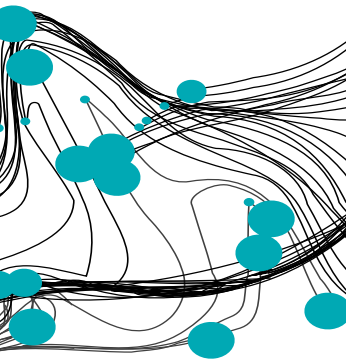

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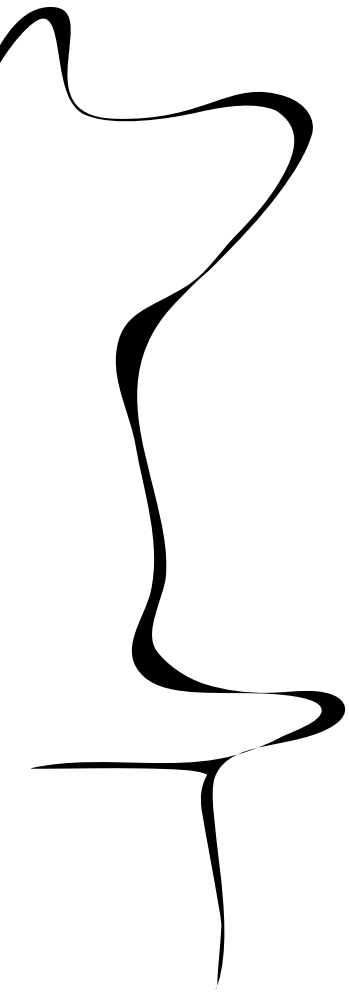

The relationship between stages of change and perceived acceptability of persuasive strategies in mHealth interventions

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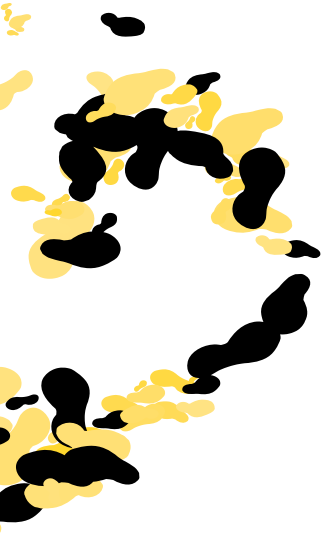

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Abstract 3
Introduction 4
Theoretical Background 6
Persuasive Strategies 6
Stages of Change 8
The current research 9
Method 10
Participants and Design 10
Procedure 11
Storyboards 11
Measures 13
Perceived Acceptability 13
Stages of change 13
Analysis 14
Results 15
Discussion 19
References 26
Appendix A 29
Appendix B 32
Appendix C 35
Appendix D 44
Appendix E 66
Appendix F 91

Abstract

Through the past years research has focused more and more on promoting health behaviour through persuasive technology interventions delivered through mobile applications. A lot of applications apply a one-size-fits-all approach, which does not include tailoring the application to users' individual differences. As tailoring can have a positive impact on sustaining user interest and adherence to the intervention, tailoring is of great importance for long-term behaviour change. The aim of this research is to explore the relationship between stages of change (of the transtheoretical model) and the perceived acceptability of persuasive strategies (of the persuasive systems design model) aimed at promoting healthy eating. In this study five stages are taken into account (*precontemplation [PC], contemplation [C], preparation [P], action [A], maintenance [M])*, which according to the model individuals need to go through in order to reach a behaviour change. Furthermore, eight persuasive strategies were chosen, which were depicted in eight different storyboards. After two stages of change measures, participants were asked to indicate to what extent they perceive the technology as acceptable. The results of Pearson Correlation analyses showed that the stages *PC* and *P* were significantly positively correlated with at least one persuasive strategy. *C* was significantly positively correlated with all eight persuasive strategies. The last stage *M* showed several significant negative correlations with the persuasive strategies. The results suggest that people who are actively thinking about eating healthy and intend to eat healthy in the next six months (*C*) perceive the different persuasive strategies as acceptable. People who have already been eating healthy for at least six months (*M*) do not perceive most of the persuasive strategies as acceptable. Because this is an exploratory study, further research needs to be done to support the offered suggestions and validate the results. In spite of this, an implication of this research is that it shows promising results for stages of change as an individual difference factor that can guide the design of persuasive technology interventions promoting healthy eating.

Keywords: persuasive technology, stages of change, persuasive strategies, healthy eating, mHealth, PSD model, transtheoretical model, tailoring

Introduction

Eating patterns have changed throughout the last decades. Shifts in the way of producing, processing, and distributing foods resulted in for instance changes of what, where and how often we eat (Popkin, Duffey, & Gordon-Larsen, 2005). Other aspects that influence these eating changes are the different eating options and food shopping possibilities that modern society offers (Popkin et al., 2005). Research has shown that amongst other things the intake of nutrient poor and energy-dense snacks, the number of meals that are consumed away from home and the overall calorie intake increased (Nielsen, Siega-Riz, & Popkin, 2002). These behaviour changes are part of an increase of unhealthy eating habits.

These unhealthy eating habits can result in different consequences. One major consequence of unhealthy eating is overweight or obesity. Since 1975 there has been a threefold increase considering the worldwide prevalence of obesity (World Health Organization [WHO], 2018). The WHO (2018) reported more than 1.9 billion people aged 18 or older as overweight in 2016. Of these 1.9 billion people, 650 million fell in the category of obesity. These statistics show that a great number of people are struggling with the societal problem of unhealthy eating. Considering the many physical and mental health risks of unhealthy eating including overweight, obesity and others (Bray, 2004; Luppino et al., 2010; WHO, 2018; Wyatt, Winters, & Dubbert, 2006) promoting healthy eating is of great importance for today's society.

One tool that is used to promote healthy eating in modern society is *persuasive technology*. Through the great use of mobile devices, persuasive technology has the opportunity to use mobile applications as a tool to support public health. As part of the design of these applications, certain design principles can be used, which are also known as *persuasive strategies*. These strategies aim to change the attitudes or behaviour of individuals without deceiving or coercing them (Busch, Schrammel, & Tscheligi, 2013; Fogg, 2003). Persuasive strategies include specific design features that are meant to motivate or persuade users to perform the desired behaviour (Oinas-Kukkonen & Harjumaa, 2009).

Throughout recent years, persuasive technology interventions have been designed and delivered through mobile applications. A lot of the applications have been designed with a one-size-fits-all approach, which does not take individual differences into account (Halko & Kientz, 2010). This approach does not consider different beliefs that people have about health and healthy lifestyles (Orji, 2014). Also, with regards to healthy eating different intentions or motivations individuals have to eat healthy are not taken into account. Research shows that while persuasive technology might encourage one person to behaviour change, the same technology might hinder another person (Orji, 2014). Therefore, in order to have an effective

behaviour change it is recommended to not use the one-size-fits-all approach but instead to tailor the application to its users. Tailoring can have a positive impact on sustaining user interest, especially in the area of health technologies (Halko & Kientz, 2010). If users are interested it also supports their adherence to the intervention, which is crucial in reaching a long-term behaviour change. Research has found that persuasion is more effective when it is personalized and therefore considers individual difference factors (Berkovsky, Freyne, & Oinas-Kukkonen, 2012; Kaptein, Markopoulos, de Ruyter, & Aarts, 2015). Therefore, tailoring can be seen as an important aspect for persuasive technology interventions, which should take individual difference factors into account.

Generally, there has been literature investigating some individual difference factors, specifically with regards to the susceptibility of persuasive strategies. Studies have for instance focused on culture (Oyibo, Adaji, Orji, Olabenjo, & Vassileva, 2018), gender, age, cognitive ability (Abdullahi, Oyibo, Orji, & Kawu, 2019) and personality (Halko & Kientz, 2010). These studies tested the relationship between these factors and the perception of persuasive strategies. Besides the already investigated factors, there are more factors that influence the susceptibility of persuasive strategies; which exact factors can only be found out through research. Therefore, additional research is necessary to enrich the knowledge about what influences users in their perception of persuasive strategies. An example of missing research is for instance the relationship between the perception of persuasive strategies and users' stage of change (Transtheoretical model of behavioural change). This can be seen as a gap in the literature, which the current research aims to reduce.

According to the Transtheoretical Model (Prochaska & Velicer, 1997), individuals need to go through six stages in order to reach behaviour change. These stages are precontemplation, contemplation, preparation, action, maintenance and termination. At the first stage, precontemplation, one does not intend to start eating healthy for the next six months. At the last stage, termination, one is very secure in the healthy eating behaviour and nothing will make this person fall back into previous unhealthy eating habits. As the person in the termination stage does not require further motivation, this stage is not included in this research. This means that the last stage is maintenance, which refers to a person who has been eating healthy for at least six months and who is trying to keep eating healthy. Depending on the stage people are in, they might need different impulses that motivate them to start or continue the process of behaviour change.

Getting people to adapt to healthy eating habits can be a challenge, and it is important to investigate how the persuasive strategies that are used to promote healthy eating are

perceived by the individuals according to their stage of change. Therefore, this research will focus on gaining insight on how individuals perceive certain strategies, because it gives us a better understanding of what should be included in the design in order to change users' behaviour or attitudes. Thus, this research aims to explore the relationship between stages of change and perceived acceptability of persuasive strategies.

Theoretical Background

Persuasive Strategies

In order to change behaviour or attitude, there are different persuasive strategies and categorizations suggested. The persuasive strategies used in this research are from the *Persuasive Systems Design (PSD) model* by Oinas-Kukkonen and Harjumaa (2009)**.** This model is very well known and widely applied to inform the design and evaluate behaviour change support systems. The PSD model does not only focus on behaviour change but is also directed at the use of persuasive technology. Within the model 28 different persuasive strategies are suggested, which can be seen in Figure 1. These strategies are design principles that are used for the persuasive system content and the functionality of the technology. These 28 strategies are divided into four different categories: primary task support, dialogue support, system credibility support, and social support. The model offers a framework for designing and evaluating persuasive technologies, as for instance mobile applications.

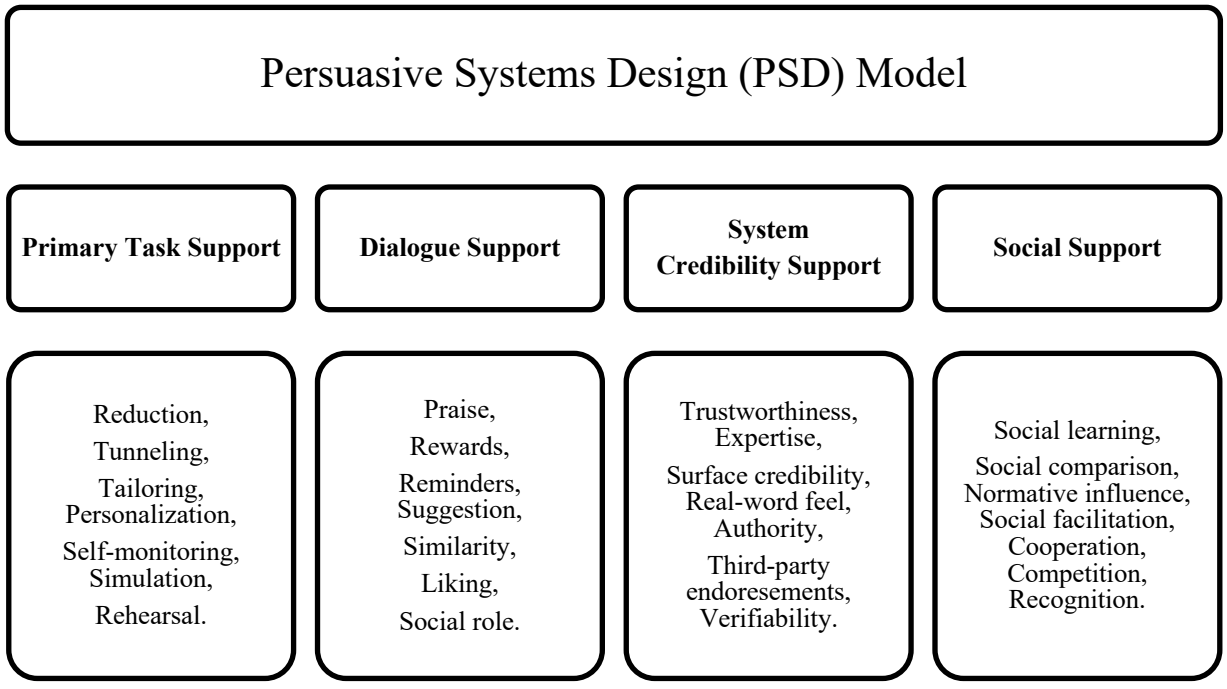

Figure 1. PSD Model (adapted from Oinas-Kukkonen and Harjumaa [2009]).

There has been some research concerning the perception of persuasive strategies within health-promoting applications. Halko and Kientz (2010) investigated the relationship between personality and persuasive strategies by the use of storyboards, which represent graphic illustrations of persuasive strategies. The results of their study showed that more agreeable individuals had higher preferences for positive and negative reinforcement strategies, but lower preference for the competitive strategy. According to the researchers the latter result is in line with the cooperative nature of agreeable individuals. Next, more extraverted individuals had higher preference for a large number of strategies used in the research suggesting that people with a tendency towards extraversion might generally perceive persuasive technologies as desirable. The results of this research show how different persuasive strategies may be preferred by different kinds of people.

The current research also focuses on the perception of persuasive strategies. More specifically the focus lies on the perceived acceptability of eight different strategies, which are presented by the use of storyboards. In total, two strategies out of each category of the PSD model were chosen in order to make sure that the categories are equally represented. The chosen strategies are presented in Table 1.

Table 1

Persuasive Strategies used in the Current Research

Category	*Persuasive strategy*	*Definition*[a]
Primary task support	Self-monitoring	The technology shows the current status of users with regards to their individual goals. It also includes keeping track of the own performance of users.
	Simulation	The technology presents a cause-effect relationship to users through certain means with regards to the context of healthy eating.
Dialogue support	Rewards	The technology offers virtual rewards to the users, when the desired behaviour with regards to healthy eating was performed.
	Reminders	The technology reminds users of the desired behaviour.
System credibility support	Authority	The technology presents names or people to the users that carry authority.

Category	*Persuasive strategy*	*Definition*[a]
	Expertise	The technology offers information which users view as incorporated expertise.
Social support	Cooperation	The technology provides means for users to co-operate with other users.
	Competition	The technology provides means for users to compete with other users.

Note. [a]The definitions are based on the definitions offered in the PSD model (Oinas-Kukkonen & Harjumaa, 2009).

Stages of Change

Stages of change is an important part of the *Transtheoretical Model* of health behaviour change (Prochaska & Velicer, 1997). According to this, individuals need to go through six different stages in order to reach a behaviour change. The stages are part of a temporal dimension, which considers the behaviour change as a process instead of an event. Within this process individuals move from one stage to another. The amount of time it takes to move from the first stage to the last one varies for each person (Marcus, Selby, Niaura, & Rossi, 1992). Besides moving forward to the next stage, it is also possible for individuals to relapse and move back into one of the previous stages or to get/be "stuck" at a certain stage. The six stages of change that are presented in the transtheoretical model are precontemplation, contemplation, preparation, action, maintenance, and termination.

In the first stage, *precontemplation*, people are not intending to change their high-risk behaviour in the near future. The reasons for this can be diverse; one reason could be for instance that they are uninformed about the consequences of certain behaviour. The second stage, *contemplation*, refers to people who are thinking about changing their high-risk behaviour within the near future. Within the third stage, *preparation*, people are intending to take action soon and have a plan of action for this. The *action* stage refers to people who actually have made adjustments with regards to their lifestyle in an overt way in the last weeks or months. The fourth stage, *maintenance*, includes people who are trying not to fall back into their previous way of living. Thus, they are working hard to continue what they have decided to change before. The last stage, *termination,* refers to people who are not tempted to fall back into their previous high-risk behaviour. At this stage, the people are completely confident in their behaviour, which is then not influenced by for instance different moods or stress. The last stage 'termination' has been omitted in this research, because when users have reached this stage, they are confident in pursuing their healthy behaviour to such an extent that nothing will

change this. Therefore, persuasive strategies will not change whether they are motivated to eat healthy or not.

Previous research has examined the stages of change in the context of health behaviour. A study by Johnson et al. (2008) investigated the effectiveness of an intervention for weight management, which is based on the stages of change. Their research shows that when individuals receive feedback which is tailored to the stage that the individual is in, it can improve healthy behaviour. Although the research does not include persuasive technology, it shows that when individuals receive feedback on their behaviour based on stages of change, it promotes the desired behaviour. This could also be applied in the context of persuasive strategies, as these could also include delivering appropriated feedback to users, which is tailored to the stage users are in.

Another study shows that in the precontemplation stage people have more arguments against the health behaviour than in favor of it (Prochaska et al., 1994). The opposite is the case for the action stage, where people have more arguments in favor of the health behaviour than against it. This shows that the attitudes of individuals in different stages vary. Therefore, it is important to adapt the strategy of an intervention to the current stages that individuals are in. More specifically, the results of this study show that for people that are not intending to change their behaviour (precontemplation stage) the focus of an intervention should lie on aspects promoting the desired behaviour (Prochaska et al., 1994). On the other hand, for people that are already thinking about changing their behaviour (contemplation stage), the intervention should rather focus on decreasing reasons that argue against the behaviour change. Thus, the strategies of an intervention should change depending on the stages that people are in. If this systematic and dynamic way of using strategies is implemented within an intervention it will facilitate the progress of moving into the next stage. These results again support the idea that as the individuals go through the process of change, they need different types of strategies to help them at different stages of this process. Thus, one can say that the same idea accounts in the context of persuasive strategies. In order to decide which persuasive strategy should be implemented, one should consider the stage of change that the user is in.

The current research

Users have different motivational needs across different stages. Therefore, it is of importance to know which persuasive strategy works best for which individual, according to users' stage of change with regards to healthy eating. However, as mentioned earlier, investigating the specific persuasive strategies in relationship to stages of change is

underreported in literature. Therefore, the current research aims to explore the relationship between stages of change and the perceived acceptability of different persuasive strategies in the context of mobile applications that promote healthy eating.

This study is the first to explore the relationship between persuasive strategies and stages of change. Investigating this relationship is of importance because it will give more insight into tailoring persuasive technologies to the users. It can benefit future research because specific hypotheses regarding which persuasive strategy is most suitable for which stage can be developed and tested. Next to that, the results of this exploratory study can guide the design of persuasive technology interventions. Designers of persuasive health technology applications may therefore benefit from this research. As these designers aim to develop interventions that match user profiles, they can adapt to users' stage of change along the process of health behaviour change. Exploring this relationship will give new insight into what is needed to tailor persuasive technology according to users' needs in order for them to achieve long-term behaviour change. Therefore, this exploratory study may benefit future research about persuasive technology and the designers and users of it.

Method

Participants and Design

In order to investigate the relationship between persuasive strategies used in mobile applications promoting healthy eating and stages of change a cross-sectional survey design was applied. A quantitative measurement in form of an online questionnaire was used to reach a convenience sample. For ethical reasons it was a precondition that participants are at least 18 years of age. An a priori power analysis was conducted using G*Power3 (Faul, Erdfelder, Lang, & Buchner, 2007). The results show that a sample size of N = 84 is required to get a power of .80 for the different values of Pearson's *r*.

In total 231 participants started the questionnaire and 186 participants continued and filled out the questions for at least one storyboard because of which their data can be used in this research (dropout rate = 19,48%). Of these 186, eight participants were removed because of several reasons: Firstly, three participants did not agree to the informed consent, because of this they were immediately directed to the end of the survey and no further data was recorded. Secondly, two other participants were younger than 18 and did therefore not meet the age requirement. Thirdly, three participants did not pass the attention check, which consisted of having a response time greater than three and a half minutes.

In total, the data of 178 participants (M_{age} = 25.04 ; SD_{age} = 9.97 ; 72.5% female, 26.4% male, 1.1% Other; 66.9% German, 39% Dutch, 11.2% Other; 3.9% HAVO/MBO 2-4/Realschulabschluss, 63.5% Abitur/VWO, 7.3% HBO, 12.9% Bachelor's degree, 5.6% Master's degree, 0.6% Doctorate (PhD), 6,2% Other; 74.2% Student, 23.6% Employee, 2,2% Other) is used for the purposes of this research. All in all, 172 participants finished the survey and six participants did not fill in the questions for all eight storyboards.

Procedure

First a pre-test was conducted and distributed within the Health Psychology and Technology department of the University of Twente in order to test the validity of the designed storyboards. After implementing the results of the pre-test participants were recruited from the University of Twente's Psychology participant pool and through social media. Participants who came from the University of Twente received course credits in return for their completion of the survey. The participation of the study was voluntary, which was confirmed by participants actively agreeing to the informed consent. Moreover, the BMS Ethics committee of the University of Twente approved the current study.

At the beginning of the questionnaire, participants were informed about the aim of the study and about their rights. They were also informed that the survey would take approximately 15 minutes of their time. After agreeing with the aforementioned information, participants provided demographic information. Next, the participants completed two measures of stages of change. Then, participants were randomly shown 8 different storyboards, after each of which they indicated their agreement with six different statements measuring their perceived acceptability of the technologies illustrated in the storyboards. After these six statements they were also asked to describe any further comments or reactions about each technology that they had previously seen. At the end of the survey the participants were thanked for their participation and the researcher's contact details were provided. Furthermore, the participants were asked, whether they had any suggestions or additional comments.

Storyboards

Following Halko and Kientz (2010), storyboards were created, which are graphic illustrations of persuasive strategies. This method was chosen as it uses simple visual language, which includes the essence of persuasive interaction in a pure form without any specific distracting design aspects. In the current study eight different storyboards were used, each of which illustrates a different persuasive strategy. The storyboards were designed by the author

of this thesis based on the aforementioned definitions (Table 1) and existing storyboards designed for physical exercise. Two examples of the designed storyboards can be seen in Figure 2. All storyboards are included in Appendices A (English) and B (German).

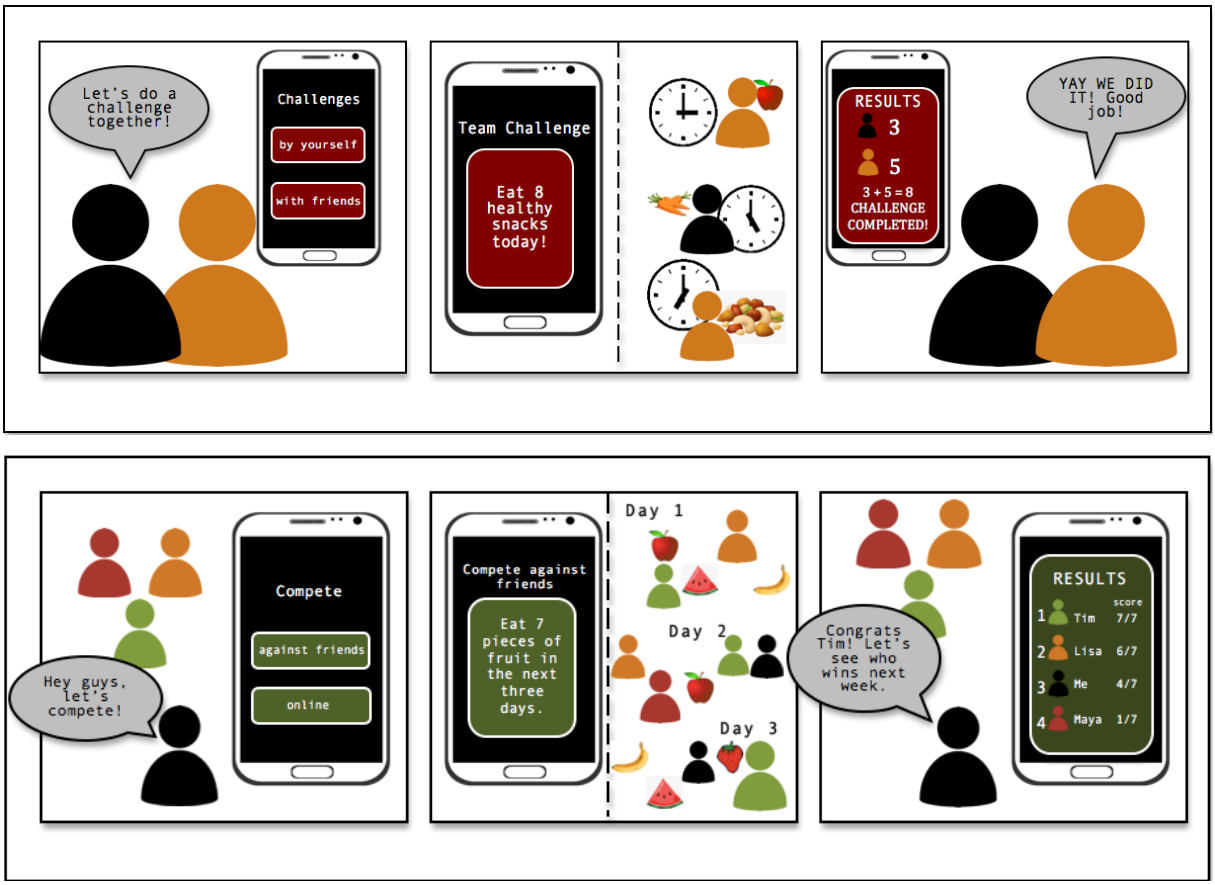

Figure 2. Storyboards depicting the strategies cooperation and competition (social support).

