**Bachelor thesis**

# The Effect of Gamification on Involvement, System Usability and System Use in an Online Positive Psychology Intervention

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**Abstract**

**Background.** The main problem of online interventions are the high drop-out rates. This research explores how gamification affects involvement, system usability and how these variables correlate with actual system use in a positive psychology online intervention.

**Method.** An experiment was conducted with 80 participants. They used either the non-gamified version or the gamified version of the intervention *Dit is jouw leven* (translated: This is your life. They did exercises on a website, which contained the intervention, and filled in the revised Personal Involvement Inventory and the System Usability Scale within one hour in a laboratory or at home.

**Results & Discussion.** The gamified version of the intervention exhibited a higher effect on involvement than the non-gamified version of the intervention which is important to secure adherence. Neither gamification, nor involvement, nor system usability correlated with actual system use. That could be ascribed to the measurement of the actual system use, which might be incorrect. More research should be done on the effect of gamification, but this research indicates that the utilization of gamification in online interventions could act as a solution to the high drop-out rates.

*Keywords:* gamification, online positive psychology interventions, involvement, system usability, actual system use

**Acknowledgement**

The process of doing the Bachelor and writing the Bachelor thesis is not just marked by the actual process of writing and the research. It is a process of gaining insights, related to the research, but also related to the general life.

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## Index

## Introduction

The 20th century is marked by a shift to positive psychology and psychiatry and away from the medicine focused diagnosis and treatment of mentally ill people. The involvement of the patient himself as a participant in his own treatment became more and more important in the last decades. The patient is considered an expert and the importance to involve the patient in his own treatment and decisions about his therapy increases (Reynolds, 2009). This shift is identified by the definition of health. Following the World Health Organization health is not only the absence of disease, but is defined as a state of mental and physical, as well as social well-being (Jeste, Palmer, Rettew & Boardman, 2015). Thus, the involvement of the patient in the treatment aims to enhance rather the well-being, than only to decrease the disease.

The broaden-and-build-theory (Fredrickson, 2004) is a key theory regarding the influence of positive emotions. It states, that positive emotions influence the momentary thought-action repertoire of an individual. Interest for example arises the desire to explore. That means that people who experience positive emotions are more likely to take part in activities. An increased involvement in activities can be observed, because based on the positive emotions the individual is more inclined to deal with new experiences and information (Fredrickson, 2001). Positive emotions as well as successful coping and social bonds are important parts of positive psychology. Positive emotions promote, among other things, physical, psychological and social resources. These resources result in an improvement of successful coping with the environment (Fredrickson, 2004). Successful coping and social bonds as important components of positive psychology in order to achieve well-being like a good mental health outcome was investigated by Jeste et al. (2015). Hence, positive emotions increase involvement which enhances well-being to some extent.

Furthermore, positive psychology interventions provide an accessibility to positive psychology and are therefore an important part of it (Jeste et al., 2015). One kind of positive psychology or psychiatry interventions are online interventions, for example e-mail therapy, web counselling and computer-mediated psychotherapy. This kind of intervention "involves a variety of activities such as psychoeducation, individual therapy, and automated self-help interventions delivered via the Internet" (Rummell & Joyce, 2010, p. 482).

### Effect Study of Online Interventions and Online Positive Psychology Interventions

Online interventions in general bring along many benefits. According to Rummell and Joyce (2010), online interventions are especially beneficial for a hardly reachable population,

which live in rural areas, are disabled, immobile or chronically ill. It is possible to provide service to people who do not embrace face-to-face therapy, because they are uncomfortable with it. Online positive psychology interventions are also applied in order to prevent individuals from diseases, because it is more effective then healing it (Ouweneel, Le Blanc & Schaufeli, 2013). Through online interventions people feel more anonymous, which leads to a more honest and open behaviour. For clients who do not need intensive individual psychotherapy and only a little support online interventions are a comfortable way to get the appropriate help. Clients with anxiety disorders like social anxiety do not have to leave their home, where they are the most comfortable. The effect of online positive psychology interventions to promote change is caused by the interpersonal factors such as anonymity, openness to one's self and the confident feeling of a treatment in a known environment (Rummell & Joyce, 2010). Online positive psychology interventions used in the work environment show positive effects on self-efficacy and positive emotions of employees (Ouweneel et al., 2013). Therefore, online interventions are an effective way to let the benefits of positive psychology reach people in many different environments.

Contrarily, online interventions also show drawbacks. According to Suler (2000), direct counselling by an expert is difficult to conduct in an online intervention, because the presence of the expert is perceived in a weaker way. One of the main problems of online interventions is the adherence. Adherence is defined as “the extent to which a person's behaviour – taking medication, following a diet and/or executing lifestyle changes, corresponds with the agreed recommendations from a health care provider” (Sabaté, 2003, p. 3). Regarding online interventions, the health care provider is presented in terms of the program or website. According to Wangberg, Bergmo and Johnsen (2008), it can happen that half of the participants stop the intervention during the first month. Lack of insights about the treatment like its goal are associated with nonadherence, according to Leclerc et al. (2015). A solution to the adherence problem is important to secure the effectiveness of the intervention. The participants gain more positive effects the more the intervention is utilized, analogous to Kelders (2015).

**Involvement**

Involvement can be a solution to the adherence problem. Involvement and adherence are related, in agreement with Kelders (2015). Involvement is defined as a perceived relevance of a service or product established on inherent needs, interests and values and is seen as a motivational construct (Zaichkowsky, 1994). In addition, involvement is described

"as a subjective psychological state […]" (Barki & Hartwich, 1989, p. 75). Zaichkowsky (1994) mentions three factors to be part of involvement: the characteristics of a person, the characteristics of a stimulus and the characteristics of the given situation. These factors can influence the involvement with products like interventions or advertisements (Zaichkowsky, 1994). "Competitive elements" (Buckley & Doyle, 2014, p. 3) like ranking and rating systems aim to maintain the involvement of a participant in the activity (Vicente et al., 2014). How can "competitive elements" (Buckley & Doyle, 2014, p. 3) be integrated in online interventions?

