator variable) and the product of the two (interaction term). According to Baron and Kenny (1986), there is an interaction effect if the interaction term (Received social support x Perceived social support) is significant.
Table 4
*Interaction effect (N=56)*

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Received social support</td>
<td>-.134</td>
<td>.137</td>
<td>.334</td>
</tr>
<tr>
<td>Perceived social support</td>
<td>.191</td>
<td>.137</td>
<td>.169</td>
</tr>
<tr>
<td>Step 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Received social support</td>
<td>-.217</td>
<td>.131</td>
<td>.103</td>
</tr>
<tr>
<td>Perceived social support</td>
<td>.266</td>
<td>.131</td>
<td>.047</td>
</tr>
<tr>
<td>Interaction term (Received social support x Perceived social support)</td>
<td>.389</td>
<td>.132</td>
<td>.005</td>
</tr>
</tbody>
</table>

*Note. R² = .44 for step 1; ΔR² = .138 for step 2, p = .005*

This interaction effect I found showed that the received social support had a negative relation with intention (Beta = -.607, t(56) = -2.960, p = .005) on participants with a relatively low level of perceived social support (1 standard deviation below the mean). In contrast, participants with relatively high levels of perceived social support (1 standard deviation above the mean) did not show a statistically significant relation between received social support and intention, Beta = .170, t(56) = 1.128, p = .264. This shows that this interaction effect mainly applies to participants with a relatively low level of perceived social support.

### 3.4.2 Mediated moderation

In the following paragraphs, mediated moderation effects are discussed. These effects were explored because Perceived social support had a stronger relation with Obligation-attitude (R = .382, p = .004) and Self-efficacy (R = .316, p = .018) than with Intention (R = .164, p = .227). Therefore, it was expected that the interaction effect of Perceived and Received social support was mediated by Obligation-attitude as well as Self-efficacy.

According to Muller, Judd, & Yzerbyt (2005) the mediation effect is proven if the following conditions are met:

1. the independent variable (the interaction term, while controlling for perceived social
Factors influencing intention

support and received social support) is shown to affect the dependent variable (Intention) in the first equation (see step 1)

2 the independent variable affects the mediator (Obligation-attitude/Self-efficacy, while controlling for perceived social support and received social support) in the second equation (see step 2).

3 the mediator (Obligation-attitude/Self-efficacy, while controlling for Perceived, Received social support and the interaction term) affects the dependent variable in the third equation (see step 3).

4 the effect of the independent variable on the dependent variable must be less in the third equation (see step 3) than in the first (see step 1).

In line with our expectations, our results showed that the interaction was (partially-) mediated by Obligation-attitude as well as by Self-efficacy. I used regression analyses to test for the mediated effect of Obligation-attitude (Muller, Judd, & Yzerbyt, 2005). Applying these regression analyses to the patients score on Intention yielded a significant (partially-) mediating effect between the interaction term and Obligation-attitude (for step 3, $R^2$ change = .08, $p = .023$). See Table 5 for details. I used regression analyses to test for the mediated effect of Self-efficacy as well (Muller, Judd & Yzerbyt, 2005). Applying these regression analyses yielded a marginally significant (partially-) mediating effect between the interaction term and Self-efficacy (for step 3, $R^2$ change = .06, $p = .051$). See Table 6 for details.
### Table 5

**Mediated moderation of Obligation-attitude (N=56)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>β</th>
<th>SE B</th>
<th>p</th>
<th>β</th>
<th>SE B</th>
<th>p</th>
<th>β</th>
<th>SE B</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
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<td>.543</td>
<td>-.055</td>
<td>.124</td>
<td>.658</td>
<td>-.060</td>
<td>.122</td>
<td>.624</td>
</tr>
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<td>Received social support</td>
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<td>.131</td>
<td>.103</td>
<td>-.061</td>
<td>.129</td>
<td>.638</td>
<td>-.198</td>
<td>.126</td>
<td>.123</td>
</tr>
<tr>
<td>Perceived social support</td>
<td>.266</td>
<td>.131</td>
<td>.047</td>
<td>.435</td>
<td>.128</td>
<td>.001</td>
<td>.127</td>
<td>.139</td>
<td>.363</td>
</tr>
<tr>
<td>Interaction term (Received x</td>
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<td>.132</td>
<td>.005</td>
<td>.277</td>
<td>.129</td>
<td>.036</td>
<td>.301</td>
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<td>.027</td>
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<td></td>
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<td></td>
<td></td>
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<tr>
<td>Obligation-attitude</td>
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<td></td>
<td></td>
<td>.318</td>
<td>.136</td>
<td>.023</td>
</tr>
</tbody>
</table>

*Note. for step 1, p = .005; for step 2, p = .036; ΔR² = .08 for step 3, p = .023*
Table 6
Mediated moderation of Self-efficacy (N=56)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Step 1</th>
<th>Step 2</th>
<th>Step 3</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Criterion moderation</td>
<td>criterion regression</td>
<td>criterion mediation</td>
</tr>
<tr>
<td></td>
<td>Intention</td>
<td>Self-efficacy</td>
<td>Self-efficacy</td>
</tr>
<tr>
<td></td>
<td>β</td>
<td>SE B</td>
<td>p</td>
</tr>
<tr>
<td>Constant</td>
<td>-.078</td>
<td>.127</td>
<td>.543</td>
</tr>
<tr>
<td>Received social support</td>
<td>-.217</td>
<td>.131</td>
<td>.103</td>
</tr>
<tr>
<td>Perceived social support</td>
<td>.266</td>
<td>.131</td>
<td>.047</td>
</tr>
<tr>
<td>Interaction term</td>
<td>.389</td>
<td>.132</td>
<td>.005</td>
</tr>
<tr>
<td>(Received x Perceived social</td>
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<tr>
<td>Self-efficacy</td>
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<td></td>
<td>.275</td>
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</tbody>
</table>

Note. for step 1, p = .005; for step 2, p = .013; ∆R² = .06 for step 3, p = .051
4 Discussion

To determine how stroke patients can be motivated to comply with their prescribed exercises, the current study investigated which of eight factors best predicts Intention. These eight factors were: Barriers, Utility-attitude and Obligation-attitude, Emotional reaction, Social norms, Self-standards, Self-efficacy, Received and Perceived social support. In the following paragraphs, an overview of the results is given and for each of these findings, the theoretical and practical implications are discussed. Next, for the practical purposes of this study some information about persuasion is given. At the end of this section, the limitations of the current research are outlined, and recommendations for further research are given. However, first, a general remark about the attitude concept is discussed.

A factor analysis showed that attitude is a multi-dimensional concept. This suggests that the concept in the theoretical framework (Fishbein et al., 2001) is incomplete. One could argue that Fishbein et al. perceive the concept of attitude generally as the evaluation of consequences and do not mention multi-dimensionality. In contrast, the theory offered by Bagozzi (1989) does acknowledge attitude as multi-dimensional and outlines three dimensions. These are: affective, utility and moral. The current study provides evidence for similar attitude dimensions. In addition, the dimensions of attitude had differential effects on intention. For these reasons, Bagozzi’s explanation of the attitude concept seemed to be more in line with the current study.