After the design, the storyboards were pre-tested for validity. The questionnaire that was used for the pre-test can be found in Appendix C. In the pre-test all eight storyboards were shown. After each storyboard the 28 persuasive strategies of the PSD model were listed. Eight experts were asked to indicate which persuasive strategies they thought were best represented in the individual storyboards. They were instructed to choose the three best fitting strategies and to rank them from 1 to 3 (1 = most fitting). Based on the results of this pre-test the storyboards were adjusted. The adjustments included changing the name of the depicted persuasive strategy, namely third-party was changed into authority and real-world feel was changed into expertise. The storyboards were then used in the main survey. In the survey participants reported their perceptions of the technologies depicted in the storyboards, which were presented in a randomized order.

Measures

The online questionnaire was provided in English (Appendix C) and German (Appendix D). The original English items were translated into German by the author of the thesis. After this, the translation was checked by three bilingual (German, English) speakers.

Perceived Acceptability. In order to test the perceived acceptability of the persuasive strategies, a 7-item measure is used that is based on the measurement by Halko & Kientz (2010). The first six items are statements to which respondents can indicate their agreement with a 7-point Likert scale. Through all items information about users' opinion is asked. The first six items refer to the enjoyment, likelihood of use, helpfulness, quality of life, ease of use, and time saving with regards to the depicted technology. The last item includes an open-ended question, in which participants can add any other general comments or thoughts about the technology. The statements are presented in Table 2. Perceived acceptability for all persuasive strategies showed excellent internal consistency, the values of Cronbach's α ranged from .934 to .946.

Table 2

Scales and Statements Used to Measure Perceived Acceptability

Scales	*Statement*
Enjoyment	This technology is something that I would enjoy using.
Likelihood of Use	In the future, this technology is something that I would consider using.
Helpfulness	With regards to my own health goals, I consider this technology helpful.
Quality of Life	With regards to the quality of my life, I think that this technology would improve the quality of my life.
Ease of Use	I think this technology seems easy to use.
Time Saving	I think using this technology would help me save time in reaching my health goals.
General Comments	Please describe any other comments or reactions to this technology depicted in the storyboard.

Note. [a]The statements are based on the original questions by Halko and Kientz (2010).

Stages of change. To measure to what extent participants are in a certain stage with regards to healthy eating, a continuous measurement (URICA-E2) by Reed (1993) was used. In this measure participants indicate to what extent they agree with 24 different statements referring to the context of exercising. Their answers indicate to which degree participants stand

in which stage. The response option consists of a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). The measurement includes six stages as the first stage, precontemplation, was split into two different stages. The first stage is precontemplation (non-believers), which includes people who do not believe in exercising. The second stage is precontemplation (believers), which includes people that believe in exercising. Both stages include people who do not intend to change their behaviour in the near future.

For the current study the original statements were changed to fit into the context of healthy eating. An example is that the original item "As far as I'm concerned, I don't need to exercise regularly." was changed into: "As far as I'm concerned, I don't need to eat healthy regularly." In the current study, the items measuring the six stages showed high internal consistency. For the six stages, the values of Cronbach's α ranged from .755 to .907.

Furthermore, a categorical measure was used in order to allocate participants into different groups, dependent on which stage they are in. For this, the first two steps of the measurement by Vallis et al. (2003) were used. Again, the questions and answers were changed in a way that they fit into the context of healthy eating. The first step included answering the question 'Do you consistently avoid eating unhealthy foods' with NO or YES. The second step included answering the exact same question with different response options. According to this answer participants were assigned to their stage. Participants that answered NO were assigned to: (1) precontemplation stage (No, and I do not intend to in the next 6 months); (2) contemplation stage (No, but I intend to in the next 6 months); (3) preparation stage (No, but I intend to in the next 30 days). Participants that answered YES were assigned to: (4) action stage (Yes, and I have been for less than 6 months); (2) maintenance stage (Yes, and I have been for more than 6 months).

Analysis

In order to analyse the provided data, the program IBM SPSS Statistics 24 was used. The data of both versions of the questionnaire (English, German) was analysed together. First, the data was checked on whether participants agreed to the informed consent, were all at least 18 years of age and whether everyone passed the attention check. Furthermore, the completeness of the data was checked in order to get the full picture of the provided data. Next, an overview of demographic variables of the sample was generated, which are presented in the Participants section above. Also, Cronbach's Alpha was calculated in order to test the reliability of the continuous measure of stages of change and the measure of perceived acceptability.

Furthermore, descriptive statistics (number of participants, means and standard deviations) were conducted of the continuous measure of stages of change and of the perceived acceptability of every persuasive strategy. After this, Pearson correlation analyses were conducted to see to what extent the continuous stages of change measure relate to the perceived acceptability of the different persuasive strategies. Lastly, descriptive statistics (number of participants, means, and standard deviations) were conducted on the perceived acceptability by categorical stages of change. Results were considered at a significance level of 0.05.

Results

The descriptive statistics (number of participants, means and standard deviations) for the continuous stages of change measure and the perceived acceptability of each persuasive strategy are presented in Table 3**.** The results of the continuous measure of stages of change show that most of the participants rather agreed with the statements that could be categorized into the contemplation stage (M = 3.35, SD = .95) and the maintenance stage (M = 3.38, SD = 1.03). Also, most participants disagreed with the statements that could be categorized into the preparation stage (M = 1.96, SD = .82).

With regards to the perceived acceptability of the different persuasive strategies, one can see that self-monitoring is perceived as most acceptable (M = 4.65, SD = 1.46). After self-monitoring, participants perceived the strategies cooperation and reminders as most acceptable (M = 4.29, SD = 1.55; M = 4.26, SD = 1.55). The results of the strategy simulation show that this strategy is perceived as least acceptable by the participants (M = 3.46, SD = 1.61).

Table 3

Descriptive Statistics of Key Variables

Variable	*N*	*M*	*SD*
Stages of change[a]			
Precontemplation (non-believers[b])	178	2.03	.76
Precontemplation (believers[c])	178	2.58	1.11
Contemplation	178	3.35	.95
Preparation	178	1.96	.82
Action	178	3.09	0.96
Maintenance	178	3.38	1.03
Perceived acceptability for different persuasive strategies[d]			
Self-monitoring	175	4.65	1.46
Simulation	174	3.46	1.61
Rewards	178	4.11	1.57
Reminders	177	4.26	1.55
Authority	175	4.12	1.44
Expertise	175	4.06	1.59
Cooperation	177	4.29	1.55
Competition	174	4.14	1.55

Note. [a]5-point Likert scale (1 = strongly disagree, 5 = strongly agree); [b]Non-believers in healthy eating; [c]Believers in healthy eating; [d]7-point Likert scale (1 = strongly disagree, 7 = strongly agree)

The results of the Pearson correlation analyses are presented in Table 4 (see Appendix F for all correlations at the item-level). The correlations show to what extent, each of the continuous stages of change relates to the perceived acceptability of the different persuasive strategies. One significantly positive correlation was found for the first stage, precontemplation (non-believers). Next to that, several significantly positive correlations were found for the three following stages, precontemplation (believers), contemplation, and preparation. For the fifth stage, action, no significant correlations were found. Lastly, for the sixth stage, maintenance, several significantly negative correlations were found.

Precontemplation (non-believers) was found to be significantly positively correlated with perceived acceptability of rewards. This significant correlation is mainly driven by the items that asked about helpfulness and time saving. *Precontemplation (believers)* was found to be significantly positively correlated with perceived acceptability of rewards, reminders, cooperation, and competition. *Contemplation* was found to be significantly positively correlated with perceived acceptability of all eight strategies, namely self-monitoring, simulation, rewards, reminders, authority, expertise, cooperation, and competition. The significant correlation with self-monitoring is mainly driven by the items that asked about enjoyment, likelihood of use, and quality of life. The significant correlation with authority is mainly driven by likelihood of use, helpfulness, and quality of life.

Preparation was found to be significantly positively correlated with perceived acceptability of self-monitoring, simulation, rewards, and reminders. The significant correlation with self-monitoring is mainly driven by the items that asked about likelihood of use, quality of life, and time saving. The significant correlation with reminders is mainly driven by helpfulness, quality of life, and time saving. *Action* was not found to be significantly correlated with perceived acceptability of any persuasive strategy. *Maintenance* was found to be significantly negatively correlated with rewards, reminders, cooperation, and competition. The significant correlation with rewards is mainly driven by the items helpfulness and time saving. The significant correlation with reminders is mainly driven by items that asked about helpfulness, quality of life, and time saving.

Table 4

Correlations between Stages of Change and Perceived Acceptability of Persuasive Strategies

Stages of change	Persuasive strategy (Perceived acceptability)	Pearson's *r*	Perceived acceptability (Item-level)[a]	*p* value
Precontemplation (non-believers[b])	1. Self-monitoring	1. -.085		1. .263
	2. Simulation	2. .011		2. .886
	3. Rewards	3. .149*	3. +H, +TS	3. .050
	4. Reminders	4. .083		4. .269
	5. Authority	5. -.010		5. .894
	6. Expertise	6. -.049		6. .523
	7. Cooperation	7. .133	7. +QL	7. .079
	8. Competition	8. .118	8. +TS	8. .116
Precontemplation (believers[c])	1. Self-monitoring	1. .079	1. +QL	1. .302
	2. Simulation	2. .062		2. .413
	3. Rewards	3. .237**	3. +E, +LU, +H, +QL, +EU, +TS	3. .002
	4. Reminders	4. .232**	4. +E, +LU, +H, +QL, +TS	4. .002
	5. Authority	5. .077		5. .307
	6. Expertise	6. .067		6. .381
	7. Cooperation	7. .230**	7. +E, +LU, +H, +QL, +TS	7. .002
	8. Competition	8. .225**	8. +E, +LU, +H, +QL, +TS	8. .003
Contemplation	1. Self-monitoring	1. .165*	1. +E, +LU, +QL	1. .029
	2. Simulation	2. .221**	2. +E, +LU, +H, +QL, +TS	2. .003
	3. Rewards	3. .273**	3. +E, +LU, +H, +QL, +EU, +TS	3. < .001
	4. Reminders	4. .209**	4. +E, +LU, +H, +QL, +TS	4. .005
	5. Authority	5. .178*	5. +LU, +H, +QL	5. .018
	6. Expertise	6. .224**	6. +E, +LU, +H, +QL	6. .003
	7. Cooperation	7. .269**	7. +E, +LU, +H, +QL, +EU, +TS	7. < .001
	8. Competition	8. .204**	8. +E, +LU, +H, +QL	8. .006
Preparation	1. Self-monitoring	1. .154*	1. +LU, +QL, +TS	1. .042
	2. Simulation	2. .319**	2. +E, +LU, +H, +QL, +TS	2. < .001
	3. Rewards	3. .194*	3. +E, +LU, +H, +QL, +TS	3. .010
	4. Reminders	4. .181*	4. +H, +QL, +TS	4. .016
	5. Authority	5. .135	5. +H, +QL	5. .073
	6. Expertise	6. .093		6. .220
	7. Cooperation	7. .049		7. .517
	8. Competition	8. .100		8. .185
Action	1. Self-monitoring	1. .034		1. .655
	2. Simulation	2. .060		2. .428
	3. Rewards	3. -.025		3. .739
	4. Reminders	4. -.122	4. -QL	4. .105
	5. Authority	5. -.021		5. .777
	6. Expertise	6. .054		6. .480
	7. Cooperation	7. -.075		7. .327
	8. Competition	8. -.119	8. -TS	8. .114
Maintenance	1. Self-monitoring	1. -.113	1. -QL	1. .136
	2. Simulation	2. -.074		2. .136
	3. Rewards	3. -.167*	3. -H, -TS	3. .028
	4. Reminders	4. -.170*	4. -H, -QL, -TS	4. .023
	5. Authority	5. -.066	5. -QL	5. .386
	6. Expertise	6. -.021		6. .785
	7. Cooperation	7. -.245**	7. -E, -LU, -H, -QL, -TS	7. .001
	8. Competition	8. -.215**	8. -E, -H, -QL, -EU, -TS	8. .004

Note. [a]Only includes significant correlations; directions (+ = positive; - = negative) and names of the items are presented (E = Enjoyment; LU = Likelihood of Use; H = Helpfulness; QL = Quality of Life, EU = Ease of Use; TS = Time Saving); [b]Non-believers in healthy eating; [c]Believers in healthy eating

*Correlation is significant at the 0.05 level (2-tailed).

**Correlation is significant at the 0.01 level (2-tailed).

In all stages of change, significant correlations with persuasive strategies were either in positive or negative directions. Furthermore, inspecting the correlations according to the four categories of persuasive strategies (primary task support, dialogue support, system credibility support, social support) one can see that there were significant correlations for either both of the strategies of one category or for none. The only exception is for precontemplation (non-believers) as only a significant correlation with rewards (dialogue support) was found and not with reminders. Considering the strength of the correlations, one can conclude that almost all of the correlations are found to be weak either in the negative or the positive direction ($.30 > r > -.30$). An exception can be found with the correlation between preparation and perceived acceptability of simulation, as this is found to be moderately positive ($r = .319$; $p < .001$). A clear overview of the significant Pearson correlations is provided in Figure 3.

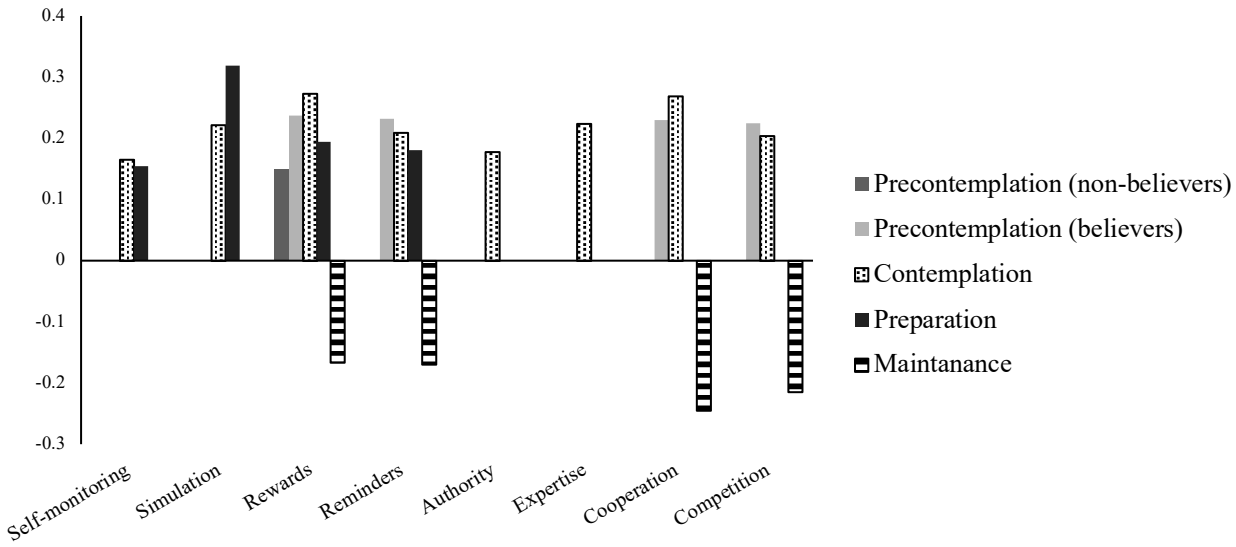

Figure 3. Significant Pearson correlations between stages of change and perceived acceptability of persuasive strategies.

Next to the continuous measure of stages of change, a categorical measure was conducted. The descriptive statistics (number of participants, means, and standard deviations) of this measure can be found in Figure 4. No inferential statistics are conducted on these means as the *n*'s of the different categories are too deviated from each other. A short inspection of the means suggests that the overall perceived acceptability of all persuasive strategies was higher for participants in the preparation or action stage than participants of the precontemplation stage.

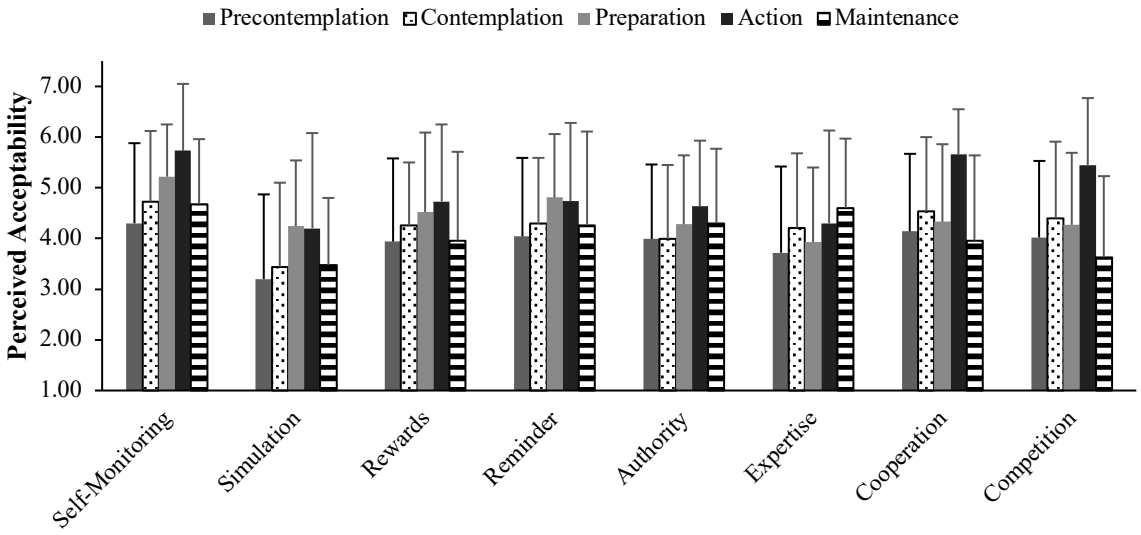

Figure 4. Means and standard deviations of perceived acceptability of different persuasive strategies by categorial stages of change. Self-monitoring/Simulation/Expertise/Cooperation n = 175; Rewards n = 174; Reminders n = 178; Authority/Competition n = 177. Precontemplation n = 76; Contemplation n = 39; Preparation n = 17; Action n = 11; Maintenance n = 35.

Discussion

The aim of the study was to explore the relationship between stages of change and perceived acceptability of persuasive strategies promoting healthy eating. Findings show some significant relations between stages of change and the perceived acceptability of persuasive strategies. Overall, individuals who are in precontemplation (non-believers), precontemplation (believers), contemplation, or preparation prefer at least one persuasive strategy. Individuals that are in the action stage neither show preference nor disapproval for the strategies. Individuals in the maintenance stage are found to have a lower perceived acceptability of several persuasive strategies.

Individuals in the *precontemplation (PC)* stage were divided into two separate groups. The first group refers to people that do not believe in the importance of healthy eating, because of which they do not intend to change their behaviour (*non-believers [NB]*). These people showed higher perceived acceptability for the persuasive strategy rewards. The Self-determination theory by Deci and Ryan (2000) suggests different approaches to motivation, which might move people to do something, in this case to eat healthy. One of these approaches is called extrinsic motivation and if this is the case the individual eats healthy when something else is attained through performing the behaviour. This could be a reason for people in *PC(NB)* to find rewards as a persuasive strategy acceptable. The strategy shows that when they do eat healthy, they gain a reward because of this behaviour. This can then be seen as extrinsic

motivation. Therefore, a possible explanation could be that people in the *PC(NB)* stage prefer rewards, because they are extrinsically motivated.

The second group of the *PC* stage does believe that healthy eating is important, thus there are other reasons for why these people do not intend to eat healthy (*believers [B]*). Individuals who are in this stage preferred the persuasive strategies rewards, reminders, cooperation and competition. Thus, dialogue support, which includes rewarding and reminding and social support, which includes cooperating and competing were perceived as acceptable although there is no intention to start eating healthy in the near future. Literature supports that gamification techniques implemented in applications might motivate users, as they might turn in this case eating healthy into more fun (Zichermann & Cunningham, 2011). These fun elements are for instance included in receiving rewards or cooperating or competing with others, which might explain the preference for these strategies in this early stage.

Considering the general *PC* stage, research shows that in the context of physical activity this stage is related to amotivation, which refers to a state where intention to act is lacking (Deci & Ryan, 2000; Ferron & Massa, 2013). Therefore, the first step would be to motivate the people in the *PC* stage. One way of doing this could be by raising the awareness of beneficial effects of healthy eating. Increasing education and awareness is especially important for the *NB* group, as these people do neither believe that healthy eating is important nor believe in the benefits of it (Consolvo et al., 2009). A study that looked at the relationship between stages of change and 12 different health behaviours, one of which was healthy eating, concluded that in order for people to move from the precontemplation stage to the contemplation stage, the focus of an intervention should be on arguments that are in favor of the health behaviour (Prochaska et al., 1994). This could be one way to induce motivation for the individuals in this stage.

Next, individuals in *contemplation (C)* are found to have higher perceived acceptability of all eight persuasive strategies. These results suggest a general preference for persuasive strategies of people who are actively thinking about eating healthy. Research found that individuals in the contemplation or preparation stage (*P*) are still unsure about their current behaviour (Forward, 2014). These people are actively thinking about eating healthy (*C*) or already have a plan of action (*P*) but they have not started eating healthy yet. Because of this, these people might be ambivalent about eating healthy and are therefore more susceptible to external influence (Forward, 2014). As the persuasive strategies are also used to change the behaviour externally, they can also be seen as external influence. This responsiveness to external influence could therefore be a possible explanation for the general preference for persuasive strategies of people in the *C* stage.

With regards to the *preparation (P)* stage it is found that these people have higher perceived acceptability of self-monitoring, simulation, rewards and reminders. Again, the individuals in this stage are about to eat healthy but do not eat healthy yet, which increases their susceptibility to external influences (Forward, 2014). The first two strategies give users external impulses by showing them their progress and where they could be or what they could look like with regards to their health goal, these are part of primary task support. The other two strategies reward or remind users, these are part of dialogue support and can also be seen as external impulses. Therefore, the responsiveness of people in this stage to external influence could be an explanation for these results. Furthermore, this stage has been found to be positively related to extrinsic motivation, which is might explain the preference for rewards (Ferron & Massa, 2013; Zichermann & Cunningham, 2011).