**Gamification in Positive Psychology Online Interventions**

Gamification is a term which describes specific design elements, often seen in video games such as Mario Kart or The Sims. Gamified online interventions integrate design elements or activity patterns known from games (Buckley & Doyle, 2014). Gamification is defined by Kapp (2012) as "game-based mechanics, aesthetics, and game thinking to engage people, motivate action, promote learning, and solve problems" (Kapp, 2012, p. 266). An example of a design element used in games, as well as in information technologies is first of all the reward system after achieving a goal or intermediate goals. Secondly, "rapid feedback cycles" (Buckley & Doyle, 2014, p. 3) provide and maintain a positive relationship with failures. Failures are seen as a step to mastery. Furthermore, there are often "competitive elements" (Buckley & Doyle, 2014, p. 3) used as a source of motivation like ranking systems. Gamification, also used in online interventions, is a rising market. Almost three billion euros are forecasted to be spent on the gamification market in 2016 in the USA (Buckley & Doyle, 2014). The study, conducted by Buckley and Doyle (2014), about a gamified learning intervention provides evidence for the conception, that game design elements in interventions increase student engagement and participation. This emphasizes the existence of an effect of gamification on the involvement and participation of the participants. Furthermore, involvement has a positive effect on skills improvement (Jha, Quinton, Bekker & Roberts, 2009). This suggests that gamified interventions can have a major positive impact on the treatment of people and that involvement supported by gamification is an important factor in maintaining adherence and.

**Effect Study of Gamified Online Interventions**

According to Vicente et al. (2014), gamification elements, such as rating systems, affect the involvement of the participants. Furthermore, gamification elements also have an influence on adherence. A gamified app that aims to increase the fitness of employees through

a reward system supports the connection between gamification, involvement and adherence. In the beginning, 12% of the employees began doing exercises regularly, as they were strongly motivated by a developed app. More gamification elements were integrated into the app like teambuilding and transparency of the results of other groups. Through this system the employees got more involved and 70% of them started exercising (Vicente et al., 2014). This intervention shows that gamification seems to affect the user behaviour with regard to the adherence and involvement.

The Technology Acceptance Model, TAM, goals to explain user behaviour related to computer technologies. The model also provides a connection between involvement and adherence. According to the TAM, perceived usefulness, perceived ease of use and the attitude towards the use have influence on the actual system use (Mathieson, 1991). The usefulness is describes as "utilitarian motive" (Zaichkowsky, 1994, p. 60) by defining involvement. Involvement occurs when a person recognizes relevance in doing something and therefore has a positive attitude (Zaichkowsky, 1994). Not only the perceived usefulness and the attitude towards the use as such mirror the level of involvement, the perceived ease of use is correlated to the attitude towards the intervention and therefore might also be connected to involvement. According to the TAM involvement, hence is one part of the process to achieve adherence and actual system use. To secure involvement therefore is an important part of an intervention to secure adherence as well. Adherence is reflected in the TAM as actual system use.

**Goal of the Study**

To what extent does the gamification factor of an online intervention contribute to the effect of the intervention? Could the effect be the same if the intervention had no gaming elements? This study has the function to fill the gap literature does not deal with and to provide new data which can be used to develop effective interventions and approaches for treating clients and non-clients. The goal of this study is to measure the influence of the gamification factor in a gamified online positive psychology intervention. Particularly, it serves to determine to what extent gaming elements contribute to the involvement, perceived system usability and actual system use of the participants in the intervention. Involvement and system usability are important to measure for securing adherence of participants in an intervention, which is important to achieve effects. Although online interventions show positive effects the drop-out rate and the non-adherence is higher than in interventions which are not online (Bolier et al., 2013; Sergeant and Mongrain, 2014). That is why it is even more

important to investigate, if gamified interventions can function as a solution for this problem. By analysing the theoretical connection between the concepts of gamification, involvement, usability and the end goal actual system use, a connection to practical work is provided, because the effect can be observed immediately.

**Hypotheses**

The research questions are: 1) “Do participants in a gamified online intervention feel significantly stronger involved in the intervention than participants in the non-gamified version of the same online intervention?”, 2) “Does the group that used the gamified version of the intervention show a higher system usability than the group that used the not-gamified version?”, 3) “Do the participants in the gamified treatment show more actual system use than the participants in the non-gamified treatment?” This is suggested by some sources like Vicente et al. (2014) who claim that gamification has an influence on adherence. 4) “Is involvement associated to the system usability ?”, 5) “Does involvement have a connection to the actual system use, the end goal of the TAM?” and 6) “Does system usability show a connection to the actual system use?”.

The main hypothesis states that participants using the gamified version of the online positive psychology intervention will have a significantly higher mean score in involvement than the participants using the non-gamified version of the intervention. The second hypothesis claims that the participants using the gamified version of the online positive psychology intervention will have a significantly higher mean score in system usability than the participants using the non-gamified version of the intervention. The third hypothesis suggests that participants using the gamified version of the intervention show a significant higher mean score in actual system use than the participants using the non-gamified version. A positive correlation between the system usability and involvement is suggested by the fourth hypothesis. In accordance with the fifth hypothesis, there is a positive correlation between involvement and the actual system use. Finally, a positive correlation between the system usability and the actual system use is claimed by the sixth hypothesis. Figure 1 shows the expected model of the relationships between the variables.

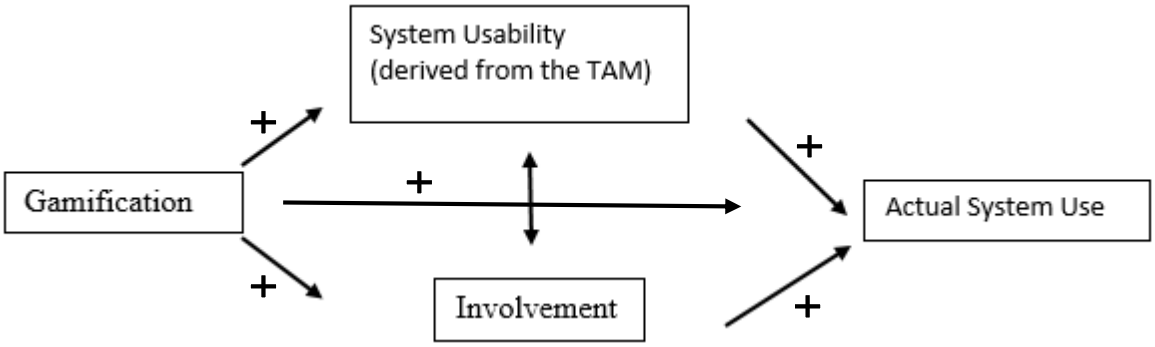


*Figure 1.* Schematic of the Expected Model of the Connections Between the Variables

## Methods

### Design

By using an experiment with randomly assigned participants to the different treatments, quantitative data was used. A between-group design was employed to examine the differences between the two participant groups. The experiment was designed as double blind meaning that neither the participant nor the investigator knew, which intervention the participant used. The participant had no knowledge about the existence of two different versions of the intervention. The experiment was conducted in a laboratory of the University of Twente or at the participant's home where a calm environment was secured. The independent variable of the first hypothesis was the version of intervention which was categorical with two groups, the gamified or the non-gamified version and the dependent variable was the total score on the revised Personal Involvement Inventory (rPII) which was ordinal. The second hypothesis used the version of intervention as independent variable which was categorical with two groups and the dependent variable was the total score on the System Usability Scale (SUS), which was ordinal. The third hypothesis' independent variable was found in the two-grouped version of intervention. The ratio interval, independent variable contained the actual system use, defined by the amount of words and the amount of exercises, a participant wrote. The variables, which were compared in the fourth hypothesis, the total score of the rPII and the total score of the SUS, were constituted ordinally. The compared variables in the fifth and sixth hypothesis were the rPII total score, the SUS total score and the actual system use.