The current study produced the following results: Firstly, Obligation-attitude is the best predictor of Intention. Secondly, Self-efficacy seems to be also an important predictor. Furthermore, two interesting results were found that do not predict intention. One of these results is that Perceived social support is a predictor of Obligation-attitude as well as Self-efficacy, therefore it indirectly predicts intention. The other result is that, in contrast to what was expected (based on the results of Glass et al., 1993 and Tsouna-hadjis et al., 2000), the Received social support factor does not predict Intention, neither Obligation-attitude, nor Self-efficacy.

4 Note. In a factor analysis, the attitude measure turned out to be multidimensional. Therefore, an additional measure has been added. As a result, we now have three different attitude measures: Utility-attitude, Obligation-attitude and an Affective-attitude, which is called Emotional reaction.

5 Note. Although there is evidence that attitude is a multidimensional concept, there is debate on the number and types of dimensions (Eagly & Chaiken, 1993).
The first result is that Obligation-attitude is an important predictor of intention. Factor analysis showed that Obligation-attitude is a dimension within the attitude concept. This dimension was measured with the items ‘foolish/wise’ and ‘incorrect/correct’. One could argue that the Obligation-attitude dimension I found represents the personal standard that Rosenberg (1989) describes. Interpreting the dimension as a personal standard entails that when a patient’s behaviour is inconsistent with his standard, feelings of guilt can occur. This is, for example, when a patient thinks it is wise to do exercises but he in fact does not do them anymore. In contrast, according to the theory provided by Rosenberg, a patient can get a positive feeling when his behaviour is consistent with his standard (Rosenberg, 1989).

The theoretical implication of this first result is that the patient should be asked about his Obligation-attitude when determining his intention. This is important because Obligation-attitude can be used as a predictor. I would argue that the strength of the current study is that it was carried out online, which made it anonymous. By being anonymous, it is likely that a situation was created where the patient felt at ease to respond truthfully, rather than socially desirable. In future research this anonymity should be maintained in order to assess obligation attitude appropriately.

A practical recommendation that can be made is that Obligation-attitude might be increased by making a public commitment (Locke & Latham, 2002). In the context of rehabilitation of stroke patients, such a public commitment can be, for example, to agree with his physiotherapist or social environment on the goals and to shake hands. When this public commitment is made, Obligation-attitude is even more increased when the patient’s exercise behaviour is observable to himself and/or to his social environment (Harmon-Jones, Peterson, & Vaughn, 2003). For example, when performing exercises in supervision of others, the patient can receive feedback. Such strategies are likely to stimulate Obligation-attitude because it probably makes the inconsistencies between what the patient values and his actions salient. Thus, a patient feels more guilt whenever he receives feedback that he does not do his exercises, despite the fact that he believes it is wise doing exercises.

The second finding is that Self-efficacy is an important predictor for intention. Self-efficacy is the belief of having the capabilities to overcome a situation that may hinder performance of behaviour. Self-efficacy was assessed with three items, one item concerned the confidence in using reminders and the other two items concerned the confidence in being able to comply with made plans. This result implies that motivated patients are more confident in complying with their own plans and using reminders.
The theoretical implication of this second result is that when determining a patient’s intention, the patients should be asked about his confidence in planning and overcoming distraction. This is important because this measure can be used as a predictor of intention.

A practical recommendation that can be made about the second result is that a stroke patient can be motivated to do exercises by helping him with planning the exercises in his daily live. Thus, creating the means to make planning easier and/or increasing the confidence of making plans are likely to increase compliance.

Thirdly, two interesting results were found that do not predict intention but might be an explanation for the contradicting effects described in paragraph 1.5, Perceived and Received social support. One of these results is that Perceived social support is a predictor of Obligation-attitude as well as Self-efficacy; it therefore indirectly predicts intention. Perceived social support was assessed with four items that were about the patient’s confidence to ask their social environment for help. However, it is important to keep in mind that it is hard to prove a causal relationship between (perceived) social support and recovery (Cohen et al., 2000). This is difficult because it cannot be determined whether positive beliefs play a role in having a positive social relationship or whether a positive social relationship leads to positive beliefs. Whatever the case may be, social support seems to be beneficial for compliance. I reason that Obligation-attitude and Self-efficacy, together with other beliefs, are influenced by social support. However, a positive influence can only be achieved when people think positively about their social environment. More explorative analyses have been performed to investigate these social influences. The most relevant conclusion of these analyses is that Received social support, which is related to rehabilitation, decreases Intention when the social environment is perceived as relatively less positive. This is when the social environment is perceived as relatively less available and/or relatively less capable of giving support. Furthermore, the result of the current study is consistent with the work of Wethington and Kessler (1986), who also researched social support in relation to a health problem (psychological distress). This result suggests that the stroke patient’s perception of the social environment is important when the social environment tries to encourage the patient to do exercises.

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6 A more specific inspection of the distribution indicated that Perceived social support had a Skewness of -1.040 and a Kurtosis of .579 and Received social support had a Skewness of .462 and a Kurtosis of -.429. This indicates that the score on Perceived social support was relatively high.
The other interesting result is that, in contrast to what was expected (based on the results of Glass et al., 1993 and Tsouna-hadjis et al., 2000), the Received social support factor does not predict Intention, neither Obligation-attitude, nor Self-efficacy. Received social support was measured with nine items that asked the participants to rate the frequency of occurrence of social actions of people around them. Glass et al. (1993) and Tsouna-hadjis et al. (2000) found a relationship between Received social support and improvement in recovery from a stroke. I suppose that recovery depends on exercise behaviour and that Intention is an antecedent of this behaviour. Therefore, I suppose that Intention was increased by Received social support in these two studies. However, in the current study, the Received social support did not predict Intention. An important difference between the studies performed by Glass et al. and Tsouna-hadjis et al. and the current study is that they researched social support in general, whereas the current study focused on social support related to rehabilitation. This result suggests that, social support in general is likely to be more effective, than when it is related to the health problem.

To come back to Lydia’s question, ‘Why is it so hard for me to do my exercises?’ this can now be answered. It is likely that a number of factors are preventing her from doing her exercises. She might feel that she is not responsible for her recovery and thus feels less obliged to do her exercises. It might that she is lacking stimulation by friends and family. Or she might simply lack the methods of good planning which triggers activities.

**Persuasion**

The current study indicates that the patient’s perception of the social environment is important, but the results do no show how this perception can be influenced. Nevertheless, for the practical purposes of this study I think it is highly relevant to briefly discuss how this perception can be influenced. In the next paragraphs it is described which human strategies are likely to increase persuasive quality.

Persuasion is a method of influence that changes beliefs by presenting arguments and facts, reasoning and showing positive results of an action. Persuasion is meant to convince people and to engage them in an action (Zimbardo & Leippe, 1991). However, it depends upon the persuasive quality of the person (e.g. a physiotherapist or the social environment), that tries to persuade, whether someone (e.g. a stroke patient) gets persuaded to perform the target action (prescribed exercises). Persuasive quality, in turn, is increased when the person that tries to persuade is perceived as credible (believable) (Kenrick, Neuberg, & Cialdini,
Factors influencing intention

2007). This thus clearly indicates why the stroke patient’s perception of the social environment is important.