Considering the last stage, *maintenance (M)* it was found that people in this stage showed lower perceived acceptability of rewards, reminders, cooperation, and competition. These results suggest that people who have already been eating healthy for at least six months do not prefer persuasive strategies that are used for persuasive technology interventions; at least not being rewarded for and reminded of healthy eating or cooperating and competing with or against other users. Interpreting these results, one could also consider an approach with regards to motivation from the Self-determination theory (Ryan & Deci, 2000). Individuals are intrinsically motivated when they perform the behaviour because of the behaviour and it's aftereffect itself. Compared to extrinsic motivation, intrinsic motivation does not include the need for attaining other consequences on top of the performed behaviour. Therefore, as the people in the *M* stage already perform the behaviour their disapproval of strategies, as for instance rewards, might indicate that they are intrinsically motivated. This suggestion is in line with research by Ferron and Massa (2013), which reports a positive relationship between *M* and intrinsic motivation in the context of physical activity. The results of this study suggest that the use of gamification techniques as for instance the persuasive strategy should be reduced. This is also in line with the disapproval of people in *M* of rewards.

Generally, one can see a difference between people in the first stage (*PC*) and people in the last stage (*M*). Before one starts to perform the behaviour (*PC[B]*) dialogue support and social support are preferred but when one is further along the process of behavioural change, and one has been eating healthy for at least six months (*M*), strategies from these two categories are not appreciated anymore. This is in line with research that supports that motivation can be induced through gamification techniques (Ferron & Massa, 2013; Zichermann & Cunningham, 2011). In both categories (dialogue support and social support) the strategies include

gamification elements as rewarding and socializing. In the early stages this kind of motivation is preferred, compared to the last stage, where intrinsic motivation does not need these external elements.

Lastly, for every stage of change (exception: *PC[NB]*) it was found that the preference or disapproval was not only for specific persuasive strategies but instead preference or disapproval was the same for the whole category (primary task support, dialogue support, system credibility support, social support). Based on this, one could imply that certain stages of change are more susceptible to (not) accept certain categories of the PSD model instead of the individual strategies. Next to that, as the individual stages either relate positively or negatively to the perceived acceptability of all persuasive strategies, one could also think that there might be a general preference or a general disapproval for persuasive strategies.

Practical implications

Persuasive technology has become a focal point of research throughout the last decades. In spite of this, the topic of the current study is underreported in literature. Therefore, this study makes novel contribution to persuasive technology research. The results show stages of change as a promising individual difference factor. Based on the above-mentioned suggestions new hypotheses can be developed and tested. This future research increases the understanding of the importance of tailoring of health promoting persuasive technology applications.

The findings of this research suggest that stages of change might be used to tailor the persuasive strategies to the different users. Depending on the stage individuals are in, their preference varies, which means that there are differences that should be considered. Therefore, it would not be beneficial to use the one-size-fits-all approach as this does not include the different preferences of individuals. Designers of these persuasive technology applications can therefore take their users' stages of change into account in order to personalize the application to the users' needs. The findings might guide the designs as they offer insight about what users of different stages perceive as useful or acceptable. This way this might support the long-term behavioural change that designers of persuasive technology interventions aim for. Which strategies are recommended or not recommended for which stage is presented in Table 5.

Table 5

Summary of Recommended and Not Recommended Persuasive Strategies by Stages of Change as Advice for the Design of Persuasive Health Technology Interventions

Stages of change	Recommended persuasive strategies[a]	Not recommended persuasive strategies[b]
Precontemplation (non-believers)	Rewards	
Precontemplation (believers)	Rewards, reminders, cooperation, competition	
Contemplation	Self-monitoring, simulation, rewards, reminders, authority, expertise, cooperation, competition	
Preparation	Self-monitoring, simulation, rewards, reminders	
Maintenance		Rewards, reminders, cooperation, competition

Note. [a]Perceived acceptability of these strategies correlated significantly positively with the concerned stage; [b]Perceived acceptability of these strategies correlated significantly negatively with the concerned stage.

Strengths, limitations and future research

Reflecting on the current research different aspects support and others limit it. Firstly, the sample can be seen as a strength of this research as there was enough diversity and enough power for the performed analyses. Next to that, a strong point of this research is the unique choice of methodology, namely the low-fidelity storyboards. These storyboards illustrate the persuasive interaction in a pure form instead of showing an already implemented application that may contain additional disruptive design aspects. Because of this, participants could focus completely on the depicted persuasive interaction which supports the results of this research. Furthermore, the relationship between stages of change and persuasive strategies was explored based on a gap in the literature. Therefore, because of the results of this study, stages of change can now be seen as a possible individual difference factor in the design of persuasive technology.

Besides the strengths there are also limitations that need to be taken into account. For instance, the results of the pre-test of the storyboards showed that the storyboards did not always (only) depict what they were meant to. Some results showed that there was overlap with regards to the persuasive strategies that were depicted. Especially for the storyboard depicting simulation, there was a high variability between the experts. Furthermore, experts pointed out that some storyboards include different elements that could be linked to more than one strategy. Therefore, for future research it would be of importance that the design of the storyboards would be improved in a way that there is the least amount of overlap between the presented strategies.

Also, a cross-sectional study was conducted, which focuses on a snapshot in time. Because of this there might be difficulties in making causal inferences (Levin, 2006). Therefore, for future research it would be recommended if other research designs would be applied. An experimental study as for instance a randomized controlled trial or conducting a real mHealth intervention could give more insight in the actual effectiveness of persuasive strategies. The research design could also be longitudinal, which allows researchers to consider change at the individual level, as this design involves repeated measures on the same sample over a certain period of time. Through these research designs one could test whether certain strategies are actually effective for certain stages in the context of healthy eating. Also, a control group could be included to keep the focus on the individual difference factor stages of change. Lastly, a factorial design could be applied in order to receive more insight into which specific strategies work for which specific stage of change.

Besides that, due to a lack of time the answers of the 'General comments' field were not coded and analysed. This could be done to get a first impression of possible thoughts and reasons behind preferences. Future research could also include more specific open questions to get a more detailed picture about preferences and underlying reasons.

As this study was exploratory, it is recommended that this topic is further tested in future research. This can for instance be done by investigating further persuasive strategies of the PSD model and their perceived acceptability with regards to stages of change. This would give a complete picture of the perceived acceptability of the persuasive strategies. On top of this, future research could take it one step further and explore these different questions: Do the persuasive strategies raise the awareness of the benefits of healthy eating? Are people in the *PC* stage extrinsically motivated in the context of healthy eating? Are people in the *M* stage intrinsically motivated in the context of healthy eating? Are there persuasive strategies that people in the *M* stage perceive as acceptable? Do people in different stages that perceive certain persuasive strategies as acceptable also perceive these as effective? Do persuasive strategies that are found to be perceived as acceptable actually have an effect on the users? Is the indicated preference/disapproval strategy-based or category-based? Do stages (*PC, C, P*) that relate positively to perceived acceptability of the strategies relate negatively to other strategies of the PSD model? Do stages (*M*) that relate negatively to perceived acceptability of the eight strategies relate negatively to other strategies of the PSD model? Do individuals in the *action* stage relate positively or negatively to other strategies of the PSD model? If new hypotheses would be developed and tested based on these questions, the understanding of which persuasive strategy works best for whom would increase.

Also, it would be valuable if future research would explore this relationship in a different context, as for instance smoking cessation or physical activity. Considering the preferences in other health behaviours would enrich the general understanding of stages of change as an individual difference factor.

Conclusion

Overall this research aims to explore the relationship between stages of change and the perceived acceptability of persuasive strategies. This research concludes that tailoring based on stages of change seems promising in the context of mHealth interventions promoting healthy eating. Depending on the stage that people are in, their preferences in different persuasive strategies vary. Therefore, the results do not support the use of the one-size-fits-all approach but instead suggest tailoring the technology to users' stage of change. Taking this into account can increase the possibility of long-term behavioural change as it informs technology designers about the different preferences. Therefore, it is of great importance to consider these individual difference factors when designing persuasive technology interventions in order to fight against the societal problem of unhealthy eating.

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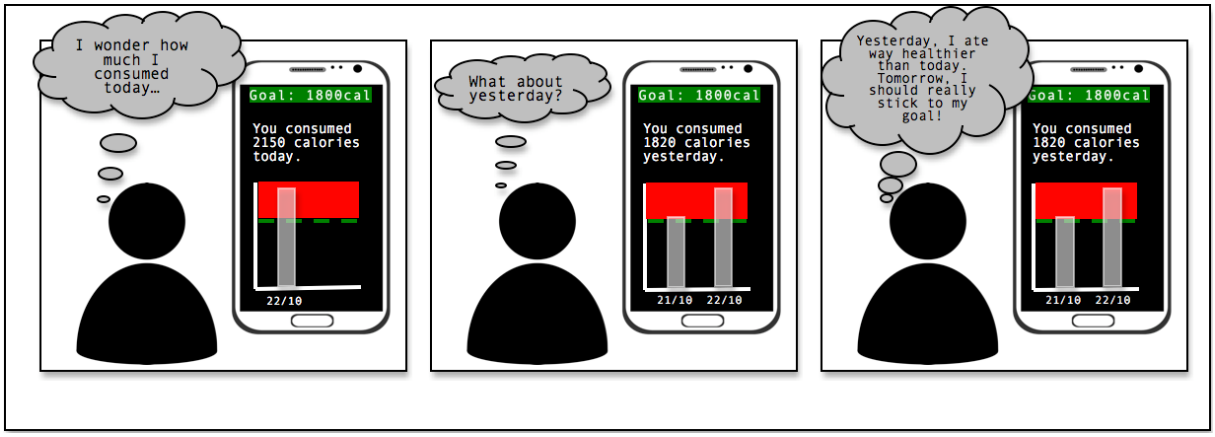
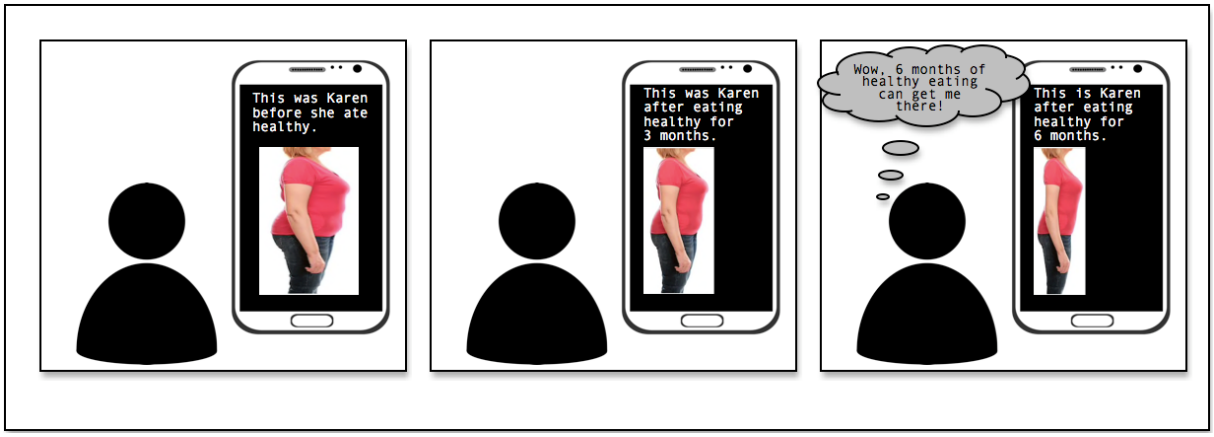
Appendix A

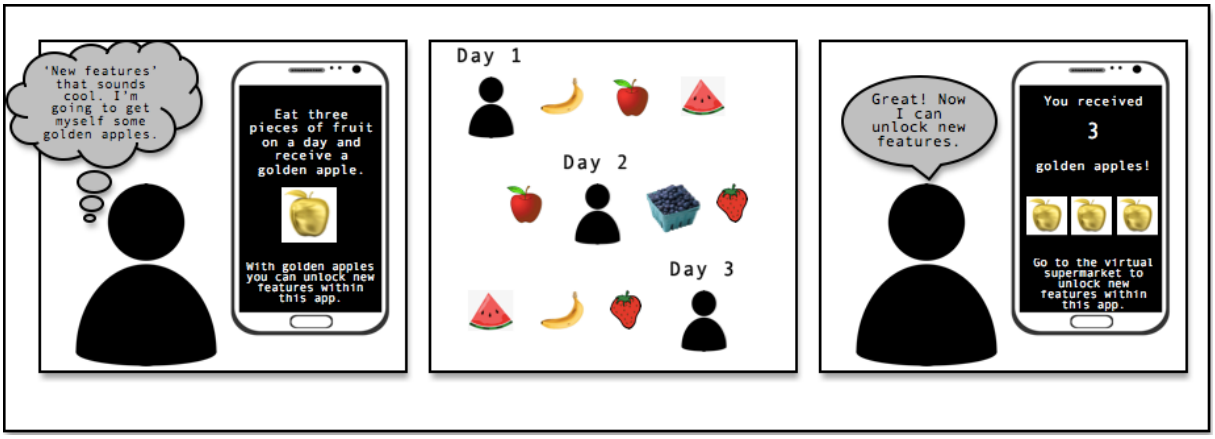
Storyboards used in the current research (English)



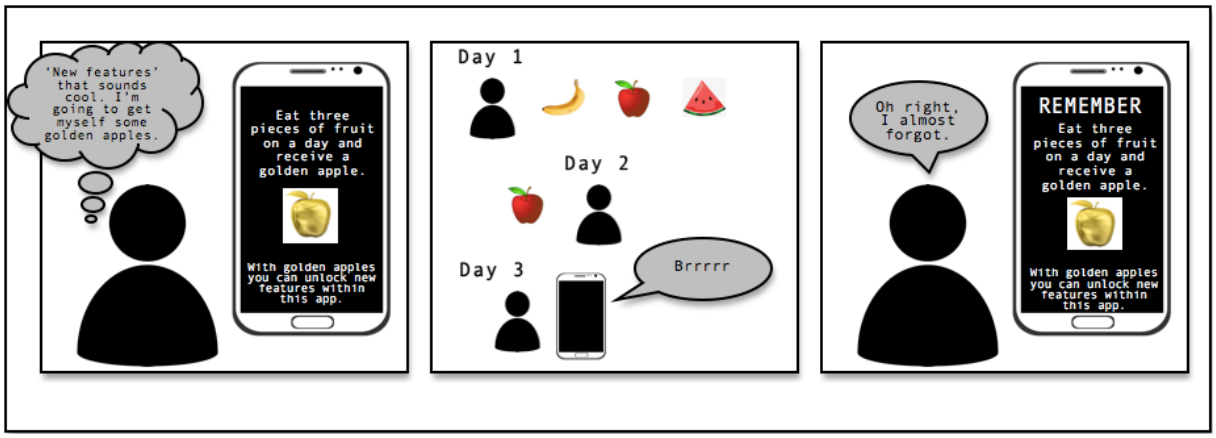
Storyboard for the strategy “self-monitoring” (primary task support).



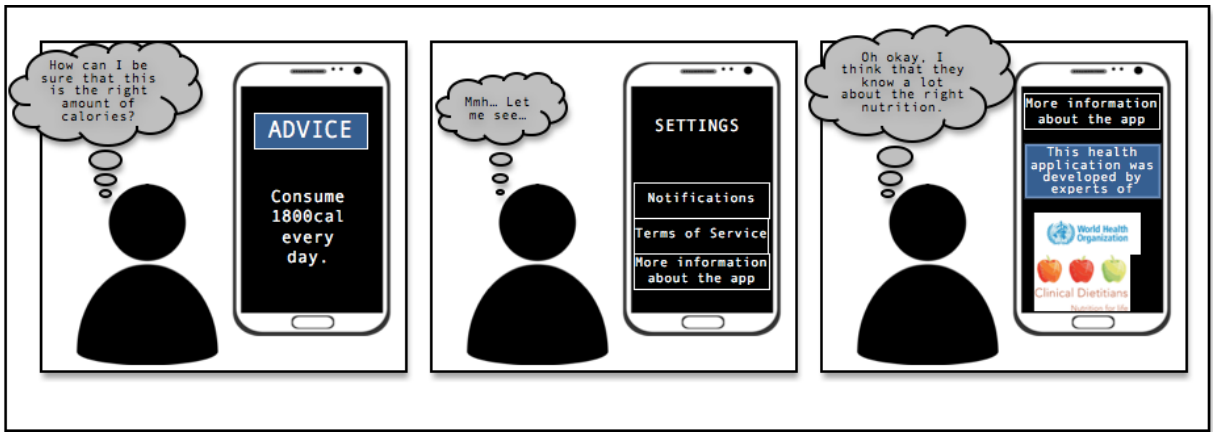
Storyboard for the strategy “simulation” (primary task support).



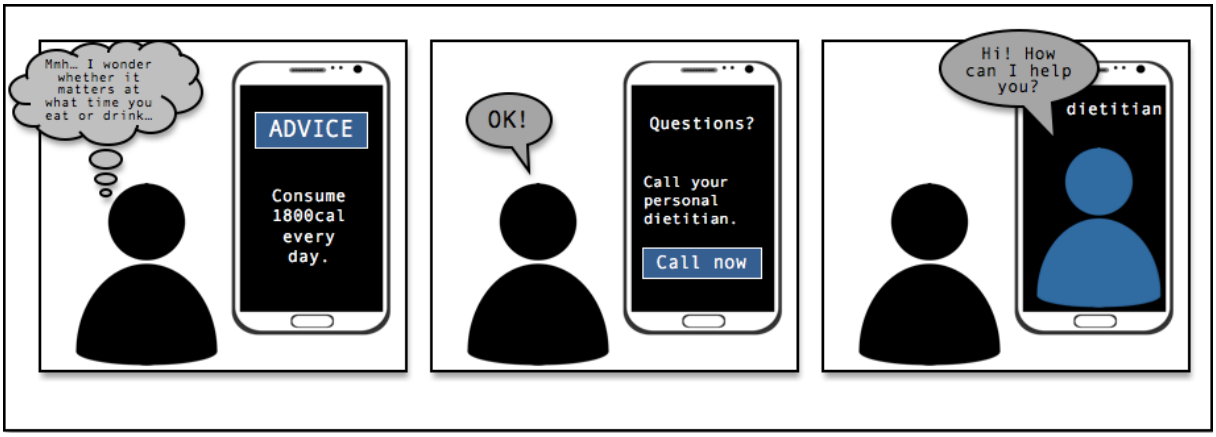
Storyboard for the strategy “rewards” (dialogue support).



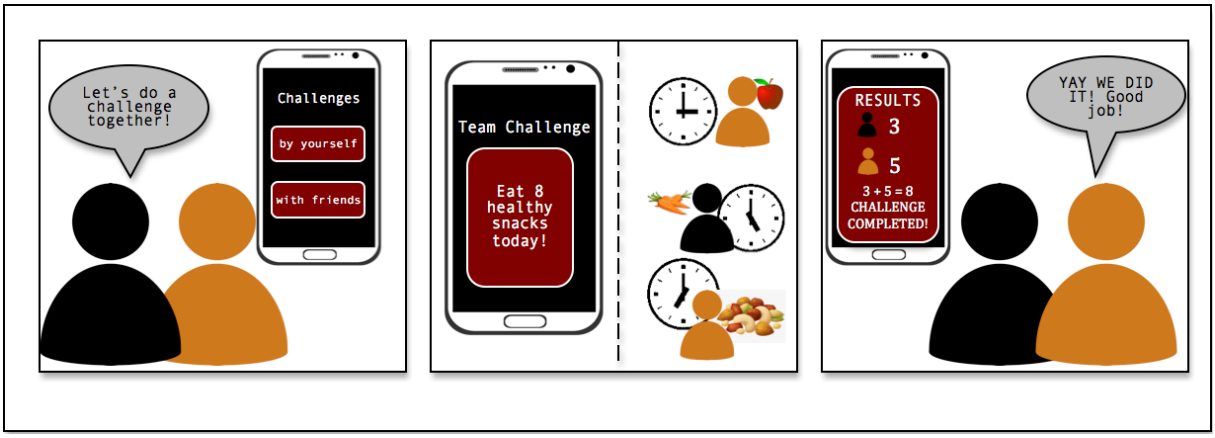
Storyboard for the strategy “reminders” (dialogue support).



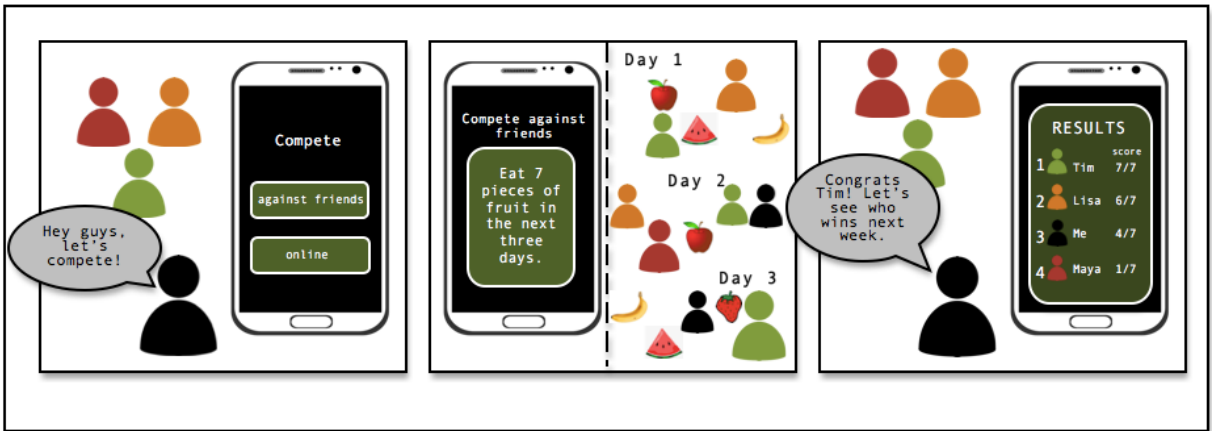
Storyboard for the strategy “authority” (system credibility support).



Storyboard for the strategy “expertise” (system credibility support).



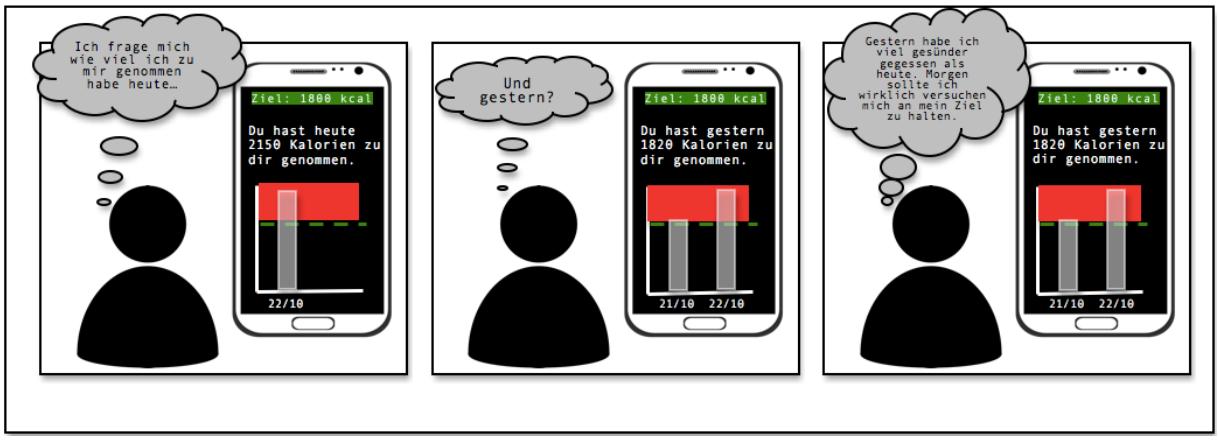
Storyboard for the strategy "cooperation" (social support).