**Participants**

The convenience sample of participants in this study included 80 students from the University of Twente and acquaintances of the researchers. The data from five participants were not used, because they did not complete at least the two mandatory exercises, did not complete the questionnaire, named an implausible age or logged in with a wrong account into the questionnaire which made it impossible to connect their data with the data from the intervention. These data were excluded to maintain a comparability between the data and the seriously conduction of the experiment. The sample included 48 females (64%) and 27 males (36%). Participants between the ages 18 and 47 were included. The mean age was 23. With 18 Dutch (24%) and 52 German participants (76%), the Dutch belonged to the minority. All participants spoke Dutch. Forty participants (53.3%) worked with the gamified intervention and 35 participants (46.7%) used the non-gamified version of the online intervention (Table 1).

Table 1

*Demographics of the Participants*

| | Frequency | Percent |
|---|---|---|
| Female | 48 | 64.0 |
| Male | 27 | 36.0 |
| Total | 75 | 100.0 |
| Gamified version | 40 | 53.3 |
| Non-gamified version | 35 | 47.7 |
| Total | 75 | 100.0 |
| Dutch | 18 | 24.0 |
| German | 57 | 76.0 |
| Total | 75 | 100.0 |

**Materials**

Firstly, the ethic commission gave the ethical approval to conduct the study. Secondly, an informed consent (Appendix A) was used, which included information about the anonymity of the participant and the confidential dealing with the data. Furthermore, the ability was given to stop the experiment at any given time elevated. Thirdly, an instruction form (Appendix B) was utilized to guide the participant step by step through the intervention.

This form also contained a log in code which decided about the kind of treatment the participant took part. The informed consent as well as the instruction form were equal for every participant. Only the log in codes on the instruction form differed.

The two possible treatments were the gamified version of the online psychology intervention *Dit is jouw leven* (translated: That is your life) and the non-gamified version. Both versions contain the same texts, instructions and exercises. The gamified version differs from the non-gamified version with regard to the design. The gamified version is designed like a city surrounded by forests and mountains. It contains a character who gives information about how a participant can go on in the intervention and how he or she can visit another area. More instruction was given by choosing a violet area on the map (Appendix C).

In the non-gamified version, information and instructions are given by pressing a bottom with an information sign. The non-gamified version has a white and blue background, contrary to the elaborate background of the gamified version (Appendix C). The buttons of the overview and exercises look in both versions similar. The knowledge buttons differ. In the gamified version the knowledge button is a sign of a head with cogs in it and in the non-gamified version the bottom is marked by a sign of a hat for graduates. The intervention consists of different exercises. Two specific exercises were mandatory. Both are presented in the “stad van positieve emoties” (translated: city of positive emotion). One is about positive moments people had experienced the day before. It was mandatory to write three of these moments down. The second exercise occupied with the rewriting of a positive moment where one felt strong emotions like rest and love. The exercise was to rewrite them in order to feel the emotions of the particular situation again when reading the text. In addition, the participant could voluntarily do more exercises. Possible exercises in the “stad van positieve emoties” (translated: city of positive emotions) were writing exercises, like writing in an online diary of the website or to focus on positive events, happening around, as well as filling in questionnaires to measure the degree a person experiences positive emotions. Besides, other cities presented in the intervention also providing further exercises.

Moreover, a computer or laptop was needed to perform the experiment. Besides the intervention and the computer, two questionnaires were used. In the beginning, demographic questions like age, sex and nationality were asked. The revised version of the Personal Involvement Inventory, rPII, and the System Usability Scale, SUS, appeared thereafter. The rPII consists out of 10 items and measures the state of involvement. The participant dealt on a

seven-point Likert scale with the items. An example of an item is “important” and “unimportant” as contrasts (Appendix D). The items two, five, eight and ten had a negative tone. The scale had a Cronbach's alfa above .9 (Zaichkowsky, 1994). The Cronbach's alfa of the rPII in this study was .93.

According to Doong and Wang (2008), the reliability and the construct validity of the System Usability scale (SUS) were adequate. Moreover, the factor loadings on the intended constructs were for all above .6. Regarding the internal consistency the factors were unidimensional. The SUS was created to evaluate perceived usability. More precisely, it provided three measures about system satisfaction, usability and learnability (Dhillon, Wünsche & Lutteroth, 2013). The estimated reliability was an alfa round .9. In this study the Cronbach's alfa of the SUS was .87. The SUS had ten items, each on a five-point Likert scale. The participant determined to what degree they agreed or disagreed with the stances. An example stance was: “I think that I would like to use this website frequently” (Appendix E). The tone of the odd-numbered items was positive and the even-numbered items had a negative tone (Lewis, Brown & Mayes, 2015). In the end of the questionnaire, the participant were asked to enter their SONA-identification number.

**Procedure**

The participants were invited through a website called SONA or were directly approached by a researcher. SONA is a system used by students from the first and second year for the participation in some studies. The participants did the experiment in a laboratory from the University of Twente, which was booked beforehand or at home. In the beginning, the participants were asked to sign the informed consent. Thereafter, they got an instruction form with a code to log in the online intervention, which was already visible on the computer screen. The researcher informed the participants about the possibility to ask questions at any time. Then she left the room. The participants were asked to read the introduction in the intervention, to go to “de stad van positieve emoties” (translated: the city of positive emotions) and to participate in two specific exercises. The participants in the gamified treatment could reach the city of positive emotions by clicking on an area on the map presented like a city. Before they could reach the city, they had to do the “uitdaging” (translated: challenge), where they wrote their expectations of the intervention down. The participants in the not-gamified version could find the city of positive emotions on a list. After finishing the exercises the participants filled in the questionnaires, whose link was already visible in the browser. Thereafter, the participants were given the opportunity to ask questions

or comment on the intervention. The researcher transcribed the SONA points to the participant for taking part in the experiment a few days later.