Kenrick, Neuberg & Cialdini (2007) explain that a person, who tries to persuade, is more credible (believable) when he is perceived as an expert or is liked by the receiver. People are also more likely to like another person when this person is perceived as attractive, when he is similar to the receiver, or when he gives positive signals, for example, by smiling or by giving compliments (Kenrick et al, 2007).

According to Brehm (1966), people can also refuse to go along with a persuasive attempt by not doing what they are expected to do. This is called ‘reactance’ and occurs when social pressure threatens someone’s freedom. Similar with going along with a message, the amount of reactance is influenced by the persuasive quality of the messenger (Kenrick et al., 2007).

Furthermore, from research it is found that it is possible to integrate human strategies in technical systems that can influence persuasive quality (Davidoff, Lee, Day, & Zimmerman, 2007; Fogg & Nass, 1997)

To summarize, changing the property of a message or the properties of its source can influence how a technical system, or social support, is perceived by a stroke patient. And this, in turn, can increase his motivation to comply to prescribed exercises.

Some extra suggestions can be made, which are based on the insights described above, to improve persuasive quality of the social environment. Firstly, by doing distracting (from stroke) social activities together and by giving positive signals to each other (by smiling or by giving compliments) people might like each other more. Secondly, it is expected that family members are people that are liked by the stroke patient, but they are probably not seen as experts. Therefore, to improve their credibility (believability), the family should be involved in the recovery process and should be educated on how to help the patient. Furthermore, the role of the physiotherapist should also be taken into account because he or she is likely to be seen as credible (believable) by both the family and patient. However, because the physiotherapist might not always be available, contact should be maintained without too much effort.

Limitations

At the beginning of this section, the most important results from the current study are described and explained. However, this research has also some limitations. The most relevant limitations are described below.
One of the limitations of the current study is that the theoretical framework provided by Fishbein et al. (2001) is used instead of a well validated theory. The reason for using this framework is because a complete and generally accepted theory, about the causal influences of the different factors of behaviour, is not available. This is because behavioural scientists do not agree on how motivation is constituted (Fishbein et al, 2001). Therefore, to understand motivation, a complete theory would be ideal, but this is not at hand.

A second limitation of the current study is that all investigated factors in the current study are self reported. Some researchers argue that self-reports are too subjective (Schwarz, 1999). Concerning this study, it would mean that, for example, the same Received social support is experienced differently. Thus, for some stroke patients the Received social support is ‘exactly what they needed’ and for some it might be ‘too much’. Therefore, it might be that if a more objective measure is used, for instance, therapist time, the results of the current research would be different.

A third limitation is that the current study focussed only on correlations between the nine factors and Intention. If both the motivated and unmotivated participants score high on one factor, it does not reveal good predictors of intention. Therefore, problems that hold for both groups of patients are not taken into consideration. For instance, being tired is well recognised as an overall problem for stroke patients (Glader, Stegmayr, & Asplund, 2002). It is expected that focussing on problems that both groups deal with, could lead to an increase of compliance, regardless of the issue of motivation. Thus, this might also help the unmotivated patient.

A fourth limitation of the current study is that as dependent variable ‘intention’ is used instead of behaviour. Although the variable is seen as most proximal to behaviour (Fishbein et al., 2001), intention only has a correlation with behaviour of 0.53 to 0.68 on average (Manstead, 1996). Therefore, a more reliable measure that can be used in a questionnaire would be ideal. However, a measure that is suitable for a relatively small sample size is, to my knowledge, not available. It might be that when a more objective measure was used, for instance, sensor data from the Philips Rehabilitation Exerciser, the results for the current study would be different.

A final limitation of the current study is the small sample size, which limits generalization of the found effects. Given the small sample size and the fact that only members of national associations for stroke patients were approached, it might be that the sample cannot be regarded as representative for the total sample of stroke patients from Belgium and
the Netherlands. Therefore, the reliability and generalizability are questionable. For the purpose of further investigation, the current results must be explored with a larger sample.

**Recommendations for further research**

In the previous paragraphs, the most important results from and limitations of the current study are discussed and explained. Furthermore, some extra information about persuasion is given. Although the current study provides us with some essential insights, many questions still need to be answered. To get a better understanding of motivation, three main recommendations for further research are given and described below.

The first recommendation is related to intervention studies. When investigating an intervention, the determinants of non-compliance should be measured and it is recommended to do this before and after the intervention. In the context of rehabilitation of stroke patients, the determinants of non-compliance are Obligation-attitude and Self-efficacy (to make plans and overcome distraction). By measuring the determinants of non-compliance before and after the intervention, it is known whether a patient was already motivated or whether an increase in motivation was caused by the intervention.

The second recommendation is to look for means to measure determinants of motivation without self-reports. Self-report items might be appropriate to measure determinants of motivation. However, it might be that participants are not aware of the extent of some determinants, which makes it difficult to report them (Torangean & Rasinski, 1988). The third recommendation is to integrate human strategies in technologies to increase persuasive quality as much as possible when technology is used to motivate people. As was explained under the Persuasion heading, some human strategies are likely to improve the persuasive quality of the social environment, and thus can increase a patient’s compliance to prescribed exercises. However, it is essential to first determine which human strategies are most important.

I believe that this report is an important basis for further research in that they show that obligation and self-efficacy (to make plans and overcome distraction) are important predictors of Intention and suggests that persuasive attempts should focus on these factors. However, efforts should also be made to improve how the patient perceives his social environment.
References


Factors influencing intention


Factors influencing intention


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Appendix 1: List of questions (translated to English)

**Intentions (exercises):**
1. *** I am going to do these exercises tomorrow. (absolutely not/absolutely).  
2. *** I expect that I will do these exercises tomorrow. (unlikely/likely)  
3. *** I intend to do these exercises tomorrow. (unlikely/likely)  
4. *** I am going to do these exercises tomorrow. (unlikely/likely)  
5. *** How often are you going to do these exercises each week? (1/7)

**Intentions (deliberate actions):**
6. ** I am going to do these exercises tomorrow. (absolutely not/absolutely).  
7. ** I expect that I will do these exercises tomorrow. (unlikely/likely)  
8. ** I intend to do these exercises tomorrow. (unlikely/likely)  
9. ** I am going to do these exercises every day. (unlikely/likely)  
10** How often are you going to do these exercises each week? (1/7)

**Barriers:**
11. I do not get around to these exercises and/or actions because I have to do household chores. (never/always)  
12.* I do not get around to these exercises and/or actions because I am tired. (never/always)  
13.* I do not get around to these exercises and/or actions because I am afraid that an accident will occur. (never/always)  
14. I do not get around to these exercises and/or actions because I forget about them. (never/always)  
15. I do not get around to these exercises and/or actions because I am distracted by television, radio, telephone and/or Internet. (never/always)

**Received social support:**
16. Somebody watches over my safety during the exercises and/or the actions. (never/always)  
17. Somebody explains the correct way to do the exercises and/or the actions. (never/always)
Factors influencing intention