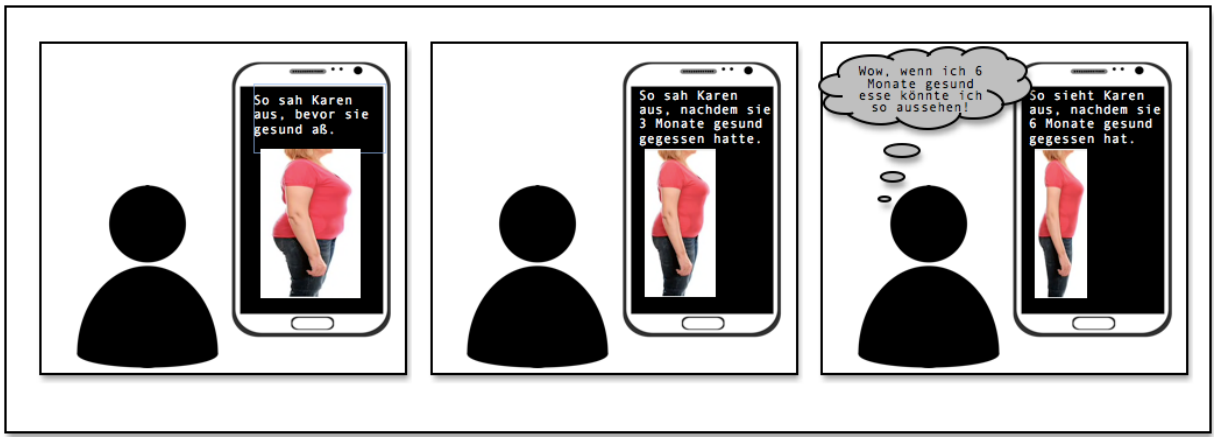
Storyboard for the strategy "competition" (social support).

Appendix B

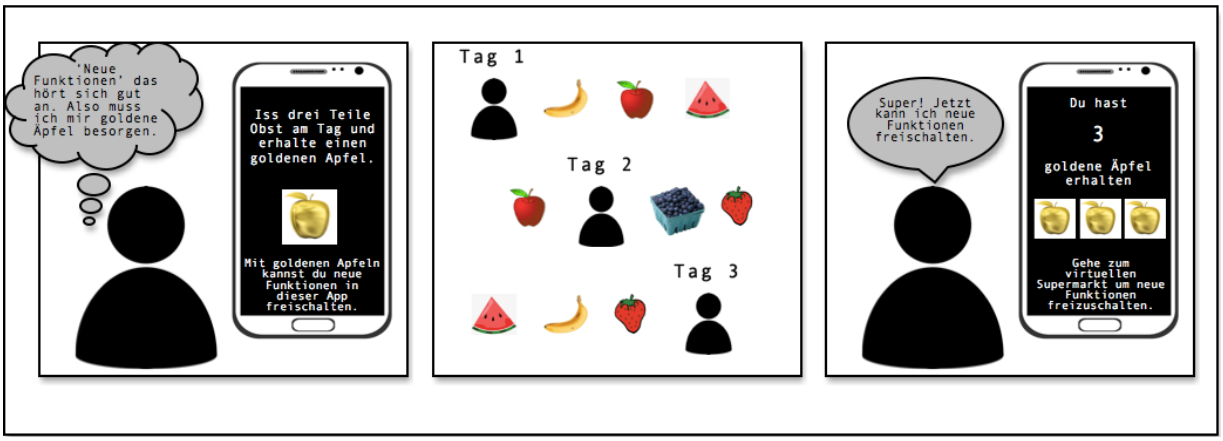
Storyboards used in the current research (German)



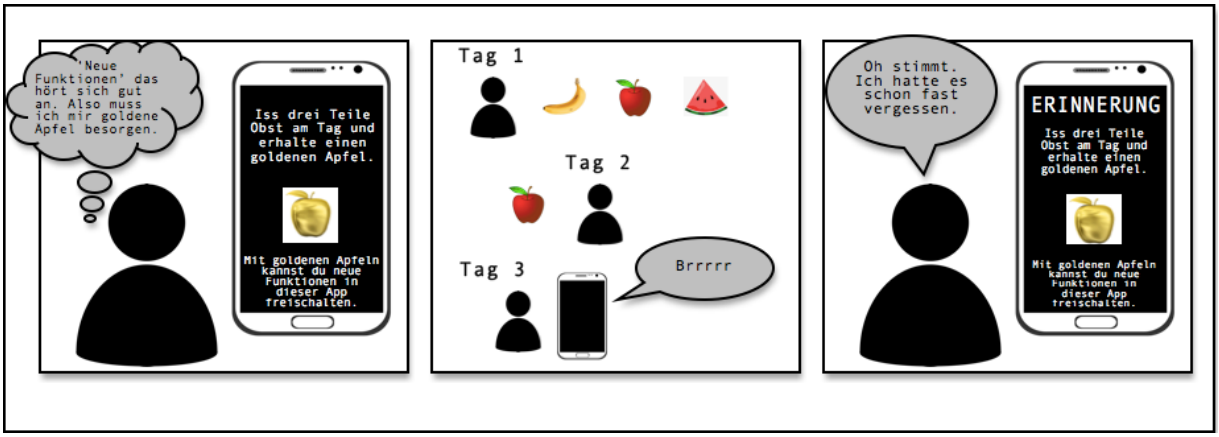
Storyboard for the strategy “self-monitoring” (primary task support).



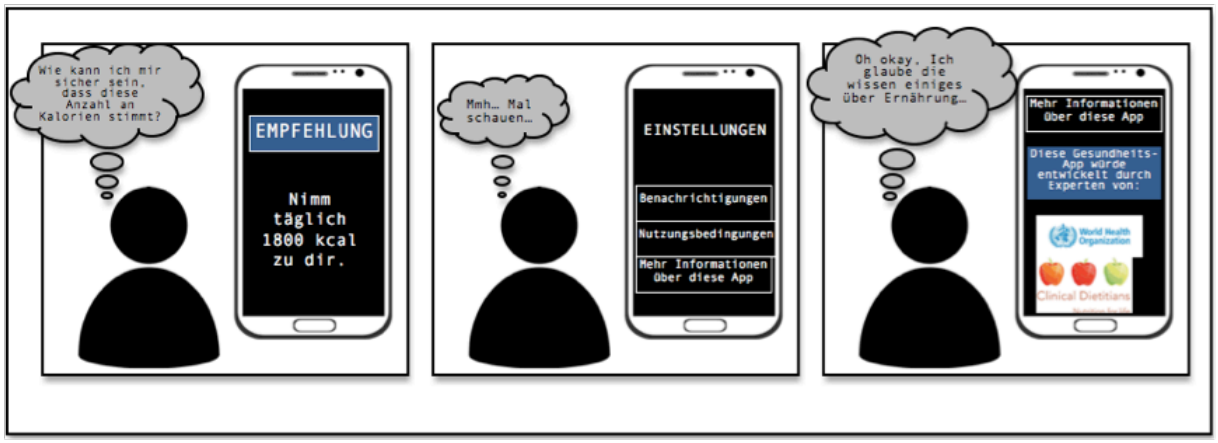
Storyboard for the strategy “simulation” (primary task support).



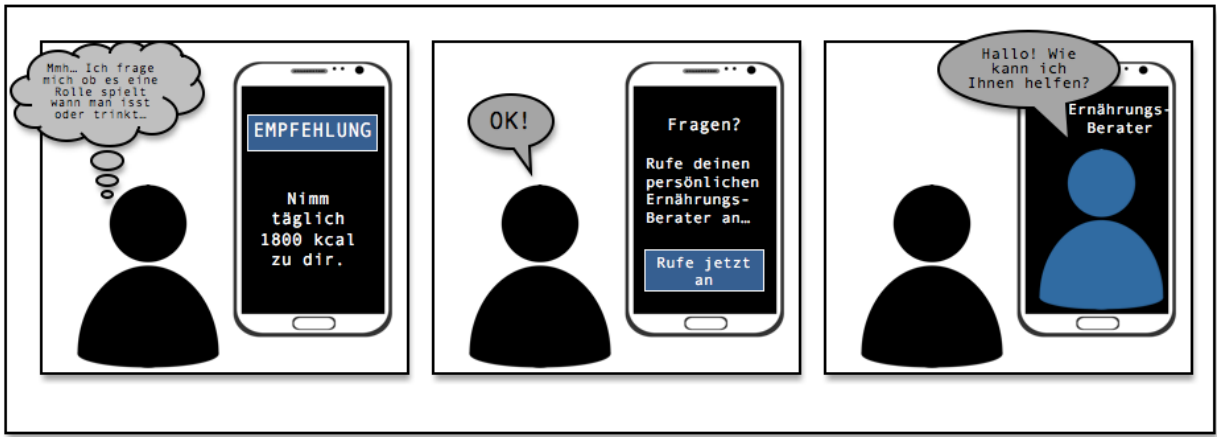
Storyboard for the strategy “rewards” (dialogue support).



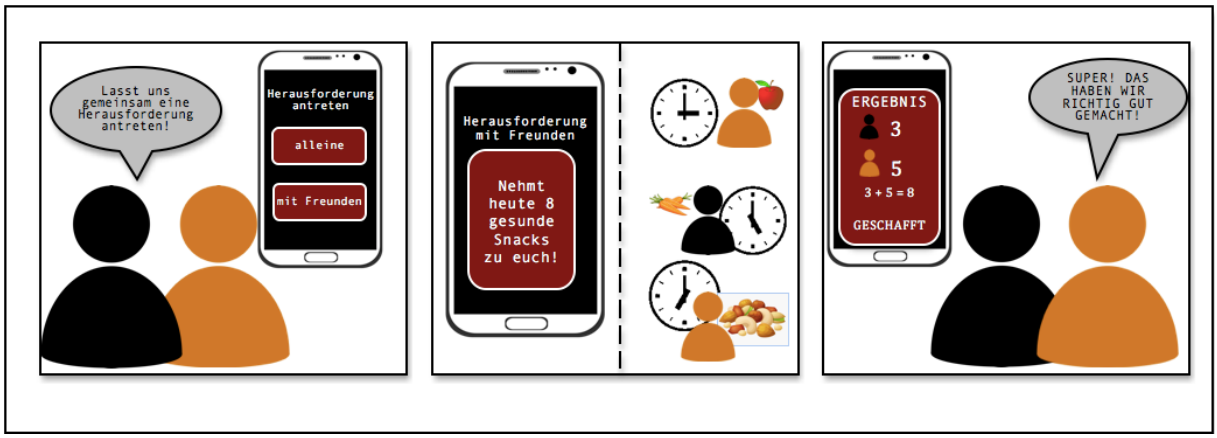
Storyboard for the strategy “reminders” (dialogue support).



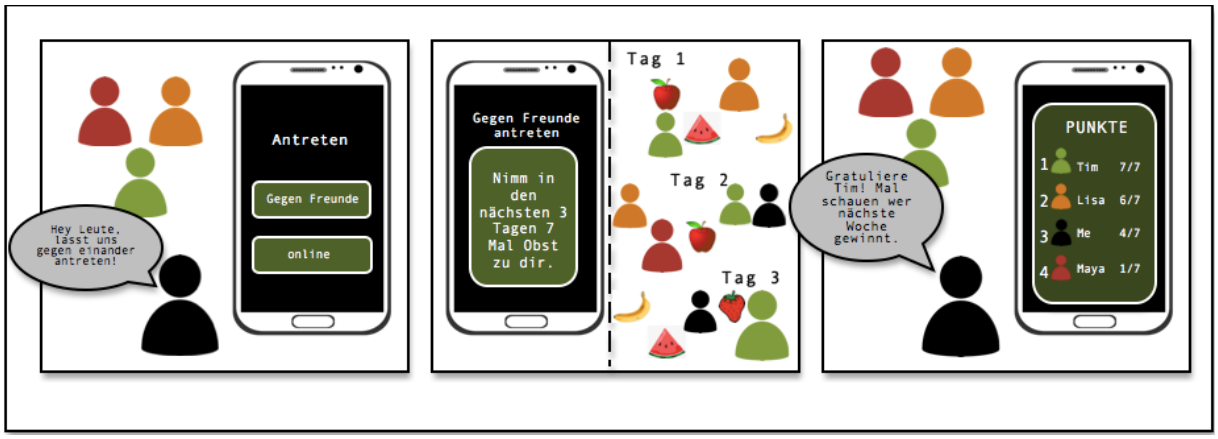
Storyboard for the strategy “authority” (system credibility support).



Storyboard for the strategy “expertise” (system credibility support).



Storyboard for the strategy “cooperation” (social support).



Storyboard for the strategy “competition” (social support).

Appendix C

Questionnaire used in the pre-test

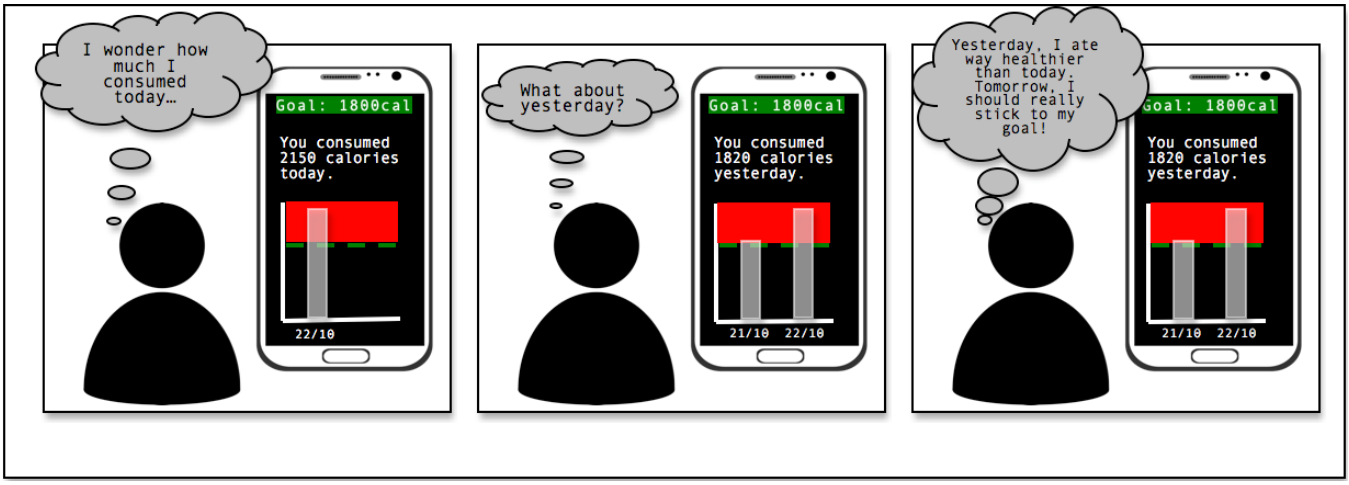
Storyboards: Persuasive Strategies and Healthy Eating

The aim of this survey is to test whether the storyboards created reflect the intended persuasive strategies that aim to encourage healthy eating. The persuasive strategies that are listed are from the Persuasive Systems Design (PSD) Model (Oinas-Kukkonen & Harjumaa, 2009). Please read and inspect the storyboards carefully and indicate which of the persuasive strategies you think is best represented by the storyboards.

Thanks in advance!

Student: Kimberly Bakker
k.bakker@student.utwente.nl

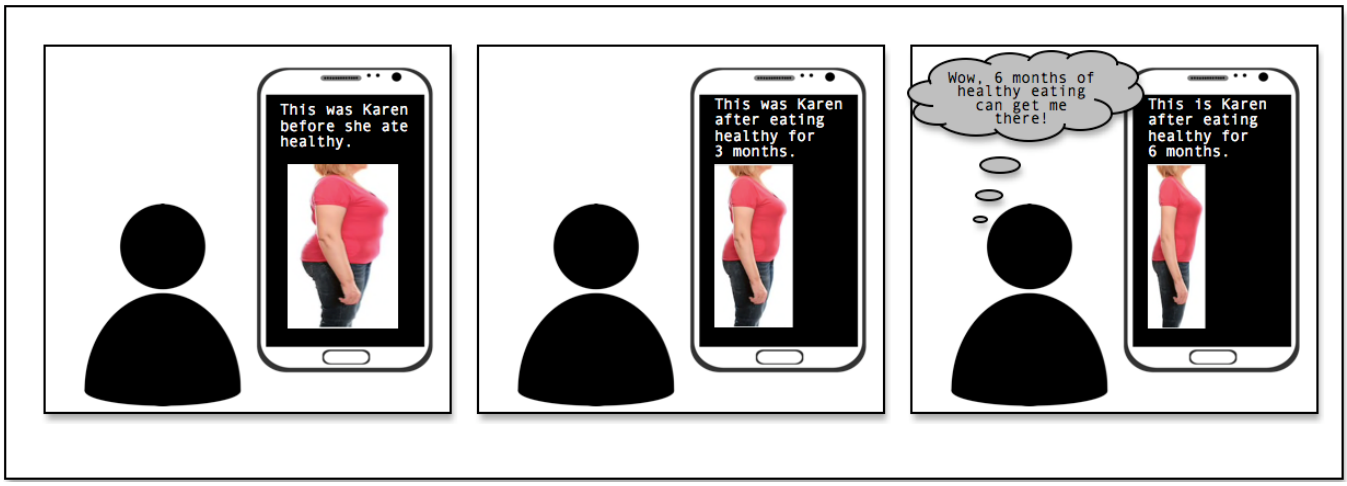
First supervisor: Pelin Gül
Second supervisor: Christian Wrede



Which persuasive strategies do you think are best represented in this storyboard? Please choose the 3 best fitting strategies and rank them from 1 to 3. (1 = most fitting)

Primary Task Support	Dialogue Support	Credibility Support	Social Support
____ Reduction	____ Praise	____ Trustworthiness	____ Social learning
____ Tunneling	____ Rewards	____ Expertise	____ Social comparison
____ Tailoring	____ Reminders	____ Surface credibility	____ Normative influence
____ Personalization	____ Suggestion	____ Real-world feel	____ Social facilitation
____ Self-monitoring	____ Similarity	____ Authority	____ Cooperation
____ Simulation	____ Liking	____ Third-party	____ Competition
____ Rehearsal	____ Social role	____ Verifiability	____ Recognition

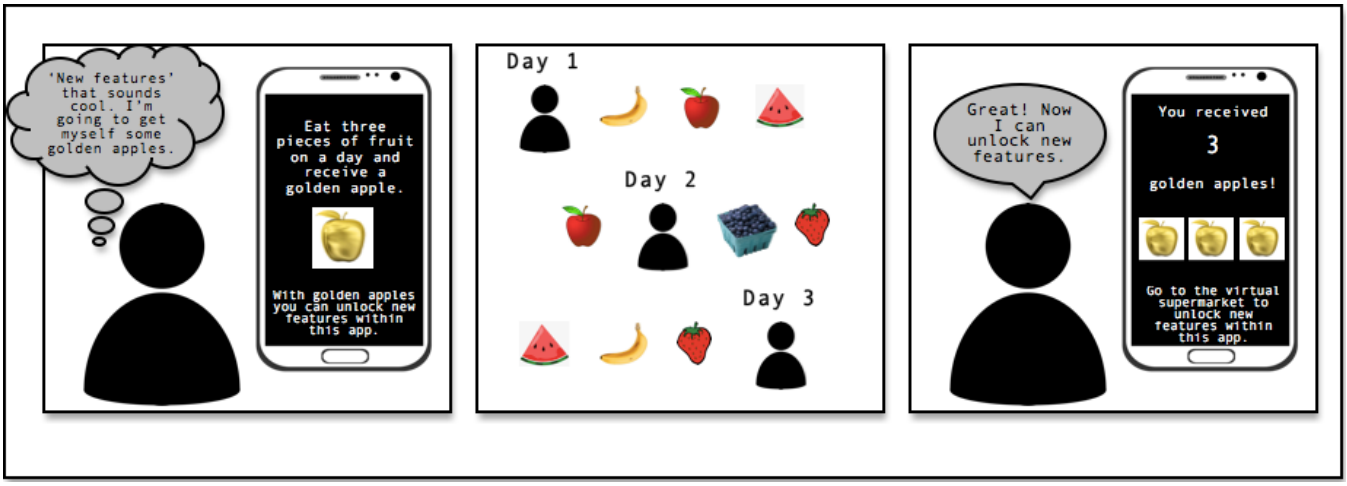
Can you explain why?



Which persuasive strategies do you think are best represented in this storyboard? Please choose the 3 best fitting strategies and rank them from 1 to 3. (1 = most fitting)

Primary Task Support	Dialogue Support	Credibility Support	Social Support
____ Reduction	____ Praise	____ Trustworthiness	____ Social learning
____ Tunneling	____ Rewards	____ Expertise	____ Social comparison
____ Tailoring	____ Reminders	____ Surface credibility	____ Normative influence
____ Personalization	____ Suggestion	____ Real-world feel	____ Social facilitation
____ Self-monitoring	____ Similarity	____ Authority	____ Cooperation
____ Simulation	____ Liking	____ Third-party	____ Competition
____ Rehearsal	____ Social role	____ Verifiability	____ Recognition

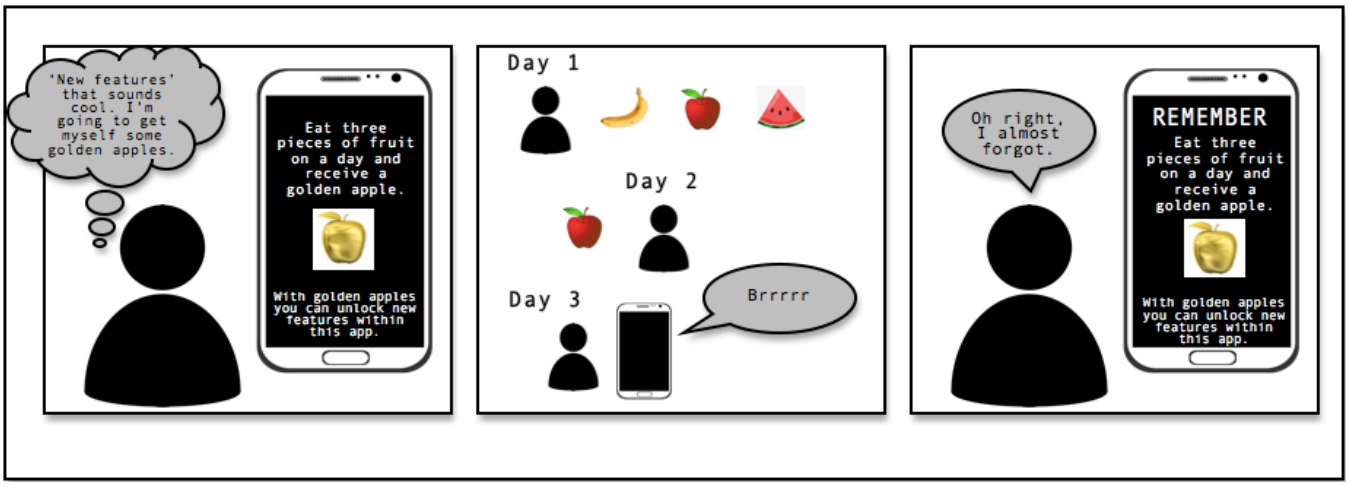
Can you explain why?