**Analyses**

First of all, the data was exported to SPSS to be analysed. Afterwards, the amount of exercises and words were count for every participant, written in the exercises in the online intervention, in order to measure the actual system use. The words from the challenge were counted separately for the sake of another investigator. The challenge was a different kind of exercise, because it contained questions about the expectations about the intervention. Therefore, the amount of words written in the expectation were excluded from the data analysis. Then, the data of some participants were excluded due to deviation. Caused by the structure of the exercises the amount of written words clearly differ. The two mandatory exercises provide a baseline to measure the actual system use. The recoding of item one, three, four, six, seven and nine from the revised Personal Involvement Inventory and the odd-numbered items of the System Usability Scale followed. Based on the sequence of the answer from “agree”, value one to “disagree”, value five, the items with a positive tone were recoded to connect the positive opinion of the participant to the higher value of the score. Afterwards, the Cronbach's Alpha was calculated for the revised PII and for the SUS to calculate the reliability of the scales and to measure how close the items of each scale are as a group. In addition, total scores of the SUS and the revised PII were made. Normal distribution was tested. The sample had a paranormal distribution, which is why a Mann-Whitney-U Test was conducted for the two different treatment groups to check the first and second hypothesis as well as the third hypothesis. Finally, a spearman correlation was calculated to answer the fourth to sixth hypothesis and measure the connection between the involvement and system use and usability and system use because the questionnaires had an abnormal distribution and one of the variables were ordinal.

## Results

The participants wrote between 30 and 469 words (Table 2). The average was approximately 154 words. Furthermore, six exercises were the maximum of completed exercises and two the minimum. The average was 2.55 exercises per participant (Table 2). By calculating the distributions of the rPII and the SUS both histograms showed a negatively skew (Appendix F). In addition, the Kolmogorov-Smirnov test ($p < .01$) and the Shapiro-Wilk test ($p < .01$) presented a significant difference to a normal distribution for the SUS. The results for the rPII were ambiguous. The Kolmogorov-Smirnov test screened a significant

difference to a normal distribution, $p < .01$, but the Shapiro-Wilk test did not show a significant difference, $p = .119$. Caused by the ambiguity of the test results, the histogram was used to decide whether the rPII had a normal distribution. Regarding the histograms (Appendix F) none of the questionnaires or system-use variables had a normal distribution.

Table 2

*Statistics, Including Mean Value (M) and Standard Deviation (SD)*

| | N | M | SD | Minimum | Maximum |
|---|---|---|---|---|---|
| Amount Words | 75 | 154 | 97.1 | 30.0 | 469 |
| Amount Exercises | 75 | 2.55 | 0.92 | 2.00 | 6.00 |

The Mann-Whitney-U Test was applied to test the first hypothesis with the version of the intervention as independent variable. The dependent variable was the rPII. The gamified-intervention group had a higher mean rank (M = 44.38) on the rPII (Table 3). In addition the Mann-Whitney U test (Table 4) indicated, that the difference in the Mean Ranks between the groups was significant, $U(73) = 445$, $p < .01$. That was consistent with the first hypothesis, which suggested that the participants using the gamified version had a significantly higher mean score on involvement than the participants using the non-gamified version of the intervention. Thus, the main hypothesis was examined to be true.

To test the second hypothesis, the Mann-Whitney-U Test was applied again (Table 3 & 4), to detect, whether the gamified-intervention group had a significantly higher mean score on system usability than the non-gamified-intervention group. The independent variable was the intervention version. The dependent variable was the SUS. No difference was found between the groups, $U(73) = 681$, $p = .840$. Therefore, the second hypothesis cannot be proven as true. The gamified-intervention group did not differ from the non-gamified-intervention group with regard to the perceived system usability.

The third hypothesis was also tested with the calculation of the Mann-Whitney-U Test (Table 3 & 4). The version of intervention as independent variable and the system use as dependent variable were utilized. The results did not show differences between the groups, neither in the amount of exercises, $U(73) = 629$, $p = .370$, nor in the amount of words as actual-system-use indicator, $U(73) = 580$, $p = .202$. These results were unsupportive to the

third hypothesis, which stood that participants in the gamified intervention had a significantly higher score on actual system use than participants in the non-gamified treatment.

Table 3

*Descriptive Statistics and Mean Ranks from the Mann-Whitney-U Tests*

| | Version of Intervention | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Gamified | | | | Non-Gamified | | | |
| | *n* | M | SD | Mean Rank | *n* | M | SD | Mean Rank |
| RPII | 40 | 1.67 | 0.30 | 44.4 | 35 | 1.86 | 0.35 | 30.7 |
| SUS | 40 | 1.42 | 0.20 | 37.5 | 35 | 1.43 | 0.29 | 38.5 |
| Amount Exercises | 40 | 2.65 | 1.03 | 38.76 | 35 | 2.43 | 0.78 | 35.99 |
| Amount Words | 40 | 166 | 16.6 | 41.0 | 35 | 139 | 14.6 | 34.6 |

Table 4

*Test Statistics of the Mann-Whitney-U Tests with Version of Intervention as Independent Variable*

| | Mann-Whitney U | Wilcoxon W | Z | *p* |
|---|---|---|---|---|
| RPII | 444 | 1075 | -2.71 | .007 |
| SUS | 681 | 1501 | -0.20 | .840 |
| Amount Exercises | 629 | 1259 | -0.89 | .370 |
| Amount Words | 580 | 1210 | -1.27 | .202 |

The fourth hypothesis suggested a positive connection between system usability and involvement. The Spearman correlation, testing the rPII and SUS (Table 5), indicated a significant, positive relationship, $r_s(73) = .48$, $p < .01$. The fourth hypothesis was therefore true. If a participant scored higher on system usability, he also scored higher on involvement and the other way around. The fifth hypothesis claimed a positive correlation between involvement and actual system use. The Spearman correlation (Table 5) with the variables rPII and the amount of exercises, gathered no relationship, $r_s(73) = -.079$, $p = .499$. Furthermore, the Spearman correlation with the variables rPII and the amount of words (Table 5) detected no relationship either, $r_s(73) = .19$, $p = .095$. These results were unsupportive to the fifth hypothesis. A participant, who showed a higher involvement did not write more

words or did more exercises and the other way around. Two Spearman correlations were used to answer the sixth hypothesis. The first correlation, testing the SUS and the amount of exercises (Table 5), found no relationship, $r_s(73) = -.11$, $p = .370$. The second Spearman correlation, examining the variables SUS and amount of words (Table 5), did not detect a relationship either, $r_s(73) = .10$, $p = .390$. These results were opposed to the sixth hypothesis, which stood that system usability and actual system use had a positive relationship. System usability and actual system use had neither a positive nor a negative relationship. Participants who scored higher on system usability did not score higher on actual system use and the other way around. Figure 2 presents the model after testing the hypotheses. Only the effect from gamification on involvement and the correlation between involvement and system usability could be verified by the second model.