18. Somebody gives me a helping hand with the exercises and/or the actions. Or, he/she supports me with his/her hands during the exercises and/or the actions. (never/always)
19. Somebody encourages me during the exercises and/or the actions. (never/always)
20. Somebody reminds me that I have to do my exercises and/or actions. (never/always)
21. How often does somebody talk to you about your emotions regarding the exercises and/or the actions? (never/always)
22. How often does somebody discuss with you what you might still achieve with regard to the physical improvement of your arm or leg? (never/always)
23. How often does somebody tell you that you perform an action right or wrong? (never/always)

Moral-attitude:
24. I find these exercises and/or actions... (foolish/wise)
25. I find these exercises and/or actions... (incorrect/correct)

Utility-attitude:
26. I find these exercises and/or actions... (dangerous/safe)
27. I find these exercises and/or actions... (harmful/useful)
28. I find these exercises and/or actions... (unsuitable/suitable)

unpleasant/pleasant)
30.* I find these exercises and/or actions... (difficult/easy)
31.* I find these exercises and/or actions... (not nice/nice)
32.* I find these exercises and/or actions... (bad/good)

Emotional reaction:
33. When I do these exercises and/or actions, I feel...(guilty/relieved).
34. When I do these exercises and/or actions, I feel...(sad/happy)
35. When I do these exercises and/or actions, I feel...(unsure/full of confidence)
36. When I do these exercises and/or actions, I feel...(frustrated/calm)
37. When I do these exercises and/or actions, I feel...(bored/good)
38. When I do these exercises and/or actions, I feel...(obliged/free)
39. When I do these exercises and/or actions, I feel...(disappointed/proud)
Factors influencing intention

Social norm:

40a. Most people who are important for me find that I must do my exercises and/or actions. (disagree/agree)

43b. When it gets down to doing exercises and/or taking actions, I want to do what people who are important for me find that I should do. (disagree/agree)

Self-image:

47. I am responsible. (disagree/agree)

48. I am active. (disagree/agree)

50. I am sensible. (disagree/agree)

51. I am realistic. (disagree/agree)

52. I am full of confidence. (disagree/agree)

Self-efficacy:

53. I can get around to exercises and/or actions even when I have household chores. How certain are you that you can do this? (very uncertain/very certain)

54.* I can ensure that I am not afraid when I start my exercises and/or actions. How certain are you that you can do this? (very uncertain/very certain)

55.* I can ensure that I am not too tired to start exercises and/or actions. How certain are you that you can do this? (very uncertain/very certain)

56. I can ensure that I do not forget my exercises and/or actions, by using reminders (for example a diary, little notes and other forms of ‘reminders’). How certain are you that you can do this? (very uncertain/very certain)

57. I can ensure that I am not too distracted by television, radio, telephone and/or Internet. How certain are you that you can do this? (very uncertain/very certain)

Perceived availability of social support

59. I feel that I can ask people close to me for an explanation on the right way to do exercises and/or an action. How certain are you that you can do this? (very uncertain/very certain)

60. I feel that I can ask people close to me for support in doing exercises and/or an action. How certain are you that you can do this? (very uncertain/very certain)
61. I feel that I can ask people close to me if they will remind me that I have to do exercises and/or actions. How certain are you that you can do this? (very uncertain/very certain)

62. I feel that I can ask people close to me for help when I need it. How certain are you that you can do this? (very uncertain/very certain)

Note. * Items not used in questionnaire. ** Items only presented when deliberated actions are performed. *** Items only presented when exercises were prescribed
Appendix 2: List of questions (in Dutch)

Intenties (exercises):
1.* Ik ga morgen deze oefeningen doen. (absoluut niet/absoluut).
2.* Ik verwacht dat ik morgen deze oefeningen ga doen.
   (onwaarschijnlijk/waarschijnlijk)
3.* Ik heb de intentie om morgen deze oefeningen te gaan doen.
   (onwaarschijnlijk/waarschijnlijk)
4.* Ik ga morgen deze oefeningen doen. (onwaarschijnlijk/waarschijnlijk)
5.* Hoe vaak gaat u deze oefeningen per week doen? (1/7)

Intenties (deliberate actions):
6.** Ik ga morgen deze handelingen doen. (absoluut niet/absoluut).
7.** Ik verwacht dat ik morgen deze handelingen ga doen.
   (onwaarschijnlijk/waarschijnlijk)
8.** Ik heb de intentie om morgen deze handelingen te gaan doen.
   (onwaarschijnlijk/waarschijnlijk)
9.** Ik ga dagelijks deze handelingen doen. (onwaarschijnlijk/waarschijnlijk)
10** Hoe vaak gaat u deze handelingen per week doen? (1/7)

Barrières:
11.* Ik kom niet aan deze oefeningen en/of handelingen toe omdat ik huishoudelijke taken moet doen. (nooit/altijd)
12. Ik kom niet aan deze oefeningen en/of handelingen toe omdat ik moe ben
   (nooit/altijd)
13. Ik kom niet aan deze oefeningen en/of handelingen toe omdat ik angstig ben dat er een ongeluk gebeurt. (nooit/altijd)
14.* Ik kom niet aan deze oefeningen en/of handelingen toe omdat ik het vergeet.
   (nooit/altijd)
15.* Ik kom niet aan deze oefeningen en/of handelingen toe omdat ik ben afgeleid door televisie, radio, telefoon en/of internet. (nooit/altijd)
Factors influencing intention

Hoeveelheid sociale support:

16. Iemand let op mijn veiligheid tijdens het doen van oefeningen en/of het uitvoeren van de handelingen. (nooit/altijd)
17. Iemand geeft mij uitleg over het correct uitvoeren van de oefeningen en/of de handelingen. (nooit/altijd)
18. Iemand geeft mij een helpende hand bij het doen van oefeningen en/of de handelingen. Oftewel, hij/zij ondersteunt mij met zijn handen tijdens het oefenen en/of het uitvoeren van de handelingen. (nooit/altijd)
19. Iemand moedigt mij aan tijdens het oefenen en/of het uitvoeren van de handelingen. (nooit/altijd)
20. Iemand herinnert mij eraan dat ik mijn oefeningen en/of handelingen moet doen. (nooit/altijd)
21. Hoe vaak komt het voor dat iemand met u praat over uw emoties die te maken hebben met het doen van oefeningen en/of het uitvoeren van handelingen? (nooit/altijd)
22. Hoe vaak bespreekt iemand met u wat u eventueel nog kan bereiken wat betreft de lichamelijke verbetering van uw arm of been? (nooit/altijd)
23. Hoe vaak komt het voor dat iemand u zegt dat u een handeling goed of slecht doet met de arm of been die een aandoening heeft? (nooit/altijd)

Moral-attitude:

24. Ik vind deze oefeningen en/of handelingen... (onnozel/wijs)
25. Ik vind deze oefeningen en/of handelingen... (onjuist/juist)

Utility-attitude:

26. Ik vind deze oefeningen en/of handelingen... (gevaarlijk/veilig)
27. Ik vind deze oefeningen en/of handelingen... (schadelijk/gunstig)
28. Ik vind deze oefeningen en/of handelingen... (ongeschikt/geschikt)

Not used attitude items:

29.* Ik vind deze oefeningen en/of handelingen... (onplezierig/plezierig).
30.* Ik vind deze oefeningen en/of handelingen... (moeilijk/makkelijk)
31.* Ik vind deze oefeningen en/of handelingen... (niet leuk/leuk)
32.* Ik vind deze oefeningen en/of handelingen... (slecht/goed)
Factors influencing intention

Emotionele reacties:
33. Als ik met deze oefeningen en/of handelingen bezig ben dan voel ik mezelf...(schuldig/opgelucht).
34. Als ik met deze oefeningen en/of handelingen bezig ben dan voel ik mezelf...(verdrietig/blij)
35. Als ik met deze oefeningen en/of handelingen bezig ben dan voel ik mezelf...(onzeker/vol zelfvertrouwen)
36. Als ik met deze oefeningen en/of handelingen bezig ben dan voel ik mezelf...(gefrustreerd/kalm)
37. Als ik met deze oefeningen en/of handelingen bezig ben dan voel ik mezelf...(verveeld/lekker bezig)
38. Als ik met deze oefeningen en/of handelingen bezig ben dan voel ik mezelf...(verplicht/vrijwillig)
39. Als ik met deze oefeningen en/of handelingen bezig ben dan voel ik mezelf...(teleurgesteld/trots)

Sociale norm:
40a. De meeste mensen die belangrijk voor me zijn vinden dat ik mijn oefeningen en/of handelingen moet doen. (oneens/eens)
43b. Wanneer het aankomt op oefenen en/of het uitvoeren van handelingen, dan wil ik doen wat mensen die belangrijk voor me zijn vinden dat ik moet doen. (oneens/eens)

Zelfbeeld:
47. Ik ben verantwoordelijk.(oneens/eens)
48. Ik ben actief. (oneens/eens)
50. Ik ben verstandig.(oneens/eens)
51. Ik ben realistisch.(oneens/eens)
52. Ik ben vol zelfvertrouwen.(oneens/eens)

Self-efficacy:
53.* Ik kan aan oefeningen en/of handelingen toekomen zelfs als ik huishoudelijke taken heb. Hoe zeker bent u ervan dat u dit kunt? (erg onzeker/zeker)
54. Ik kan ervoor zorgen dat ik niet bang ben als ik aan mijn oefeningen of handelingen begin. Hoe zeker bent u ervan dat u dit kunt? (erg onzeker/zeker)
Factors influencing intention

55. Ik kan ervoor zorgen dat ik niet te moe ben om aan oefeningen of handelingen toe te komen. Hoe zeker bent u ervan dat u dit kunt? (erg onzeker/zeker)

56.* Ik kan ervoor zorgen dat ik mijn oefeningen niet vergeet, door middel van geheugensteuntjes (bijvoorbeeld een agenda, kleine briefjes en andere vormen van ‘geheugensteuntjes’). Hoe zeker bent u ervan dat u dit kunt? (erg onzeker/zeker)

57.* Ik kan ervoor zorgen dat ik niet teveel afgeleid ben door televisie, radio, telefoon en/of internet. Hoe zeker bent u ervan dat u dit kunt? (erg onzeker/zeker)

Perceived social support

59. Ik heb het gevoel dat ik aan mijn naaste omgeving uitleg kan vragen over de goede manier van oefenen of het uitvoeren van een handeling. Hoe zeker bent u ervan dat u dit kunt? (erg onzeker/zeker)

60. Ik heb het gevoel dat ik aan mijn naaste omgeving ondersteuning kan vragen bij het doen van oefeningen of het uitvoeren van een handeling. Hoe zeker bent u ervan dat u dit kunt? (erg onzeker/zeker)

61. Ik heb het gevoel dat ik aan mijn naaste omgeving kan vragen of ze mij eraan willen herinneren dat ik oefeningen of handelingen moet doen. Hoe zeker bent u ervan dat u dit kunt? (erg onzeker/zeker)

62. Ik heb het gevoel dat ik aan mijn naaste omgeving hulp kan vragen als ik dat nodig heb. Hoe zeker bent u ervan dat u dit kunt? (erg onzeker/zeker)

Note. * Items not used in questionnaire. ** Items only presented when deliberated actions are performed. *** Items only presented when exercises were prescribed
Appendix 3: Pre-test

In the pre-test, semi-structured interviews were conducted. Semi-structured interviews were used because it gave the opportunity to reword questions whenever necessary and to explore new topics when they arose.

The goal of this study was twofold: first, by doing interviews, insight was obtained in the similarities and dissimilarities between compliant and non-compliant patients. Secondly, variable item content was assessed with open-ended elicitation questions (see Fishbein et al., 2001) that were asked by the means of interviews. This variable item content is used to develop a fixed item questionnaire as proposed in Fishbein et al. (2001). The results obtained during the interviews are discussed in this report.

Method

Criteria for participation

As mentioned in the introduction of the main report, this study focused on compliance to prescribed exercises that train a particular muscle movement. Therefore, in this study, only patients were interviewed that had an impaired arm or leg and who did have prescribed exercises to do at home. To prevent any difficulties in understanding between the interviewer and the participant during the interviews, patients with severe cognitive or language difficulties were excluded from this study.

Participants

In total eleven patients participated in this study, of which nine patients were recruited via the Dutch stroke forum ‘Samen Verder’ and two via physiotherapy ‘Maassen’. Physiotherapy Maassen (the Netherlands). Physiotherapy Maassen asked 40 of its stroke patients for participation verbally. The association ‘Samen Verder’ has about 900 members and via email these patients were asked to participate in this study.

Characteristics of participants

The eleven participants had a mean age of 54 years. Six of the thirteen patients were woman; seven participants were men. Three participants lived alone; the other patients lived
Factors influencing intention

together with their spouse or partner. Four of the participants had contact with a physiotherapist once a week or more (*patient 6, 10 and 11, compliant*).

**Procedure**

First, a discussion was started about how patients experience their rehabilitation and which exercises they had been prescribed and which exercises they did themselves for recovery.

Next, throughout the interviews, questions were asked that are based upon the open-ended elicitation questions as proposed in Fishbein et al. (2001). The answers on the open-ended elicitation questions covered four broad classes of variables:

1. Perceived outcomes
   For instance, the expectancy that one is able to walk alone when exercises are maintained.

2. Relevant referents
   For instance, a spouse that is involved in the recovery.

3. Perceived facilitators of, and barriers to
   For instance, when a patient is too tired, the patient will not do his or her exercises.

4. Personal characteristics
   For instance, patients were described as responsible if he or she did do exercises.

Additionally, topics that were brought up by patients during the interviews were discussed as and when they arose. As a final point of discussion, questions were asked about what information they had been looking for in the past and which information they would like to have.

The interviews were conducted at the patients’ home. All patients were asked to complete an informed consent before the interview started. The informed consent indicated confidentiality and anonymity of participant's information and participants were told that they could end their participation in the study at any time without any consequence.

After a brief introduction about the goals of the study, the interview was held. After completing the interview, a remuneration of € 15 by means of an ‘Iris-cheque’ was given for their participation. The interview lasted for one to two hours and a voice recorder was used with the permission of the participants.
Data analysis

The interviews were recorded with a voice recorder and this recording was analysed afterwards. The quotes, which are used in this report, are translated by the researcher because the interviews were held in Dutch.