Which persuasive strategies do you think are best represented in this storyboard? Please choose the 3 best fitting strategies and rank them from 1 to 3. (1 = most fitting)

Primary Task Support	Dialogue Support	Credibility Support	Social Support
____ Reduction	____ Praise	____ Trustworthiness	____ Social learning
____ Tunneling	____ Rewards	____ Expertise	____ Social comparison
____ Tailoring	____ Reminders	____ Surface credibility	____ Normative influence
____ Personalization	____ Suggestion	____ Real-world feel	____ Social facilitation
____ Self-monitoring	____ Similarity	____ Authority	____ Cooperation
____ Simulation	____ Liking	____ Third-party	____ Competition
____ Rehearsal	____ Social role	____ Verifiability	____ Recognition

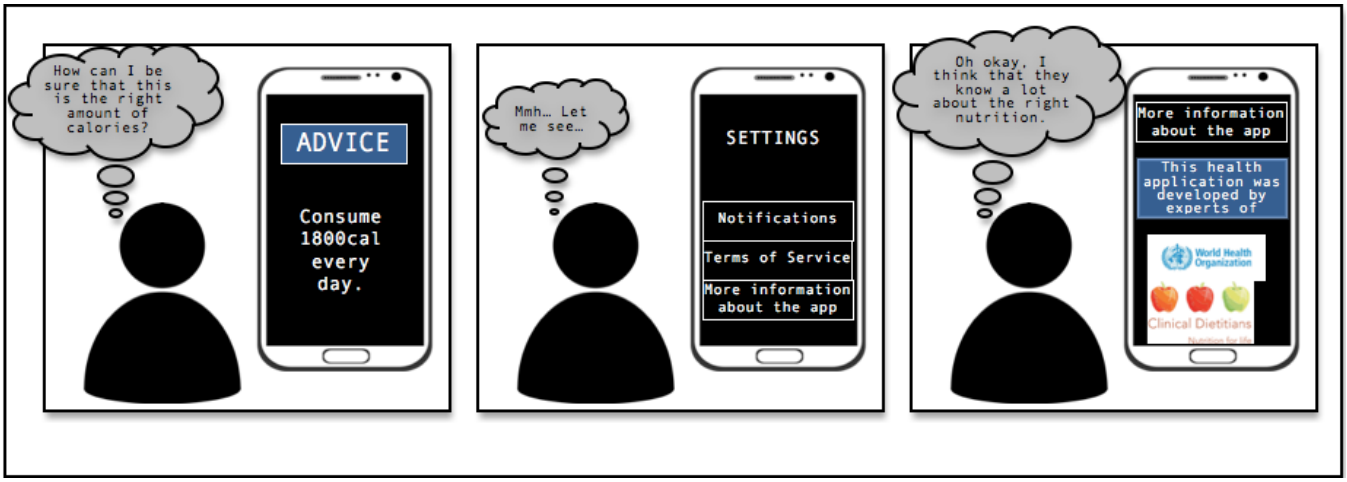
Can you explain why?



Which persuasive strategies do you think are best represented in this storyboard? Please choose the 3 best fitting strategies and rank them from 1 to 3. (1 = most fitting)

Primary Task Support	Dialogue Support	Credibility Support	Social Support
____ Reduction	____ Praise	____ Trustworthiness	____ Social learning
____ Tunneling	____ Rewards	____ Expertise	____ Social comparison
____ Tailoring	____ Reminders	____ Surface credibility	____ Normative influence
____ Personalization	____ Suggestion	____ Real-world feel	____ Social facilitation
____ Self-monitoring	____ Similarity	____ Authority	____ Cooperation
____ Simulation	____ Liking	____ Third-party	____ Competition
____ Rehearsal	____ Social role	____ Verifiability	____ Recognition

Can you explain why?



Which persuasive strategies do you think are best represented in this storyboard? Please choose the 3 best fitting strategies and rank them from 1 to 3. (1 = most fitting)

Primary Task Support	Dialogue Support	Credibility Support	Social Support
____ Reduction	____ Praise	____ Trustworthiness	____ Social learning
____ Tunneling	____ Rewards	____ Expertise	____ Social comparison
____ Tailoring	____ Reminders	____ Surface credibility	____ Normative influence
____ Personalization	____ Suggestion	____ Real-world feel	____ Social facilitation
____ Self-monitoring	____ Similarity	____ Authority	____ Cooperation
____ Simulation	____ Liking	____ Third-party	____ Competition
____ Rehearsal	____ Social role	____ Verifiability	____ Recognition

Can you explain why?

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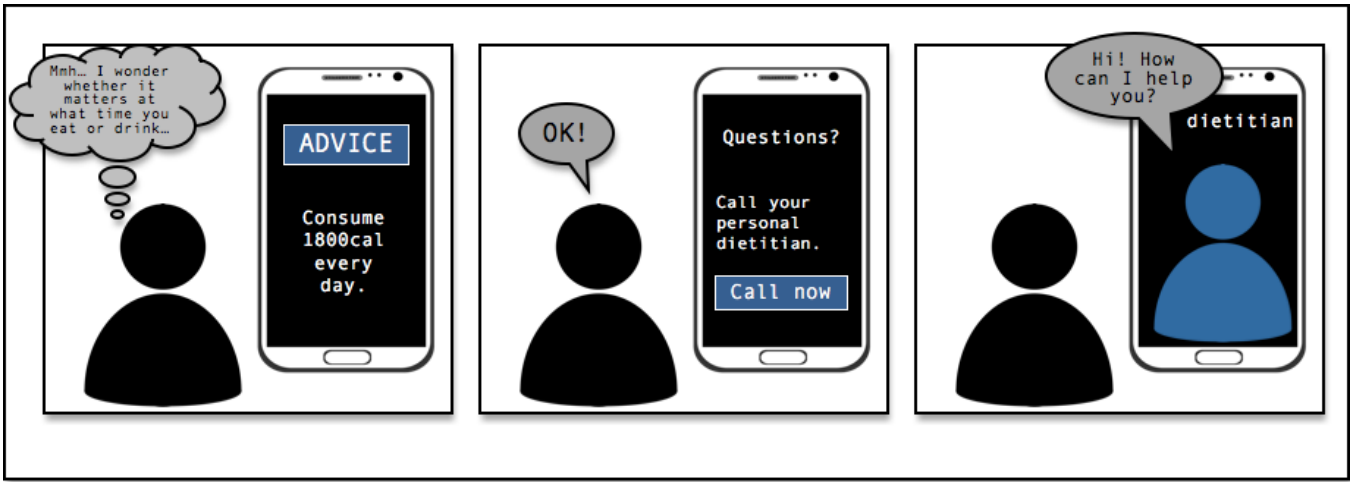

Which persuasive strategies do you think are best represented in this storyboard? Please choose the 3 best fitting strategies and rank them from 1 to 3. (1 = most fitting)

Primary Task Support	Dialogue Support	Credibility Support	Social Support
____ Reduction	____ Praise	____ Trustworthiness	____ Social learning
____ Tunneling	____ Rewards	____ Expertise	____ Social comparison
____ Tailoring	____ Reminders	____ Surface credibility	____ Normative influence
____ Personalization	____ Suggestion	____ Real-world feel	____ Social facilitation
____ Self-monitoring	____ Similarity	____ Authority	____ Cooperation
____ Simulation	____ Liking	____ Third-party	____ Competition
____ Rehearsal	____ Social role	____ Verifiability	____ Recognition

Can you explain why?

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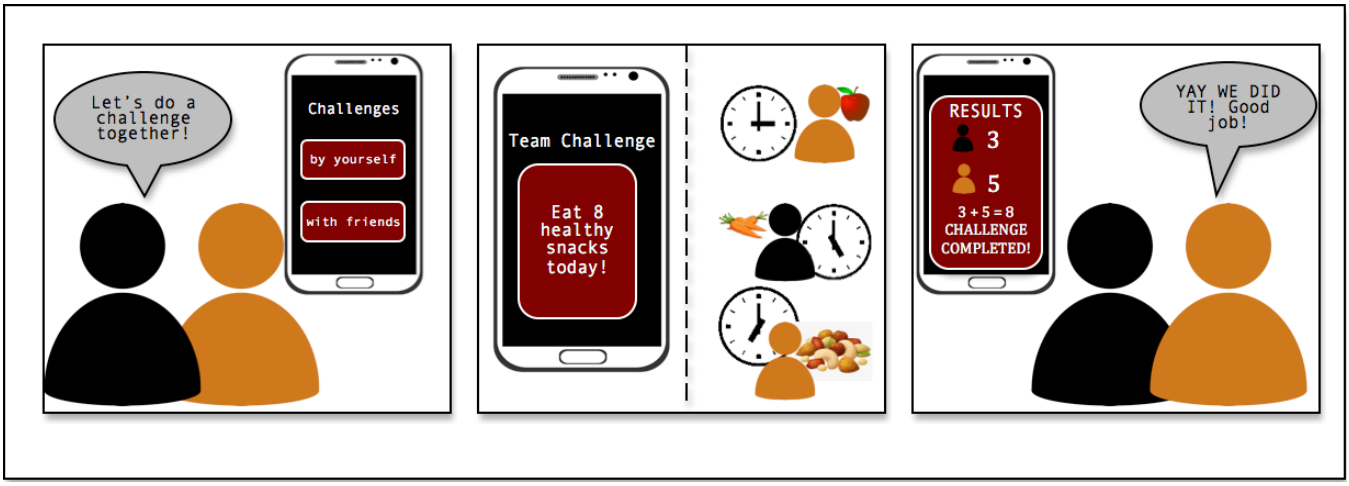

Which persuasive strategies do you think are best represented in this storyboard? Please choose the 3 best fitting strategies and rank them from 1 to 3. (1 = most fitting)

Primary Task Support	Dialogue Support	Credibility Support	Social Support
____ Reduction	____ Praise	____ Trustworthiness	____ Social learning
____ Tunneling	____ Rewards	____ Expertise	____ Social comparison
____ Tailoring	____ Reminders	____ Surface credibility	____ Normative influence
____ Personalization	____ Suggestion	____ Real-world feel	____ Social facilitation
____ Self-monitoring	____ Similarity	____ Authority	____ Cooperation
____ Simulation	____ Liking	____ Third-party	____ Competition
____ Rehearsal	____ Social role	____ Verifiability	____ Recognition

Can you explain why?

_____

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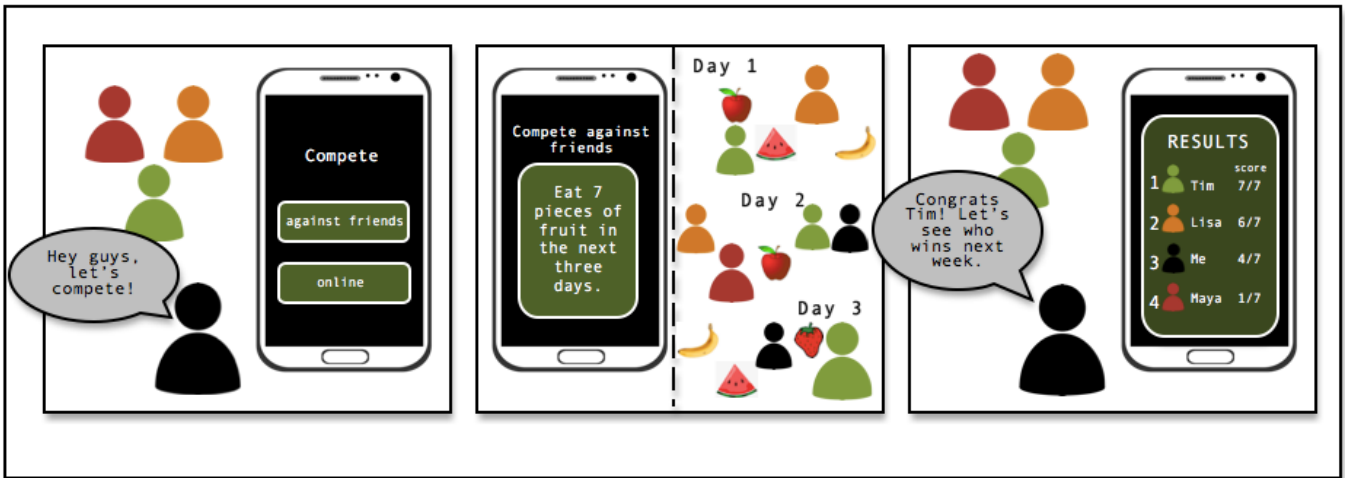
_____



Which persuasive strategies do you think are best represented in this storyboard? Please choose the 3 best fitting strategies and rank them from 1 to 3. (1 = most fitting)

Primary Task Support	Dialogue Support	Credibility Support	Social Support
____ Reduction	____ Praise	____ Trustworthiness	____ Social learning
____ Tunneling	____ Rewards	____ Expertise	____ Social comparison
____ Tailoring	____ Reminders	____ Surface credibility	____ Normative influence
____ Personalization	____ Suggestion	____ Real-world feel	____ Social facilitation
____ Self-monitoring	____ Similarity	____ Authority	____ Cooperation
____ Simulation	____ Liking	____ Third-party	____ Competition
____ Rehearsal	____ Social role	____ Verifiability	____ Recognition

Can you explain why?

_____

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_____

_____

Appendix D

Questionnaire (English)

The Relationship between Stages of Change and Perceived Effectiveness of Persuasive Strategies...

Start of Block: Start

Q22 **For students of the University of Twente:**

Please enter your Identity Code in order to receive credits.

- code can be found on sona systems (My Profile)
- not your student number

_____

Page Break

Q3 PROJECT TITLE
The Relationship between Stages of Change and Perceived Effectiveness of Persuasive Strategies Used in Mobile Apps to Promote Healthy Eating
Investigator: Kimberly Bakker, Bachelor student in Psychology.

INTRODUCTION
The aim of this study is to investigate the relationship between stages of change and persuasive strategies in the context of mobile applications that promote healthy eating.

DESCRIPTION OF PROCEDURES
First, you will need to answer questions regarding the topic healthy eating. After this you will be asked to evaluate features illustrated in different storyboards. While evaluating these, please pretend that what you see is displayed in a mobile application on your phone. Try to imagine this as vividly as possible and answer the different questions for each individual storyboard. This survey will take approximately 15 minutes of your time.

PARTICIPANT RIGHTS
Your participation in this study is completely voluntary and you may refuse to participate or leave the study at any time without the need to give any reason.

CONFIDENTIALITY
Your responses are completely anonymous, and cannot be traced back to you because no personally identifying information such as names are asked in this survey. The information you provide will not be disclosed to third, and they will be aggregated with the responses of other participants and examined for hypothesized patterns.

QUESTIONS OR PROBLEMS
For further information about the study contact Kimberly Bakker, k.bakker@student.utwente.nl. If you have any questions about the rights of research participants, please contact The Ethics Committee of the BMS, ethicscommittee-bms@utwente.nl.

CONSENT AND AUTHORIZATION PROVISIONS
In order to continue with this survey, you have to agree with the aforementioned information and consent to participate in the study.

Clicking "I agree and consent to participating in this study" indicates that you have been informed about the nature and method of this research in a manner which is clear to you, you have been given the time to read the page, and that you voluntarily agree to participate in this study.

- ○ I agree and I consent to participating in this study. (1)
- ○ I do not agree and/or I do not consent to participate in this study. (3)

Skip To: End of Survey If Introduction The aim of this survey is to investigate the relationship between stages of change and p = I do not agree and/or I do not consent to participate in this study.

Page Break

Q9 Age?

_____

Q7 Gender?

- Male (1)
- Female (2)
- Other (3)

Q11 Nationality?

- Dutch (1)
- German (2)
- Other, namely: (3) _____

Q14 What is your current education level? (completed)

- VMBO, MBO 1, Hauptschulabschluss (7)
- HAVO, MBO 2-4, Realschulabschluss (6)
- Abitur/VWO (1)
- HBO (8)
- Bachelor's degree (2)
- Master's degree (3)
- Doctorate (PhD) (4)
- Other, namely: (5) _____

Q15 What is your current occupation?

- Student (1)
- Employee (2)
- Other (3)

End of Block: Start

Start of Block: Stages of Change

Q17 Healthy eating means eating a variety of foods that give you the nutrients you need to maintain your health, feel good, and have energy. These nutrients include protein, carbohydrates, fat, water, vitamins, and minerals.

Please consider the following statements and answer to what extent you agree or disagree.

	Strongly Disagree (1)	Disagree (2)	Undecided (3)	Agree (4)	Strongly Agree (5)
1. As far as I'm concerned, I don't need to eat healthy regularly. (1)	○	○	○	○	○
2. I have been eating healthy regularly for a long time and I plan to continue. (2)	○	○	○	○	○
3. I don't eat healthy and right now I don't care. (3)	○	○	○	○	○
4. I am finally eating healthy regularly. (4)	○	○	○	○	○
5. I have been successful at eating healthy regularly and I plan to continue. (5)	○	○	○	○	○
6. I am satisfied with eating unhealthy foods. (6)	○	○	○	○	○
7. I have been thinking that I might want to start eating healthy regularly. (7)	○	○	○	○	○
8. I have started eating healthy regularly within the last 6 months. (8)	○	○	○	○	○
9. I could eat healthy regularly, but I don't plan to. (9)	○	○	○	○	○
10. Recently, I have started to eat healthy regularly. (10)	○	○	○	○	○
11. I don't have the time or energy to eat healthy foods regularly right now. (11)	○	○	○	○	○
12. I have started to eat healthy regularly, and I plan to continue. (12)	○	○	○	○	○
13. I have been thinking about whether I will be able to eat healthy regularly. (13)	○	○	○	○	○

14. I have set up a day and a time to start keeping a healthy diet regularly within the next few weeks. (14)	○	○	○	○	○
15. I have managed to keep eating healthy regularly through the last 6 months. (15)	○	○	○	○	○
16. I have been thinking that I may want to begin eating healthy regularly. (16)	○	○	○	○	○
17. I have lined up with a friend to start eating healthy regularly within the next few weeks. (17)	○	○	○	○	○
18. I have completed 6 months of regular healthy eating. (18)	○	○	○	○	○
19. I know that keeping a regular healthy diet is worthwhile, but I don't have time to commit to it in the near future. (19)	○	○	○	○	○
20. I have been calling friends to find someone to start eating healthy within the next few weeks. (20)	○	○	○	○	○
21. I think regular healthy eating is good, but I can't figure it into my schedule right now. (21)	○	○	○	○	○
22. I really think I should work on getting started with a regular healthy eating program in the next 6 months. (22)	○	○	○	○	○
23. I am preparing to start a regular healthy eating group in the next few weeks. (23)	○	○	○	○	○
24. I am aware of the importance of regular healthy eating but I can't do it right now. (24)	○	○	○	○	○

Page Break

Q18 Do you consistently avoid eating unhealthy foods?

- No (1)
- Yes (2)

Skip To: Q19 If Do you consistently avoid eating unhealthy foods? = No
Skip To: Q20 If Do you consistently avoid eating unhealthy foods? = Yes

Page Break

Q19 Do you consistently avoid eating unhealthy foods?

- No, and I do not intend to in the next 6 months. (1)
- No, but I intend to in the next 6 months. (2)
- No, but I intend to in the next 30 days. (3)

Skip To: End of Block If Do you consistently avoid eating unhealthy foods? = No, and I do not intend to in the next 6 months.
Skip To: End of Block If Do you consistently avoid eating unhealthy foods? = No, but I intend to in the next 6 months.
Skip To: End of Block If Do you consistently avoid eating unhealthy foods? = No, but I intend to in the next 30 days.

Page Break

Q20 Do you consistently avoid eating unhealthy foods?

- Yes, and I have been for less than 6 months. (1)
- Yes, and I have been for more than 6 months. (2)

End of Block: Stages of Change

Start of Block: Storyboards1

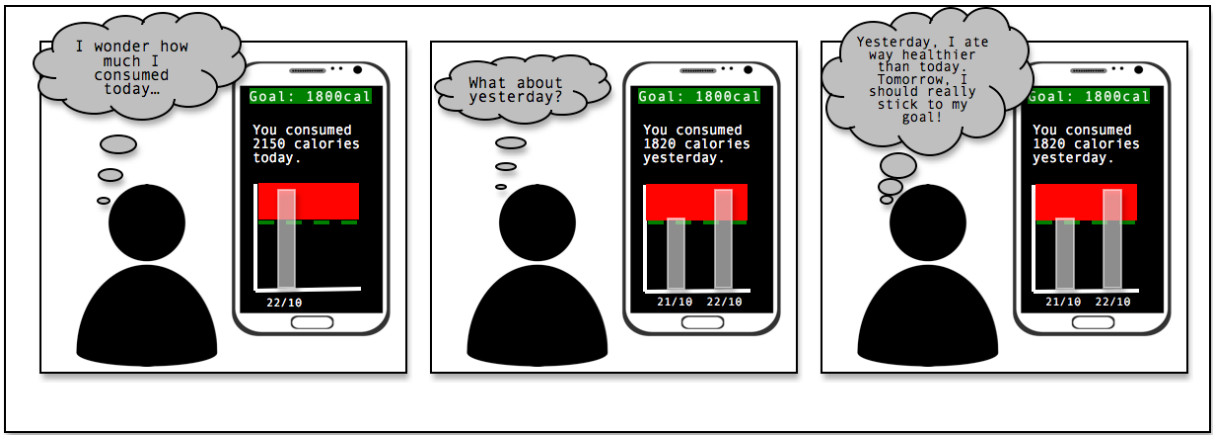
Q16 Next, 8 different storyboards will be shown to you. These storyboards present graphic illustrations of a user and his/her interaction with a mobile phone. More specifically, the user interacts with a smartphone app that supports healthy eating. After each storyboard you will be asked to indicate your agreement or disagreement on several statements and you will have the opportunity to add general comments about the storyboard.

Please read and inspect the storyboards clearly. Keep in mind that there are no right or wrong answers; it's about your personal opinion.

End of Block: Storyboards1

Start of Block: Self-Monitoring

Q21



Below you can see a number of statements based on the particular feature presented in the storyboard.
Please indicate the extent to which you agree/disagree with them.

	Strongly disagree (44)	Disagree (45)	Somewhat disagree (46)	Neither agree nor disagree (47)	Somewhat agree (48)	Agree (49)	Strongly agree (50)
This technology is something that I would enjoy using. (1)	○	○	○	○	○	○	○
In the future, this technology is something I would consider using. (2)	○	○	○	○	○	○	○
With regards to my own health goals, I consider this technology helpful. (3)	○	○	○	○	○	○	○
With regards to the quality of my life, I think this technology would improve the quality of my life. (4)	○	○	○	○	○	○	○
I think this technology seems easy to use. (5)	○	○	○	○	○	○	○
I think using this technology would help me save time in reaching my health goals. (6)	○	○	○	○	○	○	○

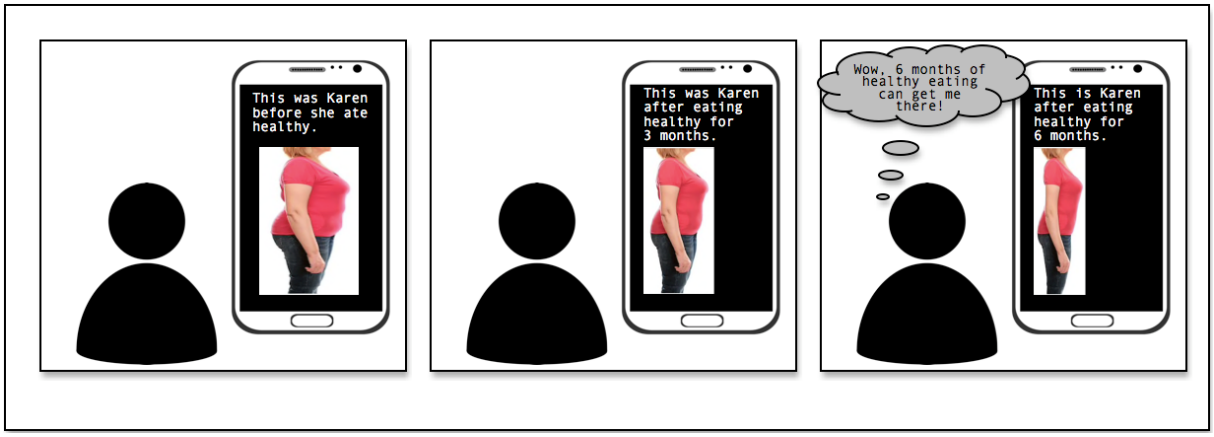
Q23 **General Comments**
Please describe any other comments or reactions to the technology depicted in the storyboard.

_____

End of Block: Self-Monitoring

Start of Block: Simulation

Q24



Below you can see a number of statements based on the particular feature presented in the storyboard.
Please indicate the extent to which you agree/disagree with them.