Table 5

*Correlation Coefficients ($r_s$) and Significance of the Spearman Correlations*

| | | SUS | | | Amount Exercises | | | Amount Words | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | $r_s$ | *p* | *n* | $r_s$ | *p* | *n* | $r_s$ | *p* | *n* |
| Spearman's rho | RPII | .48 | .000 | 75 | -.079 | .499 | 75 | .19 | .095 | 75 |
| | SUS | 1.00 | .000 | 75 | -.11 | .370 | 75 | .10 | .390 | 75 |

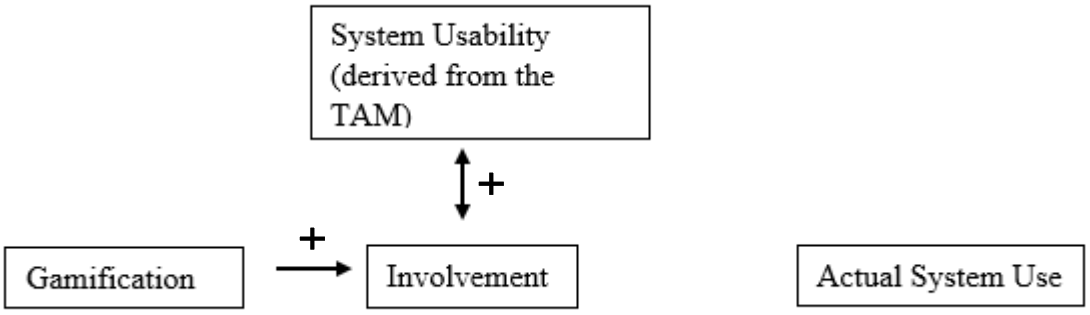


*Figure 2.* Schematic of the Model of the Connections Between the Variables After Testing the Hypotheses

## Discussion and Conclusion

### Hypotheses Interpretation

Positive psychology online interventions are used more and more often and have many benefits such as reaching many people who could not effort to go to a psychologist. But there are also drawbacks. One important drawback is the high drop-out rate and the decreased adherence of the patients. The goal of this study was to explore to what degree gamification contributes to the effect of an online intervention in contrast to the same intervention without gamification. In addition the goal was to find out to what extent gamification can be treated as a solution to high drop-out rates in online interventions. The focus lied on the involvement, the system usability and the actual system use of the participants in the two different treatments.

The experimental results supported that the gamified-treatment group scored higher on involvement than the non-gamified-treatment group. Hence, gamification raised the degree of involvement that participants showed during the experiment. These results hold consistence with the research conducted by Buckley and Doyle (2014) about a gamified learning intervention. They concluded that gamification has a positive effect on involvement and participation. The higher involvement of the participants in the gamified treatment addresses the feeling of higher relevance and motivation (Zaichkowsky, 1994) emanating from the gamified intervention opposed to the non-gamified intervention. Suler (2000) criticizes, that counselling in online intervention shows difficulties based on the absence of an expert. The gamified intervention may provide a motivational aspect through the existence of an expert character that gives instructions. This character could offer a solution to the feeling of the absence of professional guidance and, however, could motivate the participant, because he feels connected to an expert.

Furthermore, the results gained in this study also support the existence of a positive correlation between system usability and involvement. Hence, if a person scored high on involvement, he also scored high on system usability. According to the Technology Acceptance Model (TAM), an overlap is found between involvement and system usability because both are marked by the perceived usefulness, the ease of use and the relevance a participant recognizes in working with the intervention. Contrarily, participants in the gamified treatment did not score higher on system usability or on actual system use. Additionally, neither involvement nor system usability showed a connection to actual system use. Based on the higher score of the gamified-intervention group on involvement and

involvement correlated with system usability, it was expected that the gamified-intervention group scored higher on system usability as well. Contradictory to this expectation, no difference was detected between the scores of the intervention groups on system usability. A possible explanation can be found in the definitions of the constructs involvement and usability. According to Dhillon et al. (2013), the system-usability scale measures not only perceived usability as involvement does by looking at the "utilitarian motive" (Zaichkowsky, 1994, p. 60). In addition, usability also measures system satisfaction and learnability (Dhillon et al., 2013). This raises the possibility that involvement and usability only correlated, because they measured partly the same.

The intervention groups might not differ in system satisfaction and learnability, the other two constructs, measured by the System Usability Scale. Therefore, it was possible that involvement and usability correlated but did not show the same effects on the gamified-intervention group. Another possibility could be the lack of difference concerning the complexity, the satisfaction and learnability of the two intervention versions, which resulted in insignificant difference between the groups. Regarding the higher scores on involvement, it can be said that the gamified version produces an increased feeling of perceived usefulness, one construct of the system usability. In addition, the contents of the exercises in both versions are exactly the same which suggests an equality in learnability. The possibility remain very likely that the participants in the gamified treatment showed a higher perceived usefulness, based on the higher involvement scores, showed an equal learnability as the non-gamified group and at the same time were also more confused by the design of the gamified intervention which decreased the system satisfaction. The confusion could be based on the map-like design, in which the participants need to search the cities to do the exercises. Opposed to the non-gamified intervention where all cities were list and therefore easy to find. As a consequence, an equal total score on system usability for both groups was detected.

None of the constructs, version of intervention, involvement and system usability correlated with actual system use. These results were incompatible with some sources. On the one hand, Vicente et al. (2014) found out that gamification has a positive effect on adherence, which cannot be supported by this research. On the other hand, system usability and involvement are mirrored by the perceived usefulness, the attitude towards the use and the ease of use according to the TAM. These three construct result in actual system use (Mathieson, 1991), which is also not supported by this study. These contradictions result in two considerations. First of all, a possible assumption is that the TAM is not an appropriate

example model to analyse these constructs, because involvement and system usability are not the same as the perceived usefulness, the attitude towards the use and the ease of use described by the TAM but rather similar. It is considered that the constructs involvement and system usability are not extensive enough to predict actual system use. There can be more constructs, which are important to secure actual system use. According to Mathieson (1991), the behavioural intention towards the use also predicts the actual system use. If a participant does not intend to use the intervention in the future, because he or she does not expect for example better work performance or life satisfaction by doing so the system use lowered. The second consideration is that the actual system use was not measured appropriately. The amount of words and exercises written during only one one-hour session could be an invalid indicator for actual system use on a longer run. Based on the literature which suggests an effect of gamification on actual system use (Vicente et al., 2014) there is a high probability that the second consideration may be confirmed in this study.