Results

Compliance:

Only two participants said that they were non-compliant to prescribed exercises. The rest of the participants said that they did their exercises as prescribed.

The exercises

The interviewed stroke patients indicated that they did not recover from a stroke by only doing prescribed exercises. All patients felt they needed, besides the prescribed exercises, to do other exercises to recover. Most stroke patients worked on their physical condition by doing activities like walking and cycling. Furthermore, they performed deliberate actions with the aim to train a particular muscle-movement; for example: doing the dishes or eating with cutlery. The most frequently mentioned exercises were stretching exercises and the most frequently mentioned deliberate actions were eating with cutlery and cleaning.(see appendix 4 for more details.)

Barriers

The questions were mainly about circumstances and situations which made it difficult or easier to do exercises. See appendix 4 for the summary of the content analysis about barriers.

Two barriers were identified as being most prominent, namely, being easily tired and being forgetful. The stroke patients explained that because they had had the stroke they easily get tired. Because of this, they constantly have to balance and take care of their energy. “You learn very quickly that when you do your activities with a little bit more care and attention, that you balance your energy well” (patient 1, compliant). They also explained that their life at home, after having recovered in the hospital, was more difficult than they expected. At home they had more responsibilities; like doing the housekeeping and some of them had a job. Doing these extra activities seems to be so exhausting that it is difficult to continue doing the exercises. “Doing the housekeeping is so exhausting that it is easy to become sloppy with
exercising.’ (patient 8, non-compliant). Being forgetful was the second situation which made it difficult to do the exercises. All patients emphasized that planning and structure is important for them because, as they said, they are forgetful and easily distracted by various things since they had the stroke. However, they explained that they were able to manage these problems themselves, either with a calendar, by the use of post-its on the wall or with other reminders. “If I have a pencil and a piece of paper, I am able to make it through the day” (patient 1, compliant).

Social support

While discussing several topics, the patients frequently mentioned that the physiotherapist, their friends and/or family were important to them. However, social involvement was experienced both positively and negatively. It was experienced positively when encouragement was given “I like it when she says ‘Dad you can do it!’” or compliments were given “they all say that I look good and that I am the old [patient’s name] again, happy and cheerful” (patient 10, compliant). Another thing they really liked was doing things together with family or a good friend is fun and relaxing (e.g. cycling, doing the prescribed exercises, cooking). “If you have to fulfil them alone ... you also miss the cosiness” (patient 10, compliant). Social involvement was experienced negatively when a patient felt that the family was dictating his or her exercises “Then my wife says ‘do this and do that’, but I do not like it when she meddles with my exercises” (patient 6, compliant).

Mainly the two non-compliant patients expressed that they were missing involvement and interest of their social environment in their recovery and that they felt misunderstood. “they return to the order of the day more and more ... they cannot understand that it is still the same for you” (patient 8, non-compliant).

The two non-compliant patients were also more likely to reject involvement from their social environment “if they asked me ‘did you do your exercises?’ then I am so stubborn that I do not carry them out” (patient 2, non-compliant). However, later on, she explained that she wanted to have more involvement “I think that it would have had a positive influence if he was more involved in the recovery so that he is more able to give supervision in doing the exercises” (patient 2, non-compliant).

The most frequently mentioned form of support were encouragement, feedback, doing the exercises together, and although experienced negative, meddling with exercises. See appendix 4, for the summary of the content analysis about social factors.
Factors influencing intention

**Relevant referents**

Most of the participants expressed that their spouse/partner and children are really important to them. Of those who had contact with a physiotherapist once a week or more also mentioned this person.

**Perceived outcomes of performing the behaviour**

First of all, every patient has his/her personal desired goals but all patients believed that rehabilitation had a role in achieving their goals or in preventing any drawbacks. In general, all of them named independence in daily life as a desirable and achievable goal. However, being independent is a broad term. For some patients this meant to be able to walk alone, for others it meant to be able to have a job and for some it meant to be able to do the housekeeping (See appendix 4 for the summary of the content analysis about outcome expectancies). As observed by the researcher, the perceived outcomes were dependent on the severity of the stroke. However, the compliant patients were more likely to accept not to recover completely “you have to change your attitude, those fifteen hours of work is something you deserved, you have an impairment, accept it.”(patient 7, compliant) In contrast, non-compliant patients had a high expectancy about their recovery “you want to be who you used to be and that is what you want to achieve”(patient 2, compliant).

When emotions were discussed, the compliant patients expressed that they even liked doing their exercises because they noticed improvement or found confirmation of their capabilities when they do their exercises. It made them feel good about themselves “I never expected that I was able to achieve that much!”(patient 10, compliant) In contrast, the two non-compliant patients emphasized that they got frustrated and that they were bored whenever they did not make sufficient improvement “you practice yourself silly and if it does not have any effect, then you start to think: is this all?”(patient 8, compliant). Furthermore, one non-compliant patient said that she feels confronted with herself being disabled and therefore she preferred not to think about doing exercises (patient 2).

As a final point on perceived outcomes, one non-compliant patient and two compliant patients mentioned that they were afraid of falling during the activities and exercises. They fear this because they had fallen a few times when doing the exercises and therefore they had lost confidence in their body. To summarize, the most frequent mentioned emotion was for compliant patients confidence and in contrast, for non-compliant patients it was frustration. See appendix 4 for a summary of the content analysis about emotions.
Factors influencing intention

**Personal characteristics of people who do and do not perform exercises**

Although the descriptions people gave about other people who do and do not perform exercises are very broad (see appendix 4 for the summary of the content analysis about personal characteristics), the most frequently named attributes of someone who keeps on doing the exercises were of a positive nature, like being persistent and being responsible. The most frequently named attributes of someone who gives up his or her exercises were of a negative nature, like being a softy and being stupid.

**Information**

Most of the participants said that they searched on the internet about what has happened in the brain, what had caused the stroke and what its consequences are. They had to search for this information by themselves on the internet, but most of them were satisfied with the available information.

Additionally, all the patients indicated that they would have liked to come into contact with other patients earlier in the process of their recovery. Remarkably, the members of ‘Samen Verder’ were not told that the association exists by their physiotherapist and they said that they found this out by themselves. The two non-members expressed that they would have liked to have more contact with other patients but explained that they did not know how to come into contact.

As a final point, three of the compliant patients said that their family members got information about how to best help to them, and this made them feel better understood.

**Discussion**

Based on this interview the variable item content is specified. Below, the qualitative findings are discussed.

One thing that seems to differ between the compliant and non-compliant patients is the amount of social support they received and the amount of frustration they experienced. Positive feedback and encouragement from their social environment was something that made the patients feel confident. Those patients who received more social support from friends, physiotherapist or family were more likely to do the exercises. However, social support was not always experienced positively and this depended mainly on the type of support they got (e.g. encouragement versus dictation). Furthermore, the non-compliant
patients were more likely to experience desolation and pressure from their social environment and were high in expectancy of their recovery.

Other problems patients had like feeling easily tired, being forgetful and being afraid doing exercises seem to be important but held for both the compliant and the non-compliant patient. From the results from these interviews it seems that these problems do not necessarily influence compliance.