	Strongly disagree (37)	Disagree (38)	Somewhat disagree (39)	Neither agree nor disagree (40)	Somewhat agree (41)	Agree (42)	Strongly agree (43)
This technology is something that I would enjoy using. (1)	○	○	○	○	○	○	○
In the future, this technology is something I would consider using. (2)	○	○	○	○	○	○	○
With regards to my own health goals, I consider this technology helpful. (3)	○	○	○	○	○	○	○
With regards to the quality of my life, I think this technology would improve the quality of my life. (4)	○	○	○	○	○	○	○
I think this technology seems easy to use. (5)	○	○	○	○	○	○	○
I think using this technology would help me save time in reaching my health goals. (6)	○	○	○	○	○	○	○

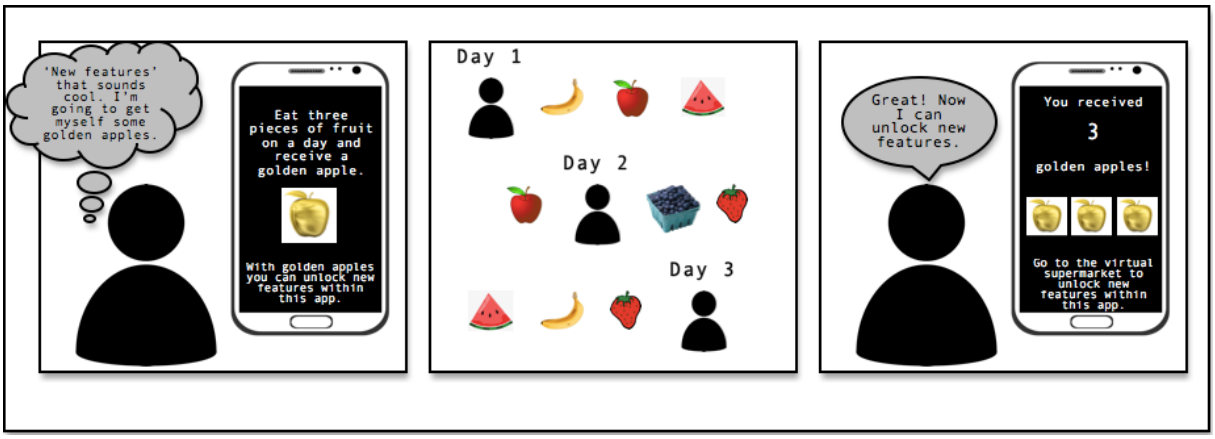
Q25 **General Comments**
Please describe any other comments or reactions to the technology depicted in the storyboard.

_____

End of Block: Simulation

Start of Block: Rewards

Q26



Below you can see a number of statements based on the particular feature presented in the storyboard.
Please indicate the extent to which you agree/disagree with them.

	Strongly disagree (37)	Disagree (38)	Somewhat disagree (39)	Neither agree nor disagree (40)	Somewhat agree (41)	Agree (42)	Strongly agree (43)
This technology is something that I would enjoy using. (1)	○	○	○	○	○	○	○
In the future, this technology is something I would consider using. (2)	○	○	○	○	○	○	○
With regards to my own health goals, I consider this technology helpful. (3)	○	○	○	○	○	○	○
With regards to the quality of my life, I think this technology would improve the quality of my life. (4)	○	○	○	○	○	○	○
I think this technology seems easy to use. (5)	○	○	○	○	○	○	○
I think using this technology would help me save time in reaching my health goals. (6)	○	○	○	○	○	○	○

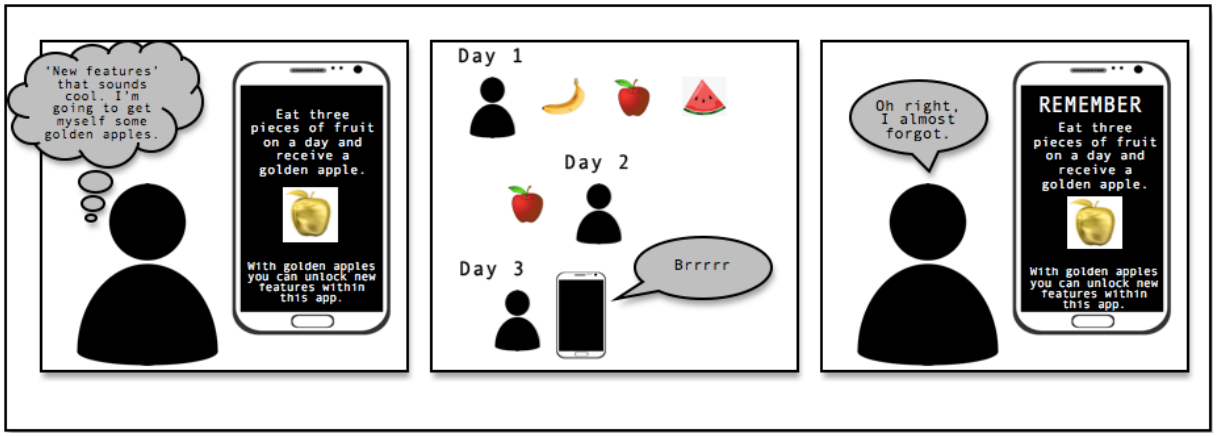
Q27 **General Comments**
Please describe any other comments or reactions to the technology depicted in the storyboard.

_____

End of Block: Rewards

Start of Block: Reminder

Q28



Below you can see a number of statements based on the particular feature presented in the storyboard.
Please indicate the extent to which you agree/disagree with them.

	Strongly disagree (37)	Disagree (38)	Somewhat disagree (39)	Neither agree nor disagree (40)	Somewhat agree (41)	Agree (42)	Strongly agree (43)
This technology is something that I would enjoy using. (1)	○	○	○	○	○	○	○
In the future, this technology is something I would consider using. (2)	○	○	○	○	○	○	○
With regards to my own health goals, I consider this technology helpful. (3)	○	○	○	○	○	○	○
With regards to the quality of my life, I think this technology would improve the quality of my life. (4)	○	○	○	○	○	○	○
I think this technology seems easy to use. (5)	○	○	○	○	○	○	○
I think using this technology would help me save time in reaching my health goals. (6)	○	○	○	○	○	○	○

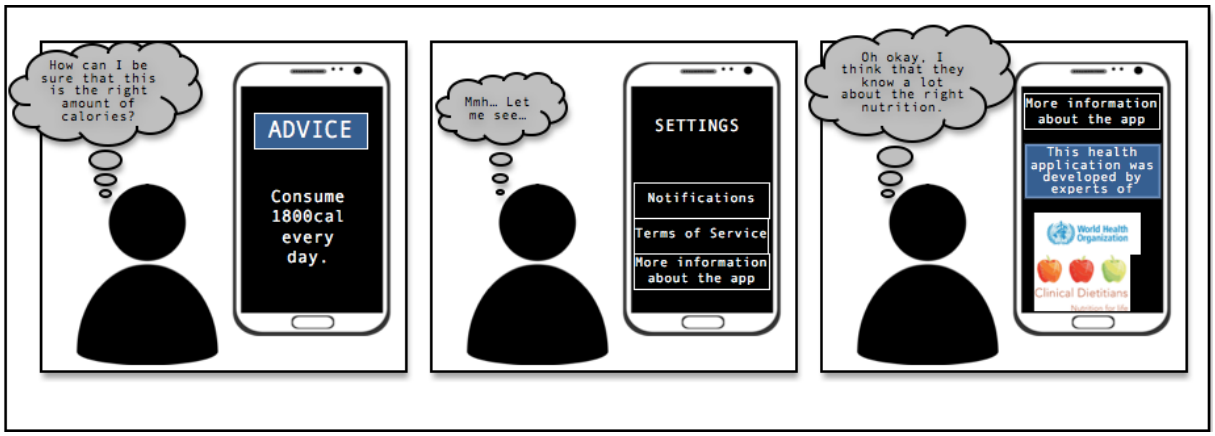
Q29 **General Comments**
Please describe any other comments or reactions to the technology depicted in the storyboard.

_____

End of Block: Reminder

Start of Block: Authority

Q30



Below you can see a number of statements based on the particular feature presented in the storyboard.
Please indicate the extent to which you agree/disagree with them.

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This technology is something that I would enjoy using. (1)	○	○	○	○	○	○	○
In the future, this technology is something I would consider using. (2)	○	○	○	○	○	○	○
With regards to my own health goals, I consider this technology helpful. (3)	○	○	○	○	○	○	○
With regards to the quality of my life, I think this technology would improve the quality of my life. (4)	○	○	○	○	○	○	○
I think this technology seems easy to use. (5)	○	○	○	○	○	○	○
I think using this technology would help me save time in reaching my health goals. (6)	○	○	○	○	○	○	○

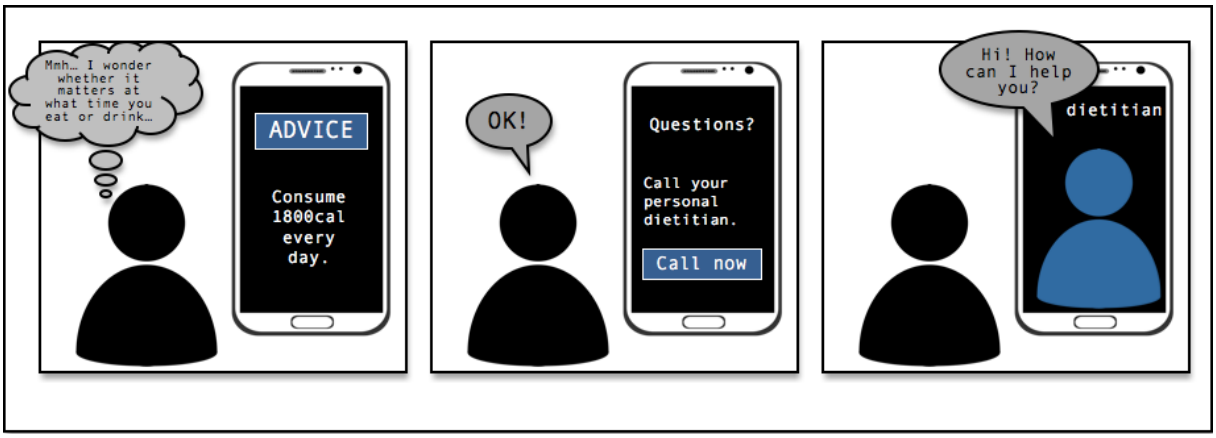
Q31 **General Comments**
Please describe any other comments or reactions to the technology depicted in the storyboard.

_____

End of Block: Authority

Start of Block: Expertise

Q32



Below you can see a number of statements based on the particular feature presented in the storyboard.
Please indicate the extent to which you agree/disagree with them.

	Strongly disagree (37)	Disagree (38)	Somewhat disagree (39)	Neither agree nor disagree (40)	Somewhat agree (41)	Agree (42)	Strongly agree (43)
This technology is something that I would enjoy using. (1)	○	○	○	○	○	○	○
In the future, this technology is something I would consider using. (2)	○	○	○	○	○	○	○
With regards to my own health goals, I consider this technology helpful. (3)	○	○	○	○	○	○	○
With regards to the quality of my life, I think this technology would improve the quality of my life. (4)	○	○	○	○	○	○	○
I think this technology seems easy to use. (5)	○	○	○	○	○	○	○
I think using this technology would help me save time in reaching my health goals. (6)	○	○	○	○	○	○	○

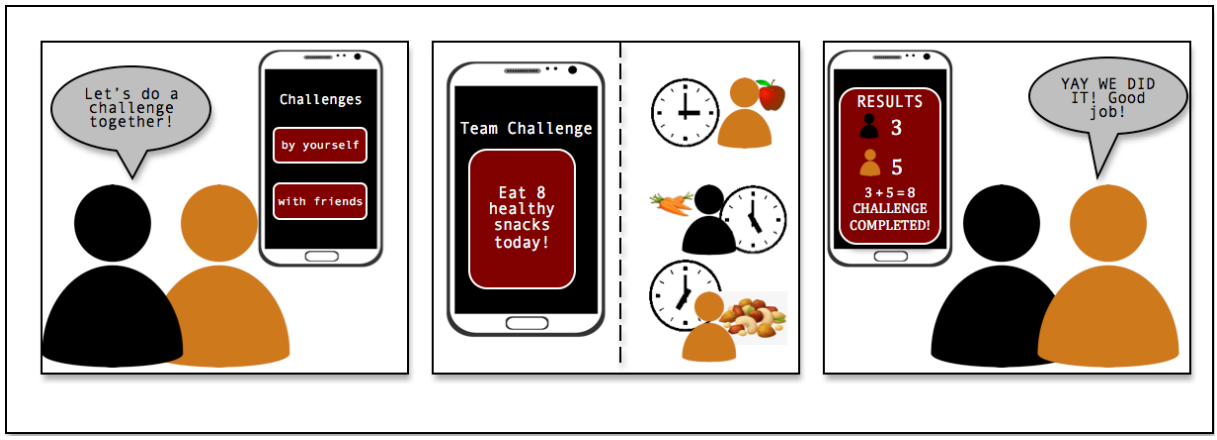
Q33 **General Comments**
Please describe any other comments or reactions to the technology depicted in the storyboard.

_____

End of Block: Expertise

Start of Block: Cooperation

Q34



Below you can see a number of statements based on the particular feature presented in the storyboard.
Please indicate the extent to which you agree/disagree with them.

	Strongly disagree (37)	Disagree (38)	Somewhat disagree (39)	Neither agree nor disagree (40)	Somewhat agree (41)	Agree (42)	Strongly agree (43)
This technology is something that I would enjoy using. (1)	○	○	○	○	○	○	○
In the future, this technology is something I would consider using. (2)	○	○	○	○	○	○	○
With regards to my own health goals, I consider this technology helpful. (3)	○	○	○	○	○	○	○
With regards to the quality of my life, I think this technology would improve the quality of my life. (4)	○	○	○	○	○	○	○
I think this technology seems easy to use. (5)	○	○	○	○	○	○	○
I think using this technology would help me save time in reaching my health goals. (6)	○	○	○	○	○	○	○

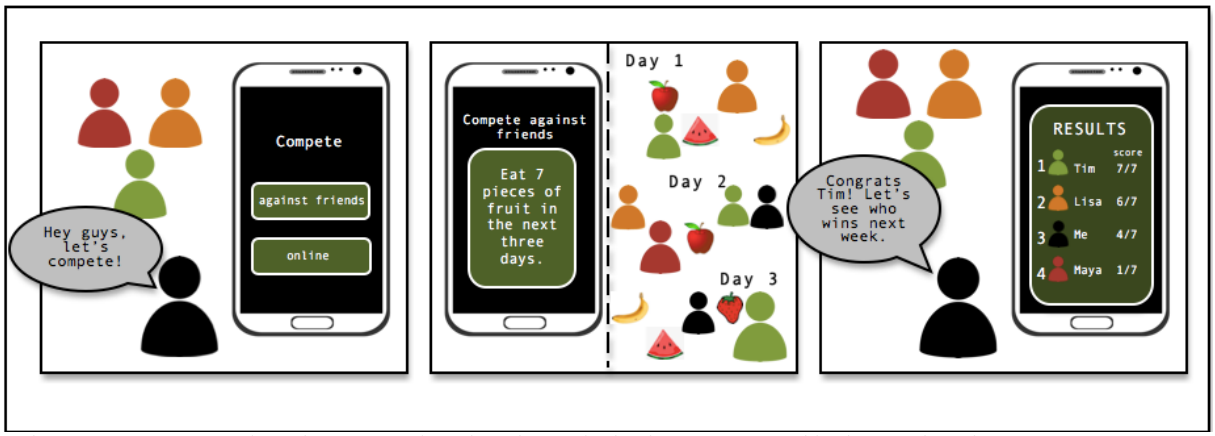
Q35 **General Comments**
Please describe any other comments or reactions to the technology depicted in the storyboard.

_____

End of Block: Cooperation

Start of Block: Competition

Q36



Below you can see a number of statements based on the particular feature presented in the storyboard.
Please indicate the extent to which you agree/disagree with them.

	Strongly disagree (37)	Disagree (38)	Somewhat disagree (39)	Neither agree nor disagree (40)	Somewhat agree (41)	Agree (42)	Strongly agree (43)
This technology is something that I would enjoy using. (1)	○	○	○	○	○	○	○
In the future, this technology is something I would consider using. (2)	○	○	○	○	○	○	○
With regards to my own health goals, I consider this technology helpful. (3)	○	○	○	○	○	○	○
With regards to the quality of my life, I think this technology would improve the quality of my life. (4)	○	○	○	○	○	○	○
I think this technology seems easy to use. (5)	○	○	○	○	○	○	○
I think using this technology would help me save time in reaching my health goals. (6)	○	○	○	○	○	○	○

Q37 **General Comments**
Please describe any other comments or reactions to the technology depicted in the storyboard.

_____

End of Block: Competition

Start of Block: End

Q13 Thank you for participating!

If you have any questions or if you would like to know more about this research you can contact me via email: k.bakker@student.utwente.nl

Do you have any suggestions/additional comments?

_____

End of Block: End

Appendix E

Questionnaire (German)

The Relationship between Stages of Change and Perceived Effectiveness of Persuasive Strategies…

Start of Block: Start

Q22 **Für Studenten der Universität Twente:**

Bitte geben Sie hier Ihren Identity Code ein, damit Sie Credits bekommen können.

- Code finden Sie bei Sona Systems (My Profile)
- Nicht die Studenten Nummer

_____

Page Break

Q3 PROJEKT TITEL
Das Verhältnis zwischen Stadien der Verhaltensänderung und der wahrgenommenen Effektivität von Überzeugungsmethoden, die in mobilen Apps verwendet werden, welche eine gesunde Ernährung fördern.
Ansprechpartnerin für die Studie: Kimberly Bakker, Bachelor Student der Psychologie.

EINLEITUNG
Das Ziel dieser Studie ist das Verhältnis zwischen Stadien der Verhaltensänderung und Überzeugungsmethoden zu untersuchen. Der Fokus liegt auf Überzeugungsmethoden, die in Apps verwendet werden, um eine gesunde Ernährung zu fördern.

VERFAHRENSBESCHREIBUNG
Zuerst werden Sie gebeten Fragen zum Thema 'gesunde Ernährung' zu beantworten. Danach werden Sie gebeten verschiedene Funktionen zu bewerten, die durch verschiedene Abbildungen (sogenannte Storyboards) gezeigt werden. Beim Bewerten der verschiedenen Funktionen, stellen Sie sich vor, dass die Abbildungen Teil einer mobilen App sind. Der Fragebogen dauert ungefähr 15 Minuten.

RECHTE DES TEILNEHMERS
Ihre Teilnahme an dieser Studie ist vollkommen freiwillig und Sie können die Teilnahme zu jeder Zeit verweigern oder beenden ohne einen Grund zu nennen.

VERTRAULICHKEIT
Ihre Antworten sind vollkommen anonym und erlauben keinen Rückschluss auf Ihre Person. Daten die Sie übermitteln werden nicht an Dritte weitergegeben und sie werden zusammengeführt mit den Antworten anderer Teilnehmer. Daten werden ausschließlich zu studienbezogenen Zwecken untersucht.

FRAGEN ODER PROBLEME
Bei weiteren Fragen zu dieser Studie wenden Sie sich an Kimberly Bakker (k.bakker@student.utwente.nl). Wenn Sie Fragen über die Rechte der Teilnehmer der Studie haben kontaktieren Sie bitte die zuständige Ethik-Komission (ethicscommittee-bms@utwente.nl).

ZUSTIMMUNG UND ERMÄCHTIGUNGSVORGABEN
Um diesen Fragebogen fortzuführen müssen Sie mit den vorgenannten Angaben einverstanden sein und der Teilnahme dieser Studie zustimmen.

Klicken Sie das Feld "Ich bin einverstanden und stimme der Teilnahme dieser Studie zu" um anzugeben, dass Sie über die Art und Methoden dieser Studie deutlich informiert wurden, genug Zeit hatten diese Seite zu lesen und dass sie freiwillig zustimmen dieser Studie teilzunehmen.

- ○ Ich bin einverstanden und stimme der Teilnahme dieser Studie zu. (1)
- ○ Ich bin nicht einverstanden und/oder stimme der Teilnahme dieser Studie nicht zu. (3)

Skip To: End of Survey If IntroductionThe aim of this survey is to investigate the relationship between stages of change and p = Ich bin nicht einverstanden und/oder stimme der Teilnahme dieser Studie nicht zu.

Page Break

Q9 Alter?

_____

Q7 Geschlecht?

- ○ Männlich (1)
- ○ Weiblich (2)
- ○ Sonstiges (3)

Q11 Nationalität?

- ○ Niederländisch (1)
- ○ Deutsch (2)
- ○ Sonstiges, nämlich: (3) _____

Q14 Was is Ihr Bildungsgrad? (abgeschlossen)

- ○ VMBO, MBO 1, Hauptschulabschluss (7)
- ○ HAVO, MBO 2-4, Realschulabschluss (6)
- ○ Abitur/VWO (1)
- ○ HBO (8)
- ○ Bachelor (2)
- ○ Master (3)
- ○ Doktortitel (4)
- ○ Sonstiges, nämlich: (5) _____

Q15 Was ist Ihre aktuelle Tätigkeit?

- ○ Student (1)
- ○ Arbeitnehmer (2)
- ○ Sonstiges (3)

End of Block: Start

Start of Block: Stages of Change

Q17
Sich gesund zu ernähren bedeutet, dass man eine Vielfalt von Nahrungsmitteln zu sich nimmt, welche Nährstoffe geben, die man braucht um gesund zu bleiben, sich gut zu fühlen und Energie zu haben. Zu diesen Nährstoffen gehören Proteine, Kohlenhydrate, Fett, Wasser, Vitamine und Mineralien.

Nehmen Sie bitte zu jede der folgenden Aussagen Stellung und entscheiden Sie, inwieweit jede auf Sie ganz persönlich zutrifft.

	stimme überhaupt nicht zu (1)	stimme nicht zu (2)	unentschlossen (3)	stimme zu (4)	stimme völlig zu (5)
1. Was mich betrifft brauche ich nicht regelmäßig gesund zu essen. (1)	○	○	○	○	○
2. Ich esse schon lange regelmäßig gesund und möchte auch damit weitermachen. (2)	○	○	○	○	○
3. Ich esse nicht gesund und im Moment ist mir das auch egal. (3)	○	○	○	○	○
4. Endlich esse ich regelmäßig gesund. (4)	○	○	○	○	○
5. Ich habe es geschafft, regelmäßig gesund zu essen und ich möchte auch damit weitermachen. (5)	○	○	○	○	○
6. Ich bin damit zufrieden ungesunde Lebensmittel zu essen. (6)	○	○	○	○	○
7. Ich habe darüber nachgedacht, dass ich eventuell regelmäßig gesund essen möchte. (7)	○	○	○	○	○
8. Ich habe innerhalb der letzten 6 Monate damit begonnen, regelmäßig gesund zu essen. (8)	○	○	○	○	○
9. Ich könnte regelmäßig gesund essen, habe es aber nicht vor. (9)	○	○	○	○	○

10. Vor kurzem habe ich damit begonnen, regelmäßig gesund zu essen. (10)	○	○	○	○	○
11. Ich habe momentan nicht die Zeit oder Energie, regelmäßig gesunde Lebensmittel zu essen. (11)	○	○	○	○	○
12. Ich habe angefangen regelmäßig gesund zu essen und ich möchte damit weitermachen. (12)	○	○	○	○	○
13. Ich habe darüber nachgedacht, ob ich in der Lage bin, regelmäßig gesund zu essen. (13)	○	○	○	○	○
14. Ich habe ein Datum und eine Zeit festgesetzt, um innerhalb der nächsten Wochen mit einer gesunden Ernährung zu beginnen und sie beizubehalten. (14)	○	○	○	○	○
15. Ich habe es geschafft, die letzten 6 Monate regelmäßig gesund zu essen. (15)	○	○	○	○	○
16. Ich habe darüber nachgedacht, dass ich vielleicht anfangen möchte regelmäßig gesund zu essen. (16)	○	○	○	○	○

17. Ich habe mich mit einem/r Freund/in zusammengetan, um in den nächsten Wochen damit zu beginnen regelmäßig gesund zu essen. (17)	○	○	○	○	○
18. Ich habe bereits 6 Monate lang regelmäßig gesund gegessen. (18)	○	○	○	○	○
19. Ich weiß, dass es sich lohnt eine dauerhaft gesunde Ernährung beizubehalten, aber ich habe in naher Zukunft keine Zeit mich dieser zu widmen. (19)	○	○	○	○	○
20. Ich habe Freunde angerufen um jemanden zu finden, der gemeinsam mit mir in den nächsten Wochen beginnt regelmäßig gesund zu essen. (20)	○	○	○	○	○
21. Ich glaube, dass regelmäßiges gesundes Essen gut ist, doch es passt momentan einfach nicht in meinen Zeitplan. (21)	○	○	○	○	○
22. Ich glaube wirklich ich sollte in den nächsten 6 Monaten mit einem Programm zu einem regelmäßig gesundem Essen beginnen. (22)	○	○	○	○	○
23. Ich bereite gerade einiges vor, um in den nächsten Wochen mit einer Gruppe zu starten, die regelmäßig gesund isst. (23)	○	○	○	○	○

24. Ich bin mir der Wichtigkeit bewusst, regelmäßig gesund zu essen aber es gelingt mir momentan nicht. (24)	○	○	○	○	○

Page Break

Q18 Vermeiden Sie konsequent das Essen ungesunder Lebensmittel?