**Limitations and Strength**

There are some factors, which can influence the scores on involvement, system usability and actual system use in both versions of the intervention. Firstly, involvement is also partly influenced by the characteristics of the participant and the characteristics of the given situation (Zaichkowsky, 1994). Only a part of the involvement score is therefore defined by the characteristics of the stimulus, the online intervention.

Secondly, the actual system use can be influenced by some aspects. If a participant wants to finish earlier to go home, he probably only does the mandatory exercises. In contrast, many participants are friends with the researchers and want to help them by providing good data. Therefore, the participants are expected to take the experiment seriously. Another important influence is connected to the instruction form the participants used during the experiment. Many participants do not read it attentively, so they are unsure about mandatory and voluntary exercises. This could be observed by the researchers, who were asked often about how to get to the mandatory exercises or heard the participants talk about the obligation of all exercises. Another aspect, which possibly influenced the actual system use are the personality traits of the participants. On the one hand, some participants were not interested in what they were doing and stated, that despite the good format of the intervention, they would not have needed it. On the other hand, some participants seemed to be fascinated by the intervention and the different exercises which target to enhance the well-being. They wanted to reach other cities to find out what kind of exercises comes next and asked whether it is

allowed to use the intervention at home, too. Thus, if a participant is sensation seeking or interested, he could investigates more time and thereby does more exercises like it is expected by the researcher.

Finally, the system-usability score can be influenced by the knowledge about technology. If someone rarely works with websites and online games before, the intervention can seem more complex than for students for example who need to use the internet for the university, use apps on the mobile phone or play computer games as a hobby. All these factors might have influenced the scores of the tests. They were, however, present for both groups. Therefore the influence is limited to the height of the scores and probably do not influence the relationship between the intervention groups on the scores. They, hence, do not mislead the results in a significant way. This leads to another important topic, called external validity. Most of the participants were students and/or about 23 years old. All of them could speak Dutch and were Dutch or Germen. Although some participants were not students and had a higher age, the results of this study are mainly valid for students or young adults. The external validity is therefore relatively low. The focus group therefore needs to be limited to young adults to interpret the result with a higher external validity.

Although its importance to emphasize the limitations of this research, it is also important to point out the strengths and contributions as well. The first strength of this research is the intervention. Both versions of the intervention only differ in the design elements. The texts and exercises are equal in both version, whereby the gamification effect can be reached in the most effective way. The intervention can also be reached by a smartphone, whereby the practical use of the intervention is made easier as most people have a smartphone today. The other measuring instruments also constitutes a big part of the positive aspects of this research. The validity of the scales are very high. Therefore, the necessary security of exact measuring is given. There were only few missing values, which improve the validity of the analyses. Apart from that, the standardized environment where the experiment was conducted was similar for each participant. Therefore no external distraction could influence the results. The most important strength of this research is that it filled the gap in the given literature, regarding the pure contribution of gamification in online interventions. No known research can identify the effect of gamification in a positive psychology online intervention in comparison to the same intervention without gamification elements. Until now, gamified interventions were seen as effective but it was unknown to what degree gamification was the effective part in it.

**Further Research and Recommendation**

The intervention gains a lot of data, which can be used in further research. Especially the comments the participants wrote about possible improvements in the end of the experiment, can be interesting to analyse. They can give an impression about the variation of complexity of the use, which is difficult to detect by analysing the SUS. Furthermore, the comments contain important data to improve the interventions, regarding the exercises and the design. The variable actual system use could be misleading in this research. This variable can be improved by measuring the actual system use of a participant in more than one session. To review the adherence of the participants for one month would give a more precise description of the drop-out rate and adherence rate of the participants on a longer time line. Wangberg et al. (2008) found high drop-out rates during the first month. This shows that the first month can already be a good indicator.

In addition, further research is recommended to define more factors, which could influence the actual system use. Involvement is assumed not to predict actual system use in this research although it would have been expected regards to the TAM (Mathieson, 1991). To define other important factors like the behavioural intention towards the use (Mathieson, 1991) in further research and to use an extended system-use score can provide more precise information about the way these factors influence each other and contribute to actual system use. The personality traits of the users could also be influencing factors regarding the actual system use and should be considered in a more extensive way to address the needs of the users and to enhance the actual system use as well.

This intervention can be used by patients as well as non-patients of mentally illness. To examine the effect of gamification on patients it would be important to involve them as participants. In addition, the intervention is available via a website. It would be possible to reach it with a mobile phone but it would be easier for the attendee, if there was an app which is designed for a smartphone. This can improve the ease and frequency of use of the intervention, because it would be easier to reach and the attendee would be reminded every time he or she looks on his or her mobile phone. Furthermore, the app could let messages appear on the mobile screen to remind the user directly to use the intervention.

**Conclusion**

The goal of this study was to measure the effect of gamification and to determine to what degree it contributed to the effectiveness of an online positive psychology intervention.

The goal is achieved. Gamification is explored to have an effect on involvement. Some sources, like the TAM (Mathieson, 1991), examine that involvement has an effect on actual system use and adherence. Although no correlation could be found between gamification or involvement and actual system use caused by the misleading system-use variable in this research, the gamified intervention shows higher influence on involvement than the non-gamified intervention, which is important to secure adherence. Gamification can be the solution for the huge adherence problem in online interventions. The valuable data and insights of this study should be used to fill the gap in the given literature and to help to revolute the positive psychology online interventions in an effective way.

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# Appendix

## Appendix A: Informed Consent
## Toestemmingsverklaring

**Voor deelnemers aan het onderzoek naar de korte termijn effecten van de positief psychologische interventie 'Dit is jouw leven'**

- Ik verklaar hierbij voldoende te zijn ingelicht over de aard, methode en doel van het onderzoek.
- Ik heb voldoende tijd gehad om over mijn deelname na te denken. Ik ben in de gelegenheid geweest om vragen te stellen. Deze vragen zijn naar tevredenheid beantwoord.
- Ik weet dat mijn antwoorden enkel worden gebruikt voor wetenschappelijk onderzoek.
- Ik weet dat de gegevens en resultaten van het onderzoek alleen anoniem en vertrouwelijk aan derden bekend gemaakt zullen worden.
- Ik stem geheel vrijwillig in met deelname aan dit onderzoek. Ik behoud me daarbij het recht voor om op elk moment zonder opgaaf van redenen mijn deelname aan dit onderzoek te beëindigen.