Most of the patients had found the information they needed. However, this only applied to the patients who were able to work with a computer. It might be that people, who are not familiar with a computer, do not receive the information they need. Moreover, although only some of the families of stroke patients got information how to help them; this seems to have a positive effect on the adherence to prescribed exercises.

Although a large number of people had been asked for cooperation, only a few non-compliant people were willing to talk about problems they face in relation to doing their exercises. This indicates how difficult research in the field of stroke rehabilitation is.

As a final conclusion, this study shows that social support seems to be important in compliance and that it possibly reduces the frustration a patient experiences when doing exercises. However, social involvement is not always accepted, especially when experienced as dictation. On the other hand, involvement can also be experienced as encouragement. Thus, involvement can be perceived by the patients in different ways, either in a supportive way or in a dictatorial way.
## Appendix 4: Summaries variable item content

<table>
<thead>
<tr>
<th>Exercises</th>
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</thead>
<tbody>
<tr>
<td>Make cycling movements</td>
<td>1</td>
</tr>
<tr>
<td>Raise arms above head</td>
<td>1111</td>
</tr>
<tr>
<td>Make circles with arms</td>
<td>1</td>
</tr>
<tr>
<td>Stretch arm</td>
<td>1111</td>
</tr>
<tr>
<td>Stretch leg</td>
<td>1111</td>
</tr>
<tr>
<td>Move knee to mouth</td>
<td>1</td>
</tr>
<tr>
<td>Stretch neck</td>
<td>1</td>
</tr>
<tr>
<td>Roll ball</td>
<td>1</td>
</tr>
<tr>
<td>Rub towel over table</td>
<td>1</td>
</tr>
<tr>
<td>Stretchable tape</td>
<td>1</td>
</tr>
<tr>
<td>Stack draughts' pieces</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Deliberate actions</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Walk lengths (10 m)</td>
<td>11</td>
</tr>
<tr>
<td>Sweep curb</td>
<td>1</td>
</tr>
<tr>
<td>Make sandwich</td>
<td>11</td>
</tr>
<tr>
<td>Stand up synchronously</td>
<td>1</td>
</tr>
<tr>
<td>Pick container synchronously</td>
<td>1</td>
</tr>
<tr>
<td>with your arms</td>
<td></td>
</tr>
<tr>
<td>Do the washing up</td>
<td>1</td>
</tr>
<tr>
<td>Eat with knife and fork</td>
<td>11</td>
</tr>
<tr>
<td>Do the cleaning</td>
<td>1</td>
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</table>

<table>
<thead>
<tr>
<th>Barriers compliant</th>
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<tbody>
<tr>
<td>Fatigue</td>
<td>1111</td>
</tr>
<tr>
<td>Monitor limits</td>
<td>111</td>
</tr>
<tr>
<td>Planning.</td>
<td>111</td>
</tr>
<tr>
<td>Fixed rhythm</td>
<td>111</td>
</tr>
<tr>
<td>Fear</td>
<td>11</td>
</tr>
<tr>
<td>Visit</td>
<td>111</td>
</tr>
<tr>
<td>Work</td>
<td>1</td>
</tr>
<tr>
<td>Pain</td>
<td>1</td>
</tr>
<tr>
<td>Have to do the housekeeping</td>
<td>11</td>
</tr>
<tr>
<td>Stressed</td>
<td>1</td>
</tr>
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</table>

<table>
<thead>
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<th>Barriers non-compliant</th>
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</thead>
<tbody>
<tr>
<td>Work</td>
<td>11</td>
</tr>
<tr>
<td>Confrontation</td>
<td>1</td>
</tr>
<tr>
<td>Correct execution of exercises</td>
<td>11</td>
</tr>
<tr>
<td>Monitor limits</td>
<td>11</td>
</tr>
<tr>
<td>Tired</td>
<td>11</td>
</tr>
<tr>
<td>Diverted by telephone, television, Internet</td>
<td>11</td>
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<tr>
<td>Feeling of not being safe</td>
<td>1</td>
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</table>
### Factors influencing intention

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Social factors compliant</strong></td>
</tr>
</tbody>
</table>
| Emotional support     | 11111  
| Feedback              | 11111  
| Encourage             | 111111  
| Reminder from partner | 11  
| Join in exercises     | 11111  
| Have to do the housekeeping | 11  
| Stressed              | 1  
| Give trust            | 11  
| Involvement of partner | 111  

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Social factors non-compliant</strong></td>
</tr>
</tbody>
</table>
| Involvement of partner | 11  

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Emotional reaction compliant</strong></td>
</tr>
</tbody>
</table>
| Relieved              | 11  
| Frustrated            | 11  
| Satisfied             | 1  
| Proud                 | 1  
| Full of confidence    | 11111  
| Happy                 | 1  
| Afraid                | 11  

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Emotional reaction non-compliant</strong></td>
</tr>
</tbody>
</table>
| Boring                | 1  
| Frustrated            | 11  
| Mandatory             | 1  
| Tired out             | 1  
| Afraid                | 1  
| Guilty                | 1  
| Relieved              | 1  

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outcome expectancies compliant</strong></td>
</tr>
</tbody>
</table>
| Housekeeping easier   | 1  
| More souple           | 1  
| No decline            | 1  
| Less tired            | 1  
| Power                 | 11  
| Less stiff            | 1  
| Gardening             | 1  
| Playing tennis        | 1  
| Declines              | 11  
| Work more             | 1  
| Eat with knife and fork | 1  

54
### Factors influencing intention

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Condition</td>
<td>1</td>
</tr>
<tr>
<td>Balance</td>
<td>1</td>
</tr>
<tr>
<td>Hold cup tightly</td>
<td>1</td>
</tr>
<tr>
<td>Cooking</td>
<td>1</td>
</tr>
<tr>
<td>Typing</td>
<td>1</td>
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</table>

<table>
<thead>
<tr>
<th>Outcome expectancies compliant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strength</td>
</tr>
<tr>
<td>Condition</td>
</tr>
<tr>
<td>Housekeeping</td>
</tr>
<tr>
<td>Gardening</td>
</tr>
<tr>
<td>Working</td>
</tr>
<tr>
<td>Doing the shopping: carry a bag</td>
</tr>
<tr>
<td>Walking better</td>
</tr>
<tr>
<td>Confrontation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Personal characteristics compliant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active</td>
</tr>
<tr>
<td>Responsible</td>
</tr>
<tr>
<td>Realistic</td>
</tr>
<tr>
<td>Complaining</td>
</tr>
<tr>
<td>Stayer</td>
</tr>
<tr>
<td>Not clever</td>
</tr>
<tr>
<td>Patient</td>
</tr>
<tr>
<td>Curious</td>
</tr>
<tr>
<td>Optimist</td>
</tr>
<tr>
<td>Pitiful</td>
</tr>
<tr>
<td>Weak person</td>
</tr>
<tr>
<td>Self-confident</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Personal characteristics non-compliant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fanatic</td>
</tr>
<tr>
<td>Good</td>
</tr>
<tr>
<td>Weak</td>
</tr>
<tr>
<td>Does not dare</td>
</tr>
<tr>
<td>responsible</td>
</tr>
<tr>
<td>Sensible</td>
</tr>
</tbody>
</table>
Appendix 5: Demographics

Q: How long has it been ago that you have had a stroke?