○ Nein (1)

○ Ja (2)

Skip To: Q19 If Do you consistently avoid eating unhealthy foods? = Nein

Skip To: Q20 If Do you consistently avoid eating unhealthy foods? = Ja

Page Break

Q19 Vermeiden Sie konsequent das Essen ungesunder Lebensmittel?

○ Nein und ich habe es nicht vor dies zu tun in den nächsten 6 Monaten. (1)

○ Nein, aber ich habe es vor in den nächsten 6 Monaten. (2)

○ Nein, aber ich habe es vor in den nächsten 30 Tagen. (3)

Skip To: End of Block If Do you consistently avoid eating unhealthy foods? = Nein und ich habe es nicht vor dies zu tun in den nächsten 6 Monaten.

Skip To: End of Block If Do you consistently avoid eating unhealthy foods? = Nein, aber ich habe es vor in den nächsten 6 Monaten.

Skip To: End of Block If Do you consistently avoid eating unhealthy foods? = Nein, aber ich habe es vor in den nächsten 30 Tagen.

Page Break

Q20 Vermeiden Sie konsequent das Essen ungesunder Lebensmittel?

○ Ja und zwar seit weniger als 6 Monaten (1)

○ Ja und zwar schon länger als 6 Monate. (2)

End of Block: Stages of Change

Start of Block: Storyboards1

Q16
Als nächstes bekommen Sie 8 verschiedene Storyboards zu sehen. Diese Storyboards beinhalten Abbildungen einer Person, die mit dem Handy interagiert. Die Person interagiert mit einer mobilen App, die eine gesunde Ernährung fördert. Nach

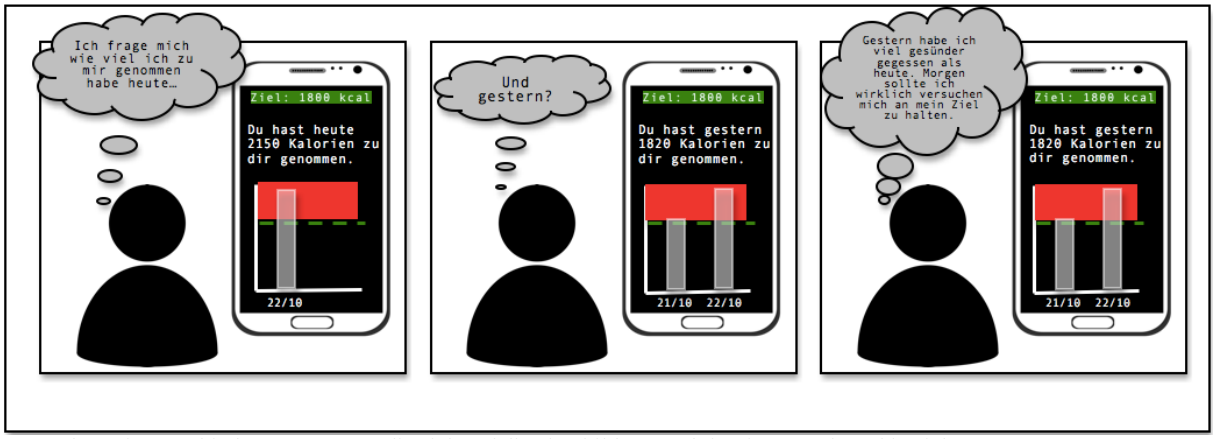
jedem Storyboard werden Sie gebeten zu verschiedenen Aussagen Stellung zu nehmen und anzugeben, inwieweit jede auf Sie ganz persönlich zutrifft. Außerdem haben Sie die Möglichkeit allgemeine Anmerkungen anzugeben.

Bitte lesen und prüfen Sie die Storyboards sorgfältig. Beachten Sie, dass es kein richtig oder falsch gibt; es geht um Ihre persönliche Meinung.

End of Block: Storyboards1

Start of Block: Self-Monitoring

Q21



Nun sehen Sie verschiedene Aussagen, die sich auf die abgebildete Funktion im Storyboard beziehen.
Nehmen Sie bitte zu jede der folgenden Aussagen Stellung und entscheiden Sie, inwieweit jede auf Sie ganz persönlich zutrifft.

	stimme überhaupt nicht zu (44)	stimme nicht zu (45)	stimme eher nicht zu (46)	weder noch (47)	stimme eher zu (48)	stimme zu (49)	stimme völlig zu (50)
Ich würde es genießen diese Technologie zu verwenden. (1)	○	○	○	○	○	○	○
In Zukunft würde ich es in Betracht ziehen, diese Technologie zu nutzen. (2)	○	○	○	○	○	○	○
Ich betrachte diese Technologie als hilfreich im Hinblick auf meine gesundheitlichen Ziele. (3)	○	○	○	○	○	○	○
Im Bezug auf die Qualität meines Lebens, denke ich dass die Technologie die Qualität verbessern würde. (4)	○	○	○	○	○	○	○
Ich finde diese Technologie scheint bedienerfreundlich. (5)	○	○	○	○	○	○	○
Ich denke diese Technologie würde mir Zeit sparen im Hinblick auf meine gesundheitlichen ZieIe. (6)	○	○	○	○	○	○	○

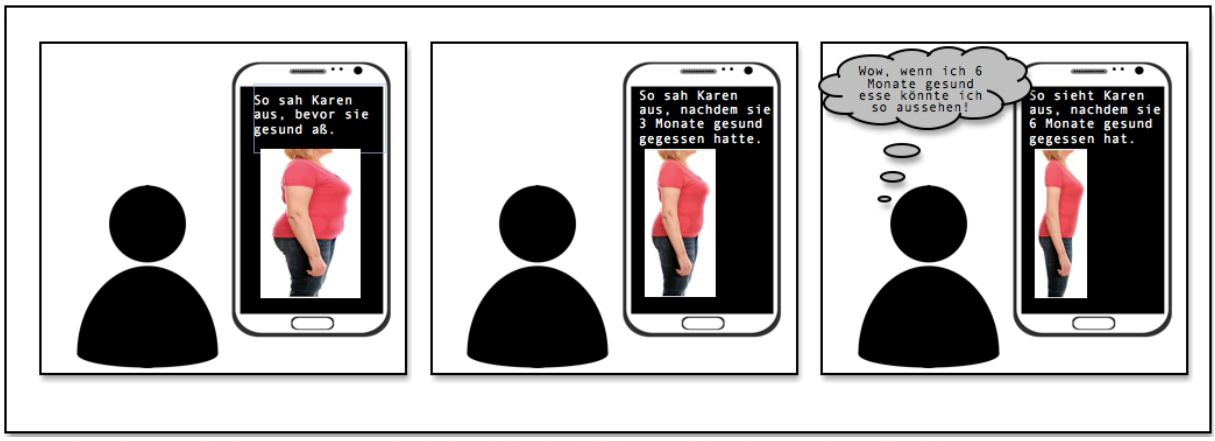
Q23 **Allgemeine Anmerkungen**
Bitte beschreiben Sie allgemeine Anmerkungen oder Reaktionen über die Technologie, die abgebildet wurde.

_____

End of Block: Self-Monitoring

Start of Block: Simulation

Q24



Nun sehen Sie verschiedene Aussagen, die sich auf die abgebildete Funktion im Storyboard beziehen.
Nehmen Sie bitte zu jede der folgenden Aussagen Stellung und entscheiden Sie, inwieweit jede auf Sie ganz persönlich zutrifft.

	stimme überhaupt nicht zu (37)	stimme nicht zu (38)	stimme eher nicht zu (39)	weder noch (40)	stimme eher zu (41)	stimme zu (42)	stimme völlig zu (43)
Ich würde es genießen diese Technologie zu verwenden. (1)	○	○	○	○	○	○	○
In Zukunft würde ich es in Betracht ziehen, diese Technologie zu nutzen. (2)	○	○	○	○	○	○	○
Ich betrachte diese Technologie als hilfreich im Hinblick auf meine gesundheitlichen Ziele. (3)	○	○	○	○	○	○	○
Im Bezug auf die Qualität meines Lebens, denke ich dass die Technologie die Qualität verbessern würde. (4)	○	○	○	○	○	○	○
Ich finde diese Technologie scheint bedienerfreundlich. (5)	○	○	○	○	○	○	○
Ich denke diese Technologie würde mir Zeit sparen im Hinblick auf meine gesundheitlichen Ziele. (6)	○	○	○	○	○	○	○

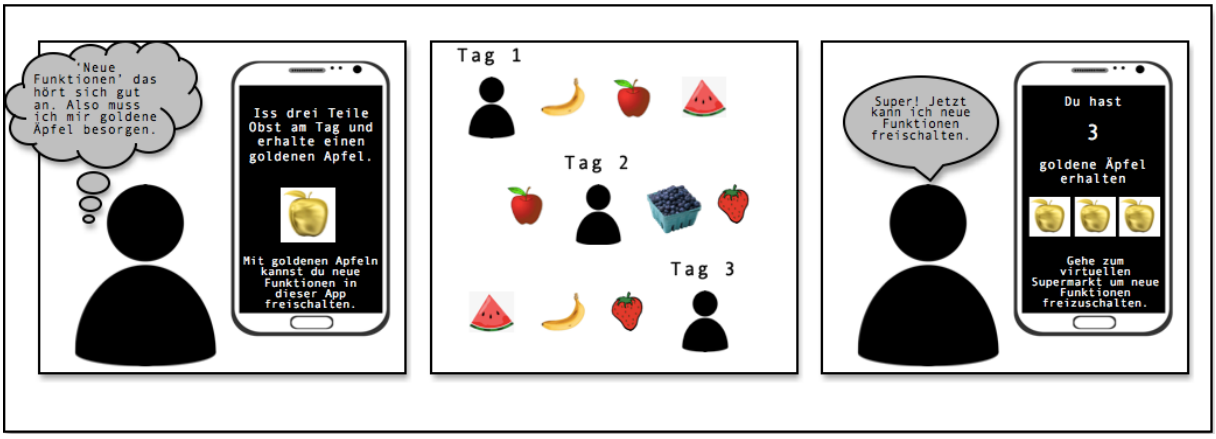
Q25 **Allgemeine Anmerkungen**
Bitte beschreiben Sie allgemeine Anmerkungen oder Reaktionen über die Technologie, die abgebildet wurde.

_____

End of Block: Simulation

Start of Block: Rewards

Q26



Nun sehen Sie verschiedene Aussagen, die sich auf die abgebildete Funktion im Storyboard beziehen.
Nehmen Sie bitte zu jede der folgenden Aussagen Stellung und entscheiden Sie, inwieweit jede auf Sie ganz persönlich zutrifft.

	stimme überhaupt nicht zu (37)	stimme nicht zu (38)	stimme eher nicht zu (39)	weder noch (40)	stimme eher zu (41)	stimme zu (42)	stimme völlig zu (43)
Ich würde es genießen diese Technologie zu verwenden. (1)	○	○	○	○	○	○	○
In Zukunft würde ich es in Betracht ziehen, diese Technologie zu nutzen. (2)	○	○	○	○	○	○	○
Ich betrachte diese Technologie als hilfreich im Hinblick auf meine gesundheitlichen Ziele. (3)	○	○	○	○	○	○	○
Im Bezug auf die Qualität meines Lebens, denke ich dass die Technologie die Qualität verbessern würde. (4)	○	○	○	○	○	○	○
Ich finde diese Technologie scheint bedienerfreundlich. (5)	○	○	○	○	○	○	○
Ich denke diese Technologie würde mir Zeit sparen im Hinblick auf meine gesundheitlichen Ziele. (6)	○	○	○	○	○	○	○

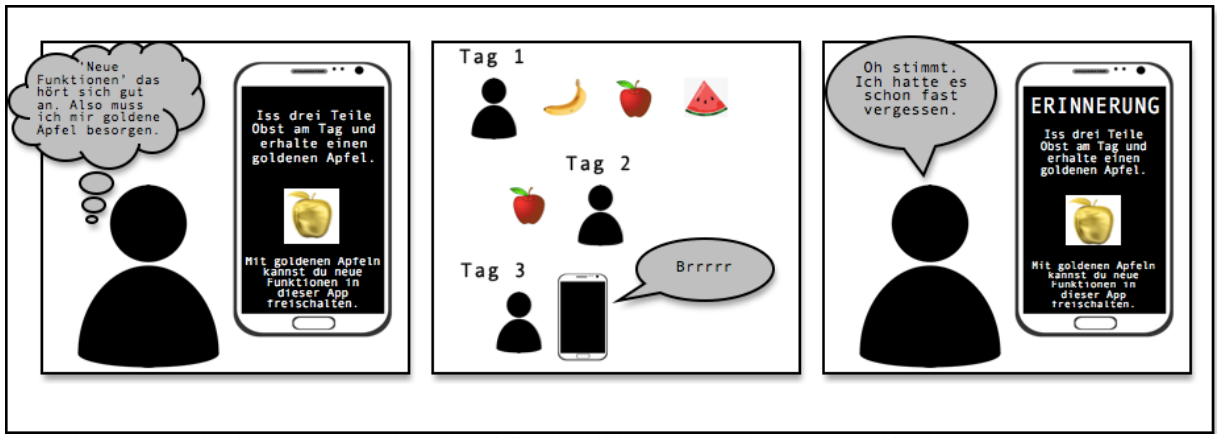
Q27 **Allgemeine Anmerkungen**
Bitte beschreiben Sie allgemeine Anmerkungen oder Reaktionen über die Technologie, die abgebildet wurde.

_____

End of Block: Rewards

Start of Block: Reminder

Q28



Nun sehen Sie verschiedene Aussagen, die sich auf die abgebildete Funktion im Storyboard beziehen.
Nehmen Sie bitte zu jede der folgenden Aussagen Stellung und entscheiden Sie, inwieweit jede auf Sie ganz persönlich zutrifft.

	stimme überhaupt nicht zu (37)	stimme nicht zu (38)	stimme eher nicht zu (39)	weder noch (40)	stimme eher zu (41)	stimme zu (42)	stimme völlig zu (43)
Ich würde es genießen diese Technologie zu verwenden. (1)	○	○	○	○	○	○	○
In Zukunft würde ich es in Betracht ziehen, diese Technologie zu nutzen. (2)	○	○	○	○	○	○	○
Ich betrachte diese Technologie als hilfreich im Hinblick auf meine gesundheitlichen Ziele. (3)	○	○	○	○	○	○	○
Im Bezug auf die Qualität meines Lebens, denke ich dass die Technologie die Qualität verbessern würde. (4)	○	○	○	○	○	○	○
Ich finde diese Technologie scheint bedienerfreundlich. (5)	○	○	○	○	○	○	○
Ich denke diese Technologie würde mir Zeit sparen im Hinblick auf meine gesundheitlichen Ziele. (6)	○	○	○	○	○	○	○

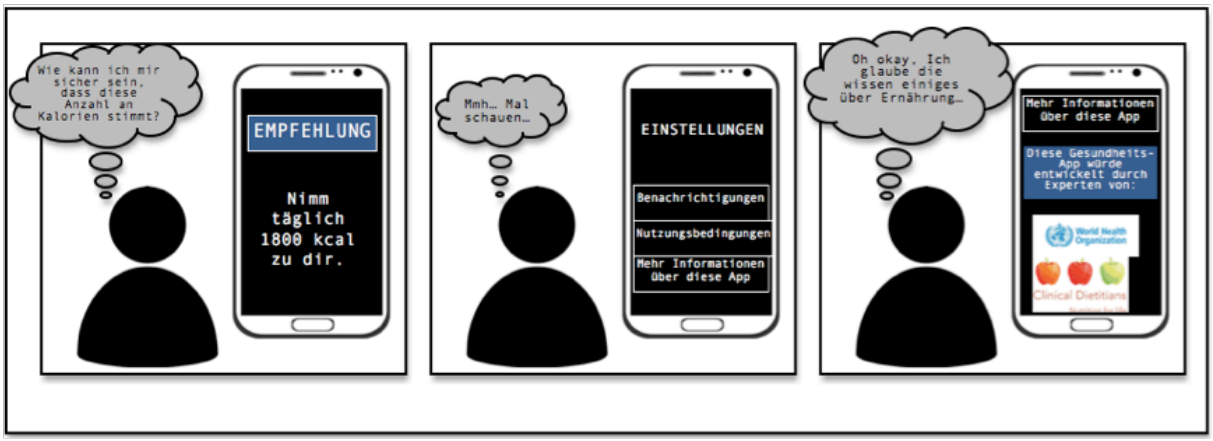
Q29 **Allgemeine Anmerkungen**
Bitte beschreiben Sie allgemeine Anmerkungen oder Reaktionen über die Technologie, die abgebildet wurde.

_____

End of Block: Reminder

Start of Block: Authority

Q30



Nun sehen Sie verschiedene Aussagen, die sich auf die abgebildete Funktion im Storyboard beziehen.
Nehmen Sie bitte zu jede der folgenden Aussagen Stellung und entscheiden Sie, inwieweit jede auf Sie ganz persönlich zutrifft.

	stimme überhaupt nicht zu (37)	stimme nicht zu (38)	stimme eher nicht zu (39)	weder noch (40)	stimme eher zu (41)	stimme zu (42)	stimme völlig zu (43)
Ich würde es genießen diese Technologie zu verwenden. (1)	○	○	○	○	○	○	○
In Zukunft würde ich es in Betracht ziehen, diese Technologie zu nutzen. (2)	○	○	○	○	○	○	○
Ich betrachte diese Technologie als hilfreich im Hinblick auf meine gesundheitlichen Ziele. (3)	○	○	○	○	○	○	○
Im Bezug auf die Qualität meines Lebens, denke ich dass die Technologie die Qualität verbessern würde. (4)	○	○	○	○	○	○	○
Ich finde diese Technologie scheint bedienerfreundlich. (5)	○	○	○	○	○	○	○
Ich denke diese Technologie würde mir Zeit sparen im Hinblick auf meine gesundheitlichen ZieIe. (6)	○	○	○	○	○	○	○

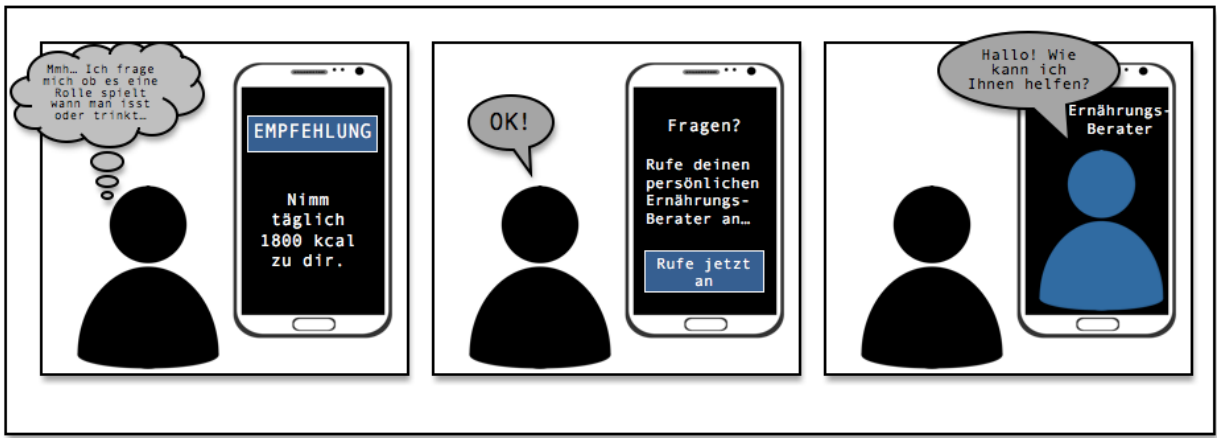
Q31 **Allgemeine Anmerkungen**
Bitte beschreiben Sie allgemeine Anmerkungen oder Reaktionen über die Technologie, die abgebildet wurde.

_____

End of Block: Authority

Start of Block: Expertise

Q32



Nun sehen Sie verschiedene Aussagen, die sich auf die abgebildete Funktion im Storyboard beziehen.
Nehmen Sie bitte zu jede der folgenden Aussagen Stellung und entscheiden Sie, inwieweit jede auf Sie ganz persönlich zutrifft.

	stimme überhaupt nicht zu (37)	stimme nicht zu (38)	stimme eher nicht zu (39)	weder noch (40)	stimme eher zu (41)	stimme zu (42)	stimme völlig zu (43)
Ich würde es genießen diese Technologie zu verwenden. (1)	○	○	○	○	○	○	○
In Zukunft würde ich es in Betracht ziehen, diese Technologie zu nutzen. (2)	○	○	○	○	○	○	○
Ich betrachte diese Technologie als hilfreich im Hinblick auf meine gesundheitlichen Ziele. (3)	○	○	○	○	○	○	○
Im Bezug auf die Qualität meines Lebens, denke ich dass die Technologie die Qualität verbessern würde. (4)	○	○	○	○	○	○	○
Ich finde diese Technologie scheint bedienerfreundlich. (5)	○	○	○	○	○	○	○
Ich denke diese Technologie würde mir Zeit sparen im Hinblick auf meine gesundheitlichen ZieIe. (6)	○	○	○	○	○	○	○

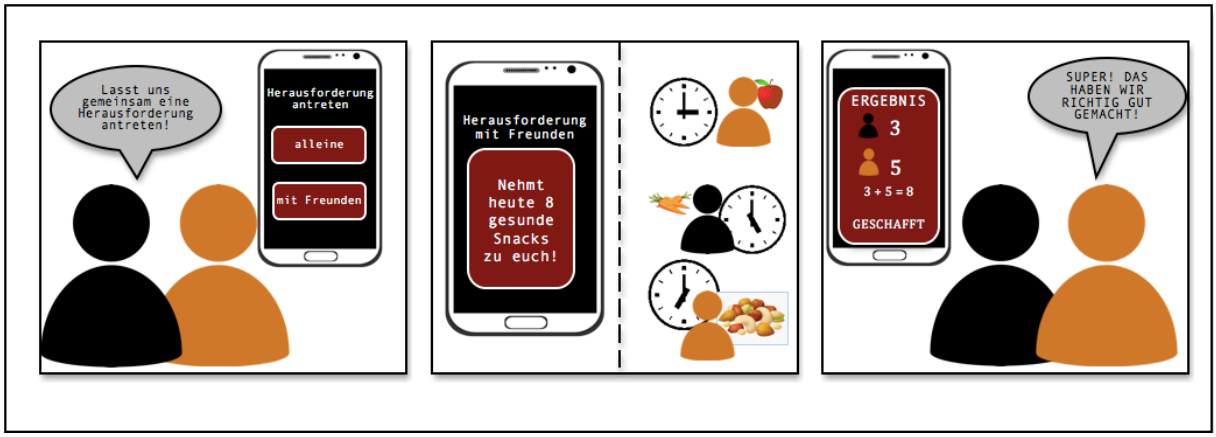
Q33 **Allgemeine Anmerkungen**
Bitte beschreiben Sie allgemeine Anmerkungen oder Reaktionen über die Technologie, die abgebildet wurde.