Naam deelnemer: _____ Handtekening: _____

SONA nummer: _____

Plaats: _____ Datum: ____– ____– _____

## Appendix B: Instruction Form

### Instructieblad voor deelnemers

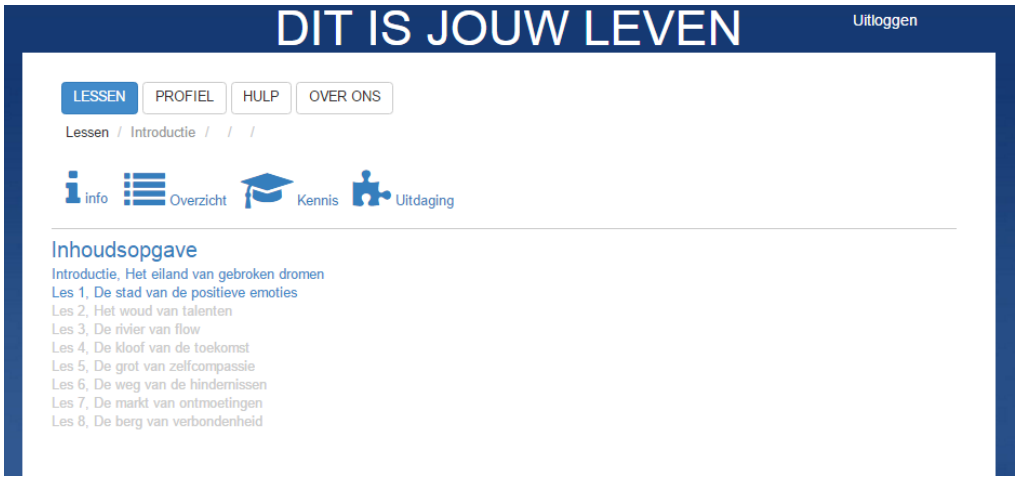
Welkom bij het onderzoek naar de korte termijn effecten van de positief psychologische interventie “Dit is jouw leven”. Hieronder staat stapsgewijs uitgelegd wat je moet doen.

1. Neem plaats achter de laptop.
2. Ga naar de website www.ditisjouwleven.com. Deze staat reeds klaar in de browser.
3. Log in met het onderstaande inlogaccount en wachtwoord.

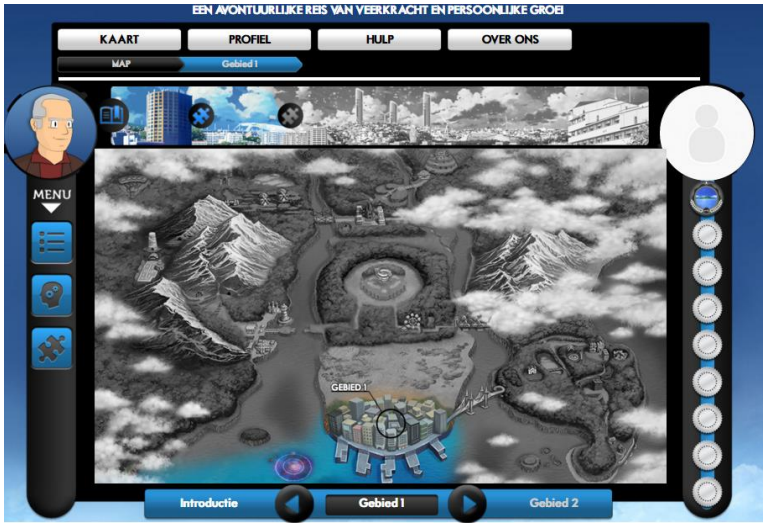
   **Inlogaccount: testXX@utwente.nl**
   **Wachtwoord: testtestXX**

4. Lees de introductie.
5. Ga naar de “stad van positieve emoties”.
6. Doe minimaal de volgende 2 oefeningen: “drie goede dingen-oefening” en “schrijven over positieve herinneringen”. Je hoeft deze oefeningen maar één keer te doen, neem daarbij telkens de *vorige dag* als uitgangspunt.
7. Vul de vragenlijst in via https://goo.gl/loNrTT. Deze staat reeds klaar in de browser.
8. Als je alle stappen (1 t/m 7) doorlopen hebt, lever dan het instructieblad in bij de onderzoeker(s).

## Appendix C.1: Not-Gamified Positive Psychology Intervention



## Appendix C.2: Gamified Positive Psychology Online Intervention




## Appendix D: Revised Personal Involvement Inventory (PII)

**Revised Personal Involvement Inventory**

To me (object to be judged) is:

| | | | |
|---|---|---|---|
| 1. | important | ___:___:___:___:___:___:___ | unimportant* |
| 2. | boring | ___:___:___:___:___:___:___ | interesting |
| 3. | relevant | ___:___:___:___:___:___:___ | irrelevant* |
| 4. | exciting | ___:___:___:___:___:___:___ | unexciting* |
| 5. | means nothing | ___:___:___:___:___:___:___ | means a lot to me |
| 6. | appealing | ___:___:___:___:___:___:___ | unappealing* |
| 7. | fascinating | ___:___:___:___:___:___:___ | mundane* |
| 8. | worthless | ___:___:___:___:___:___:___ | valuable |
| 9. | involving | ___:___:___:___:___:___:___ | uninvolving* |
| 10. | not needed | ___:___:___:___:___:___:___ | needed |

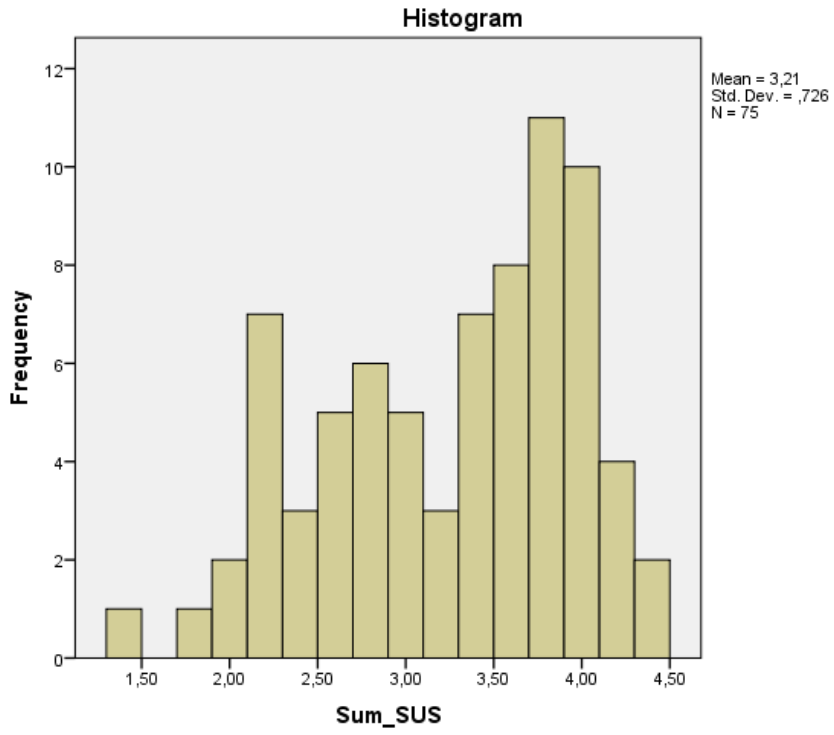
* indicates item is reverse scored.