Q: How often do you get support from your physiotherapist?
Factors influencing intention

Q: What is your highest degree?
Appendix 6: Validating the measures

This study was set up to find an answer to the following research question:

*Which motivational factors influence intention in stroke patients to do exercises at home most strongly?*

The nine factors of interest were: Intention, Barriers, Attitude, Social norms, Self-standards, Emotional reaction, Self-efficacy, Received and Perceived social support.

To be able to find an answer to my research question I first had to check whether the developed measures indeed presented the proposed factors. Therefore, several exploratory factor analyses that used the Kaiser’s criterion were performed on the measures of the factors to find the desired structure in the measures. Attitude turned out to be multidimensional and the Self-efficacy turned out to be instable.

Validating Self-efficacy Some items of Self-efficacy had loadings less than 0.4 on the factor where the other Self-efficacy items belonged to and did load on other factors they did not belong to. Therefore, those items were subsequently eliminated. See appendix 1 and 2, for the used measures for Self-efficacy. Deleting these items decreased the Cronbach Alpha from .791 to .737. To check whether the developed measure indeed consisted the most relevant items of Self-efficacy, all the items were entered in a correlation analyses with Intention. This analysis showed that the used measure contained the most relevant items, therefore, the measure was considered suitable (see Table 7 for more details).

Table 7
Intercorrelations between measures of Self-efficacy and Intention

<table>
<thead>
<tr>
<th>Variable</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1. Intention</td>
<td>--</td>
</tr>
<tr>
<td>2. Q1*</td>
<td>.345</td>
</tr>
<tr>
<td>3. Q2</td>
<td>.279</td>
</tr>
<tr>
<td>4. Q3</td>
<td>.280</td>
</tr>
<tr>
<td>5. Q4*</td>
<td>.262</td>
</tr>
<tr>
<td>6. Q5*</td>
<td>.363</td>
</tr>
</tbody>
</table>

Note. * Questions included in the measure of Self-efficacy. Self-efficacy was measured by rating each of six 5-point scales anchored by “very uncertain” (1) to “very certain” (5) in response to statements.
Originally, Self-efficacy concerned the following items:

Q1. I can get around to exercises and/or actions even when I have household chores. How certain are you that you can do this?
Q2. I can ensure that I am not afraid when I start my exercises and/or actions. How certain are you that you can do this?
Q3. I can ensure that I am not too tired to start exercises and/or actions. How certain are you that you can do this?
Q4. I can ensure that I do not forget my exercises and/or actions, by using reminders (for example a diary, little notes and other forms of ‘reminders’). How certain are you that you can do this?
Q5. I can ensure that I am not too distracted by television, radio, telephone and/or Internet. How certain are you that you can do this?

Because the Barrier items are linked to the Self-efficacy items, that is, the external circumstances are those situations wherein a person perceives he or she has the capabilities to perform the target behaviour. Thus, it is required to use only those items concerning the same situations. Deleting items decreased the Cronbach Alpha from .776 to .713. To check whether the developed measure indeed consisted the most relevant items of Barriers, all the items were entered in a correlation analyses with Intention. This analysis showed that the used measure contained the most relevant items, therefore, the measure was considered suitable.

Table 8
Intercorrelations between measures of Barriers and Intention.

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Intention</td>
<td>--</td>
</tr>
<tr>
<td>2. Q1*</td>
<td>.016</td>
</tr>
<tr>
<td>3. Q2</td>
<td>.027</td>
</tr>
<tr>
<td>4. Q3</td>
<td>.117</td>
</tr>
<tr>
<td>5. Q4*</td>
<td>.312</td>
</tr>
<tr>
<td>6. Q5*</td>
<td>.414</td>
</tr>
</tbody>
</table>

Note. * Questions included in the measure of Barriers. Barriers were measured by rating each of seven 5-point scales anchored by “never” (5) to “always” (1) in response to items.
Originally, Barriers concerned the following items:

Q1. I do not get around to these exercises and/or actions because I have to do household chores.
Q2. I do not get around to these exercises and/or actions because I am tired.
Q3. I do not get around to these exercises and/or actions because I am afraid that an accident will occur.
Q4. I do not get around to these exercises and/or actions because I forget about them.
Q5. I do not get around to these exercises and/or actions because I am distracted by television, radio, telephone and/or Internet.

Validating Attitude. In contrast to the Self-efficacy measure, the Attitude items loaded not on dimensions of they did not belong to, instead, they loaded on their own dimension in the factor analyses. To find which dimensions were present in the measure of Attitude, an exploratory principal axis factor analysis that used the Kaiser’s criterion was performed on the Attitude related items. This analysis showed that Attitude was indexed along three main dimensions, which were interpreted by the researcher as a Utility-attitude, an Affective-attitude and a Obligation-attitude dimension. A similar distinction has also been proposed by Bagozzi (1989). Factor analyses, which included all items, indicated that Affective-attitude items were loading on the same dimension Emotional reaction items were loading on. This suggested that the affective component was already captured in our framework. The use of the other two dimensions was considered suitable, that is, one factor for Utility-attitude and one factor for Obligation-attitude. This brought the total amount of factors to ten. To create clear measures of the different attitude dimensions, attitude related items that cross-loaded on several factors (items that had loadings of greater than 0.4 on more than one factor), or had loadings of less than 0.4 on all the factors were subsequently eliminated.
Appendix 7: Factor analysis

To be able to find an answer to our research question I first had to check whether the developed measures indeed loaded on the proposed dimensions in a factor analysis. The Social norm was assessed with only one item. Because the influence on any dimension of the item was minimal, it was decided to remove it from further factor analyses. Next, as mentioned in paragraph 1.3 (The theoretical framework), Intention is the dependent variable. Therefore, it was removed from further factor analyses as well. To summarize, I expected to find eight factors in further factor analyses. A principal factor analysis confirmed that eight factors could be found in the structure (the eight factors accounted for 60.69 % of the total variance). The technique that was used is called a confirmatory factor analysis, which looks for the number of factors that are predefined. Both Varimax (orthogonal, i.e. assuming the factors are independent of each other) and Oblique (oblimin, i.e. assuming the factors are dependent on each other) were performed. The two solutions were identical, and the mean correlation among the oblique factors was poor ($R < 0.30$). This suggests that the Varimax rotation offered a good fit for this data.

See Table 9 for the ‘rotated factor matrix’, this table shows the factor loadings of each item. The items are sorted for each factor, based on the factor loadings. The rotated solution yielded eight interpretable factors. See Table 9 for the Eigenvalues of these factors and see Table 10 for the factor loadings.

Table 9

<table>
<thead>
<tr>
<th>Factor</th>
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<td>4</td>
<td>2.444</td>
</tr>
<tr>
<td>5</td>
<td>1.970</td>
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<td>6</td>
<td>1.598</td>
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<td>7</td>
<td>1.563</td>
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<tr>
<td>8</td>
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Table 10
The ‘rotated factor matrix’, see appendix 1 and 2 for the used items.

**Rotated factor matrix**

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<th>Factor</th>
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Factors influencing intention