_____

End of Block: Expertise

Start of Block: Cooperation

Q34



Nun sehen Sie verschiedene Aussagen, die sich auf die abgebildete Funktion im Storyboard beziehen.
Nehmen Sie bitte zu jede der folgenden Aussagen Stellung und entscheiden Sie, inwieweit jede auf Sie ganz persönlich zutrifft.

	stimme überhaupt nicht zu (37)	stimme nicht zu (38)	stimme eher nicht zu (39)	weder noch (40)	stimme eher zu (41)	stimme zu (42)	stimme völlig zu (43)
Ich würde es genießen diese Technologie zu verwenden. (1)	○	○	○	○	○	○	○
In Zukunft würde ich es in Betracht ziehen, diese Technologie zu nutzen. (2)	○	○	○	○	○	○	○
Ich betrachte diese Technologie als hilfreich im Hinblick auf meine gesundheitlichen Ziele. (3)	○	○	○	○	○	○	○
Im Bezug auf die Qualität meines Lebens, denke ich dass die Technologie die Qualität verbessern würde. (4)	○	○	○	○	○	○	○
Ich finde diese Technologie scheint bedienerfreundlich. (5)	○	○	○	○	○	○	○
Ich denke diese Technologie würde mir Zeit sparen im Hinblick auf meine gesundheitlichen Ziele. (6)	○	○	○	○	○	○	○

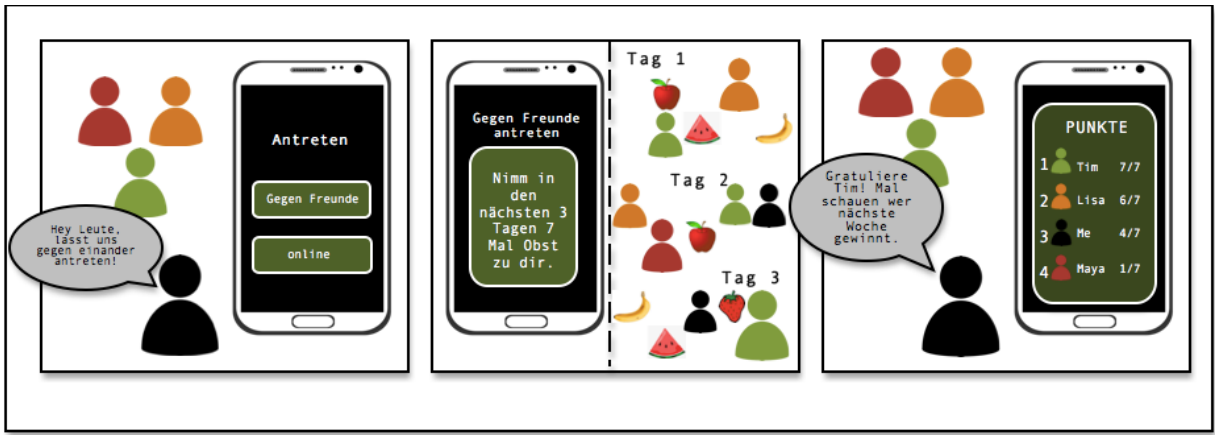
Q35 **Allgemeine Anmerkungen**
Bitte beschreiben Sie allgemeine Anmerkungen oder Reaktionen über die Technologie, die abgebildet wurde.

_____

End of Block: Cooperation

Start of Block: Competition

Q36



Nun sehen Sie verschiedene Aussagen, die sich auf die abgebildete Funktion im Storyboard beziehen.
Nehmen Sie bitte zu jede der folgenden Aussagen Stellung und entscheiden Sie, inwieweit jede auf Sie ganz persönlich zutrifft.

	stimme überhaupt nicht zu (37)	stimme nicht zu (38)	stimme eher nicht zu (39)	weder noch (40)	stimme eher zu (41)	stimme zu (42)	stimme völlig zu (43)
Ich würde es genießen diese Technologie zu verwenden. (1)	○	○	○	○	○	○	○
In Zukunft würde ich es in Betracht ziehen, diese Technologie zu nutzen. (2)	○	○	○	○	○	○	○
Ich betrachte diese Technologie als hilfreich im Hinblick auf meine gesundheitlichen Ziele. (3)	○	○	○	○	○	○	○
Im Bezug auf die Qualität meines Lebens, denke ich dass die Technologie die Qualität verbessern würde. (4)	○	○	○	○	○	○	○
Ich finde diese Technologie scheint bedienerfreundlich. (5)	○	○	○	○	○	○	○
Ich denke diese Technologie würde mir Zeit sparen im Hinblick auf meine gesundheitlichen Ziele. (6)	○	○	○	○	○	○	○

Q37 **Allgemeine Anmerkungen**
Bitte beschreiben Sie allgemeine Anmerkungen oder Reaktionen über die Technologie, die abgebildet wurde.

_____

End of Block: Competition

Start of Block: End

Q13 Vielen Dank für Ihre Mitarbeit!

Für weitere Informationen oder Rückfragen kontaktieren Sie bitte Kimberly Bakker: k.bakker@student.utwente.nl

Haben Sie noch Vorschläge oder Anmerkungen?

_____

End of Block: End

Appendix F

Correlations between Stages of Change and Perceived Acceptability at the Item-Level

Table F1

Correlations between Stages of Change and Perceived Acceptability (Item-Level) of Self-Monitoring

Stages of change	Items	Pearson's *r*	*p* value
Precontemplation (non-believers[a])	1. Enjoyment	1. -.079	1. .301
	2. Likelihood of use	2. -.061	2. .424
	3. Helpfulness	3. -.095	3. .209
	4. Quality of life	4. -.041	4. .592
	5. Ease of use	5. -.052	5. .497
	6. Time saving	6. -.115	6. .130
Precontemplation (believers[b])	1. Enjoyment	1. .063	1. .411
	2. Likelihood of use	2. .071	2. .348
	3. Helpfulness	3. .038	3. .622
	4. Quality of life	4. .152*	4. .045
	5. Ease of use	5. .009	5. .903
	6. Time saving	6. .067	6. .377
Contemplation	1. Enjoyment	1. .153*	1. .043
	2. Likelihood of use	2. .175*	2. .020
	3. Helpfulness	3. .139	3. .067
	4. Quality of life	4. .203**	4. .007
	5. Ease of use	5. .082	5. .281
	6. Time saving	6. .099	6. .191
Preparation	1. Enjoyment	1. .141	1. .062
	2. Likelihood of use	2. .171*	2. .024
	3. Helpfulness	3. .103	3. .177
	4. Quality of life	4. .183*	4. .015
	5. Ease of use	5. .004	5. .955
	6. Time saving	6. .179*	6. .018
Action	1. Enjoyment	1. .001	1. .987
	2. Likelihood of use	2. .036	2. .640
	3. Helpfulness	3. .056	3. .459
	4. Quality of life	4. .025	4. .746
	5. Ease of use	5. .020	5. .793
	6. Time saving	6. .040	6. .602
Maintenance	1. Enjoyment	1. -.118	1. .121
	2. Likelihood of use	2. -.114	2. .132
	3. Helpfulness	3. -.024	3. .749
	4. Quality of life	4. -.179*	4. .018
	5. Ease of use	5. -.071	5. .347
	6. Time saving	6. -.078	6. .307

Note. [a]Non-believers in healthy eating; [b]Believers in healthy eating
*Correlation is significant at the 0.05 level (2-tailed).
**Correlation is significant at the 0.01 level (2-tailed).

Table F2

Correlations between Stages of Change and Perceived Acceptability (Item-Level) of Simulation

Stages of change	Items	Pearson's *r*	*p* value
Precontemplation (non-believers[a])	1. Enjoyment	1. -.005	1. .949
	2. Likelihood of use	2. -.010	2. .899
	3. Helpfulness	3. .052	3. .497
	4. Quality of life	4. .015	4. .847
	5. Ease of use	5. -.031	5. .688
	6. Time saving	6. .030	6. .689

Stages of change	Items	Pearson's *r*	*p* value
Precontemplation (believers[b])	1. Enjoyment	1. .044	1. .565
	2. Likelihood of use	2. .068	2. .375
	3. Helpfulness	3. .081	3. .288
	4. Quality of life	4. .052	4. .498
	5. Ease of use	5. -.002	5. .974
	6. Time saving	6. .080	6. .293
Contemplation	1. Enjoyment	1. .214**	1. .004
	2. Likelihood of use	2. .224**	2. .003
	3. Helpfulness	3. .227**	3. .003
	4. Quality of life	4. .185*	4. .014
	5. Ease of use	5. .071	5. .348
	6. Time saving	6. .230**	6. .002
Preparation	1. Enjoyment	1. .303**	1. < .001
	2. Likelihood of use	2. .303**	2. < .001
	3. Helpfulness	3. .325**	3. < .001
	4. Quality of life	4. .307**	4. < .001
	5. Ease of use	5. .089	5. .240
	6. Time saving	6. .330**	6. < .001
Action	1. Enjoyment	1. .096	1. .208
	2. Likelihood of use	2. .057	2. .453
	3. Helpfulness	3. .026	3. .733
	4. Quality of life	4. .081	4. .289
	5. Ease of use	5. -.006	5. .938
	6. Time saving	6. -.058	6. .449
Maintenance	1. Enjoyment	1. -.031	1. .680
	2. Likelihood of use	2. -.062	2. .417
	3. Helpfulness	3. -.100	3. .186
	4. Quality of life	4. -.048	4. .524
	5. Ease of use	5. -.071	5. .351
	6. Time saving	6. -.078	6. .307

Note. [a]Non-believers in healthy eating; [b]Believers in healthy eating
*Correlation is significant at the 0.05 level (2-tailed).
**Correlation is significant at the 0.01 level (2-tailed).

Table F3

Correlations between Stages of Change and Perceived Acceptability (Item-Level) of Rewards

Stages of change	Items	Pearson's *r*	*p* value
Precontemplation (non-believers[a])	1. Enjoyment	1. .133	1. .080
	2. Likelihood of use	2. .133	2. .081
	3. Helpfulness	3. .150*	3. .048
	4. Quality of life	4. .110	4. .147
	5. Ease of use	5. .097	5. .205
	6. Time saving	6. .162*	6. .033
Precontemplation (believers[b])	1. Enjoyment	1. .171*	1. .024
	2. Likelihood of use	2. .209**	2. .006
	3. Helpfulness	3. .238**	3. .002
	4. Quality of life	4. .222**	4. .003
	5. Ease of use	5. .196**	5. .010
	6. Time saving	6. .220**	6. .004
Contemplation	1. Enjoyment	1. .269**	1. < .001
	2. Likelihood of use	2. .257**	2. .001
	3. Helpfulness	3. .258**	3. .001
	4. Quality of life	4. .275**	4. < .001
	5. Ease of use	5. .196**	5. .010
	6. Time saving	6. .182*	6. .016
Preparation	1. Enjoyment	1. .171*	1. .024
	2. Likelihood of use	2. .196**	2. .010
	3. Helpfulness	3. .180*	3. .017
	4. Quality of life	4. .208**	4. .006

Stages of change	Items	Pearson's *r*	*p* value
	5. Ease of use	5. .029	5. .701
	6. Time saving	6. .220**	6. .003
Action	1. Enjoyment	1. .025	1. .744
	2. Likelihood of use	2. -.003	2. .974
	3. Helpfulness	3. -.063	3. .408
	4. Quality of life	4. .012	4. .817
	5. Ease of use	5. -.030	5. .697
	6. Time saving	6. -.082	6. .284
Maintenance	1. Enjoyment	1. -.124	1. .104
	2. Likelihood of use	2. -.136	2. .073
	3. Helpfulness	3. -.183*	3. .016
	4. Quality of life	4. -.133	4. .081
	5. Ease of use	5. -.097	5. .202
	6. Time saving	6. -.207**	6. .006

Note. [a]Non-believers in healthy eating; [b]Believers in healthy eating
*Correlation is significant at the 0.05 level (2-tailed).
**Correlation is significant at the 0.01 level (2-tailed).

Table F4

Correlations between Stages of Change and Perceived Acceptability (Item-Level) of Reminders

Stages of change	Items	Pearson's *r*	*p* value
Precontemplation (non-believers[a])	1. Enjoyment	1. .065	1. .387
	2. Likelihood of use	2. .055	2. .462
	3. Helpfulness	3. .087	3. .246
	4. Quality of life	4. .136	4. .070
	5. Ease of use	5. .008	5. .911
	6. Time saving	6. .076	6. .311
Precontemplation (believers[b])	1. Enjoyment	1. .202**	1. .007
	2. Likelihood of use	2. .191*	2. .010
	3. Helpfulness	3. .255**	3. .001
	4. Quality of life	4. .278**	4. < .001
	5. Ease of use	5. .112	5. .135
	6. Time saving	6. .173*	6. .021
Contemplation	1. Enjoyment	1. .199**	1. .008
	2. Likelihood of use	2. .214**	2. .004
	3. Helpfulness	3. .201**	3. .007
	4. Quality of life	4. .227**	4. .002
	5. Ease of use	5. .094	5. .210
	6. Time saving	6. .151*	6. .044
Preparation	1. Enjoyment	1. .134	1. .075
	2. Likelihood of use	2. .138	2. .067
	3. Helpfulness	3. .181*	3. .015
	4. Quality of life	4. .197**	4. .008
	5. Ease of use	5. .052	5. .489
	6. Time saving	6. .232**	6. .002
Action	1. Enjoyment	1. -.063	1. .403
	2. Likelihood of use	2. -.048	2. .523
	3. Helpfulness	3. -.138	3. .067
	4. Quality of life	4. -.181*	4. .015
	5. Ease of use	5. -.114	5. .131
	6. Time saving	6. -.109	6. .147
Maintenance	1. Enjoyment	1. -.139	1. .064
	2. Likelihood of use	2. -.188	2. .116
	3. Helpfulness	3. -.174*	3. .020
	4. Quality of life	4. -.239**	4. .001
	5. Ease of use	5. -.054	5. .474
	6. Time saving	6. -.158*	6. .035

Note. [a]Non-believers in healthy eating; [b]Believers in healthy eating
*Correlation is significant at the 0.05 level (2-tailed).
**Correlation is significant at the 0.01 level (2-tailed).

Table F5

Correlations between Stages of Change and Perceived Acceptability (Item-Level) of Authority

Stages of change	Items	Pearson's *r*	*p* value
Precontemplation (non-believers[a])	1. Enjoyment	1. -.046	1. .547
	2. Likelihood of use	2. -.057	2. .451
	3. Helpfulness	3. -.031	3. .682
	4. Quality of life	4. .092	4. .224
	5. Ease of use	5. -.043	5. .568
	6. Time saving	6. .038	6. .615
Precontemplation (believers[b])	1. Enjoyment	1. .042	1. .581
	2. Likelihood of use	2. .059	2. .436
	3. Helpfulness	3. .078	3. .299
	4. Quality of life	4. .099	4. .188
	5. Ease of use	5. .031	5. .678
	6. Time saving	6. .091	6. .229
Contemplation	1. Enjoyment	1. .140	1. .064
	2. Likelihood of use	2. .184*	2. .014
	3. Helpfulness	3. .220**	3. .003
	4. Quality of life	4. .210**	4. .005
	5. Ease of use	5. .061	5. .423
	6. Time saving	6. .100	6. .185
Preparation	1. Enjoyment	1. .110	1. .144
	2. Likelihood of use	2. .117	2. .120
	3. Helpfulness	3. .155*	3. .039
	4. Quality of life	4. .173*	4. .021
	5. Ease of use	5. -.001	5. .990
	6. Time saving	6. .139	6. .064
Action	1. Enjoyment	1. .012	1. .877
	2. Likelihood of use	2. .039	2. .607
	3. Helpfulness	3. .012	3. .871
	4. Quality of life	4. -.072	4. .342
	5. Ease of use	5. -.032	5. .668
	6. Time saving	6. -.079	6. .294
Maintenance	1. Enjoyment	1. -.003	1. .971
	2. Likelihood of use	2. -.024	2. .753
	3. Helpfulness	3. -.044	3. .565
	4. Quality of life	4. -.168*	4. .025
	5. Ease of use	5. -.029	5. .699
	6. Time saving	6. -.079	6. .297

Note. [a]Non-believers in healthy eating; [b]Believers in healthy eating
*Correlation is significant at the 0.05 level (2-tailed).
**Correlation is significant at the 0.01 level (2-tailed).

Table F6

Correlations between Stages of Change and Perceived Acceptability (Item-Level) of Expertise

Stages of change	Items	Pearson's *r*	*p* value
Precontemplation (non-believers[a])	1. Enjoyment	1. -.065	1. .395
	2. Likelihood of use	2. -.090	2. .235
	3. Helpfulness	3. -.013	3. .864
	4. Quality of life	4. .058	4. .450
	5. Ease of use	5. -.132	5. .083
	6. Time saving	6. -.020	6. .795
Precontemplation (believers[b])	1. Enjoyment	1. .061	1. .424
	2. Likelihood of use	2. .021	2. .779
	3. Helpfulness	3. .098	3. .197
	4. Quality of life	4. .106	4. .163
	5. Ease of use	5. .011	5. .884
	6. Time saving	6. .045	6. .554

Stages of change	Items	Pearson's *r*	*p* value
Contemplation	1. Enjoyment	1. .206**	1. .006
	2. Likelihood of use	2. .189*	2. .012
	3. Helpfulness	3. .258**	3. .001
	4. Quality of life	4. .248**	4. .001
	5. Ease of use	5. .117	5. .122
	6. Time saving	6. .139	6. .066
Preparation	1. Enjoyment	1. .099	1. .192
	2. Likelihood of use	2. .097	2. .202
	3. Helpfulness	3. .073	3. .334
	4. Quality of life	4. .113	4. .135
	5. Ease of use	5. -.003	5. .964
	6. Time saving	6. .096	6. .204
Action	1. Enjoyment	1. .102	1. .179
	2. Likelihood of use	2. .083	2. .275
	3. Helpfulness	3. .028	3. .717
	4. Quality of life	4. .026	4. .738
	5. Ease of use	5. .047	5. .540
	6. Time saving	6. -.007	6. .922
Maintenance	1. Enjoyment	1. .031	1. .682
	2. Likelihood of use	2. .042	2. .584
	3. Helpfulness	3. -.054	3. .480
	4. Quality of life	4. -.086	4. .260
	5. Ease of use	5. -.009	5. .908
	6. Time saving	6. -.035	6. .649

Note. [a]Non-believers in healthy eating; [b]Believers in healthy eating
*Correlation is significant at the 0.05 level (2-tailed).
**Correlation is significant at the 0.01 level (2-tailed).

Table F7

Correlations between Stages of Change and Perceived Acceptability (Item-Level) of Cooperation

Stages of change	Items	Pearson's *r*	*p* value
Precontemplation (non-believers[a])	1. Enjoyment	1. .106	1. .161
	2. Likelihood of use	2. .104	2. .171
	3. Helpfulness	3. .134	3. .077
	4. Quality of life	4. .160*	4. .034
	5. Ease of use	5. .079	5. .300
	6. Time saving	6. .123	6. .104
Precontemplation (believers[b])	1. Enjoyment	1. .207**	1. .006
	2. Likelihood of use	2. .180*	2. .017
	3. Helpfulness	3. .214**	3. .005
	4. Quality of life	4. .256**	4. .001
	5. Ease of use	5. .114	5. .134
	6. Time saving	6. .246**	6. .001
Contemplation	1. Enjoyment	1. .258**	1. .001
	2. Likelihood of use	2. .243**	2. .001
	3. Helpfulness	3. .262**	3. < .001
	4. Quality of life	4. .269**	4. < .001
	5. Ease of use	5. .149*	5. .049
	6. Time saving	6. .236**	6. .002
Preparation	1. Enjoyment	1. .026	1. .732
	2. Likelihood of use	2. .047	2. .537
	3. Helpfulness	3. .021	3. .787
	4. Quality of life	4. .043	4. .573
	5. Ease of use	5. .016	5. .832
	6. Time saving	6. .110	6. .148

Stages of change	Items	Pearson's *r*	*p* value
Action	1. Enjoyment	1. -.088	1. .249
	2. Likelihood of use	2. -.009	2. .905
	3. Helpfulness	3. -.077	3. .313
	4. Quality of life	4. -.099	4. .192
	5. Ease of use	5. -.044	5. .559
	6. Time saving	6. -.080	6. .293
Maintenance	1. Enjoyment	1. -.201**	1. .008
	2. Likelihood of use	2. -.190*	2. .012
	3. Helpfulness	3. -.231**	3. .002
	4. Quality of life	4. -.248**	4. .001
	5. Ease of use	5. -.144	5. .058
	6. Time saving	6. -.284**	6. < .001

Note. [a]Non-believers in healthy eating; [b]Believers in healthy eating
*Correlation is significant at the 0.05 level (2-tailed).
**Correlation is significant at the 0.01 level (2-tailed).

Table F8

Correlations between Stages of Change and Perceived Acceptability (Item-Level) of Competition

Stages of change	Items	Pearson's *r*	*p* value
Precontemplation (non-believers[a])	1. Enjoyment	1. .077	1. .311
	2. Likelihood of use	2. .096	2. .202
	3. Helpfulness	3. .073	3. .337
	4. Quality of life	4. .097	4. .199
	5. Ease of use	5. .078	5. .302
	6. Time saving	6. .202**	6. .007
Precontemplation (believers[b])	1. Enjoyment	1. .208**	1. .006
	2. Likelihood of use	2. .206**	2. .006
	3. Helpfulness	3. .211**	3. .005
	4. Quality of life	4. .210**	4. .005
	5. Ease of use	5. .108	5. .153
	6. Time saving	6. .217**	6. .004
Contemplation	1. Enjoyment	1. .216**	1. .004
	2. Likelihood of use	2. .183*	2. .015
	3. Helpfulness	3. .211**	3. .005
	4. Quality of life	4. .186*	4. .013
	5. Ease of use	5. .131	5. .081
	6. Time saving	6. .130	6. .084
Preparation	1. Enjoyment	1. .051	1. .499
	2. Likelihood of use	2. .071	2. .345
	3. Helpfulness	3. .069	3. .360
	4. Quality of life	4. .109	4. .148
	5. Ease of use	5. .093	5. .218
	6. Time saving	6. .137	6. .070
Action	1. Enjoyment	1. -.086	1. .256
	2. Likelihood of use	2. -.082	2. .275
	3. Helpfulness	3. -.121	3. .108
	4. Quality of life	4. -.094	4. .214
	5. Ease of use	5. -.080	5. .289
	6. Time saving	6. -.161*	6. .033
Maintenance	1. Enjoyment	1. -.178*	1. .018
	2. Likelihood of use	2. -.130	2. .084
	3. Helpfulness	3. -.187*	3. .013
	4. Quality of life	4. -.198**	4. .008
	5. Ease of use	5. -.179*	5. .017
	6. Time saving	6. -.260**	6. < .001

Note. [a]Non-believers in healthy eating; [b]Believers in healthy eating
*Correlation is significant at the 0.05 level (2-tailed).
**Correlation is significant at the 0.01 level (2-tailed).