## Appendix E: System Usability Scale

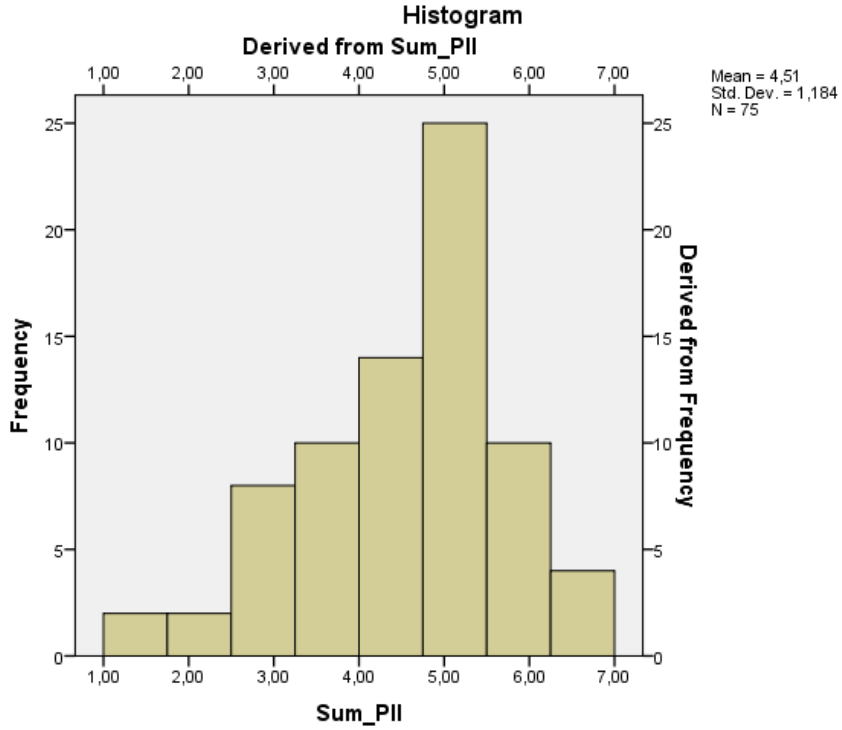
| | The System Usability Scale<br>Standard Version for Websites | | Strongly Disagree | | | | Strongly Agree |
|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 5 |
| 1 | I think that I would like to use this website frequently. | | O | O | O | O | O |
| 2 | I found the website unnecessarily complex. | | O | O | O | O | O |
| 3 | I thought the website was easy to use. | | O | O | O | O | O |
| 4 | I think that I would need the support of a technical person to be able to use this website. | | O | O | O | O | O |
| 5 | I found the various functions in this website were well integrated. | | O | O | O | O | O |
| 6 | I thought there was too much inconsistency in this website. | | O | O | O | O | O |
| 7 | I would imagine that most people would learn to use this website very quickly. | | O | O | O | O | O |
| 8 | I found the website very cumbersome to use. | | O | O | O | O | O |
| 9 | I felt very confident using the website. | | O | O | O | O | O |
| 10 | I needed to learn a lot of things before I could get going with this website. | | O | O | O | O | O |

FIG. 2. The System Usability Scale questionnaire.

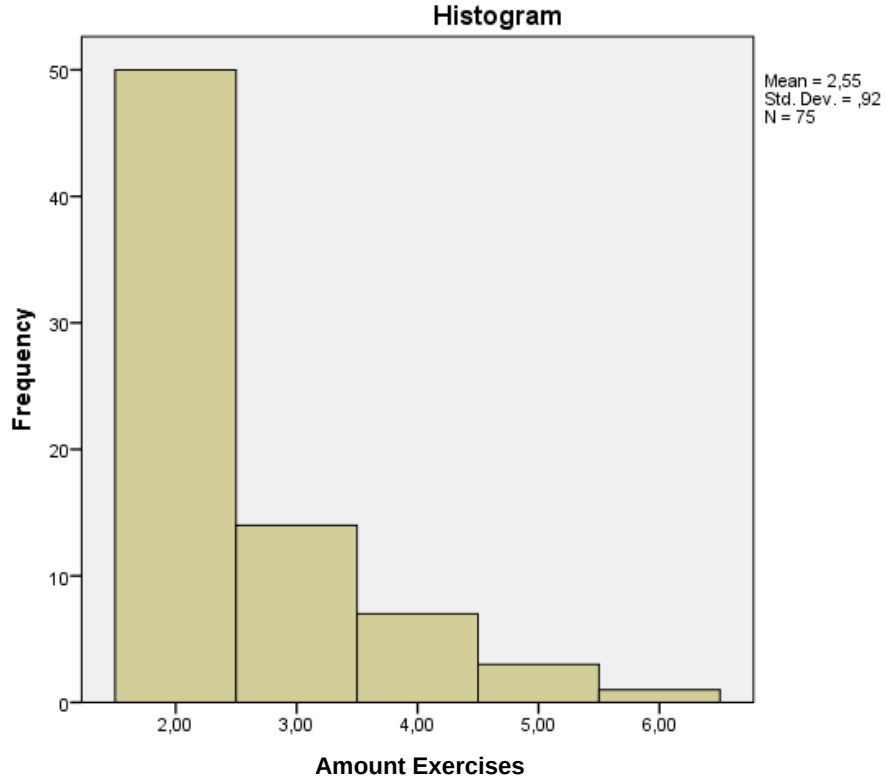
## Appendix F.1: Histogram SUS



## Appendix F.2: Histogram RPII




## Appendix F.3: Histogram Amount of Exercises



## Appendix F.4: Histogram Amount of Words