A New Approach to Reducing the Negative Effects of Social Media on The Well-Being: Profile Badges

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ABSTRACT

Various studies have failed to reduce the negative effects of social comparison on social media on the well-being of users with an intervention. This design science paper aims to improve on existing knowledge, by creating and testing a new solution: Profile Badges. The effectivity of the badges is tested in a Between-Samples experiment, conducted with 40 female participants in the Netherlands. The negative effects of social media were reduced in the group that saw the profile badges. Limitations of the study were a small sample size, the influence of nationality, and the influence of the setup of the experiment. Contrary to previous studies, the negative effects of social comparison were reduced in either the more often comparing, as in the less often socially comparing individual. This indicates that Profile Badges are a proper new approach in reducing the negative effects on the well-being of social media. This paper provides new insights, methods, and a design for an intervention, for both researchers in the field of Human Computer Interaction and Psychology, as for social media sites that want to reduce the negative impact of social media on the well-being of their users.

1 INTRODUCTION

Social networking sites are used by 90% of the adults in America between 18 and 21, and 92% of the Americans between 13 and 17 uses them. In Europe, the statistics are equal[6]. Not having social media is more an exception rather than the norm [12]. Social media, which are sometimes also referred to as 'Social Networking Sites', have become a standard.

The characteristics of various social media are similar. In papers, they are described as systems in which users interact with each other [5]. Often, users have a profile within the system, with which they can connect to other profiles [3]. Well known social networking sites are Instagram, TikTok and Facebook.

There is an ongoing debate about the influence of social media on the well-being. Where the adverse effects are often highlighted. The most common negative effects are generalized anxiety disorder and depression [5]. Others are a lower self-esteem, increased amount of envy, and missing out on valuable 'real time' with friends [10].

Multiple studies researched the cause of reduced well-being due to social media. One study found that the effects on the well-being differ per platform, where Instagram, which is especially focused on making new contacts, contributed to more depression. On the contrary, Facebook lowered depression rate [10], while being more focused on closer contacts. Other potential causes of a reduced well-being are a high proportion of weak ties [10,18], more content showing similar people regarding demographics (age, wealth, gender), being an adolescent or teen [4,17], being a passive user [18]

and seeing much positive content [4]. However, most studies conclude that (upward) social comparison is the major mediating link between a reduced well-being and social media use [10,15,17,18].

Social comparison is the activity called after the behavior of people to compare their own life to that of someone else [4]. Despite that social comparison is normal behavior of humans, it can be problematic once an individual is exposed to a high number of opportunities to engage in upward social comparison, which often happens on social media [4]. It is hard for someone to not compare their life to the photos of their peers with all their friends, the travel pictures, the models on Instagram, the outstanding lifestyles, and the talents of people when they scroll through a social media feed.

The effects social comparison are apparent in various studies which research the effect of social media on the well-being. So did one study find that usage of multiple social media increases the negative affect. A socially comparing individual however, would have a 33% higher increase of negative affect.[18]. Another study found that Facebook increased the negative affect in people, however, if they controlled the variable of social comparison, no increase of negative affect was present at all, which is a strong indicator that social comparison is the major mediating link between a reduced well-being and social media usage.

Besides studies measuring the impact of social media on the well-being by scales, users of social media also report themselves that they are negatively affected by social media. In a study, where participants were shown content which is likely to cause upward social comparison, 29% of the participants reported that they felt quite a bit worse, 34% felt worse for less than half an hour, and 37%(!) felt worse for a day or more. 45% wished afterwards that they had not seen the posts [10].

Since many studies have found that social comparison is the major mediating link between a reduced well-being and social media use, several approaches to reducing social comparison have been designed and tested. So did one study test adding primes on positive posts and the effect of showing negative posts [17]. This study managed to reduce the negative affect in teens with high self-reported social comparison, however, the negative affect of teens with low self-reporting social comparison was higher. Also, adding negative posts, to reduce upward social comparison, did not show to be effective [15,17]. Despite, none of the interventions has shown to be effective in reducing the adverse effects of social media, wherefore users are still subject to the negative side-effects of social comparison.

However, the search for a suitable intervention should not be halted. Previous studies contained multiple flaws, which gives room for improvement. This study addresses those flaws and proposes a new solution: 'Profile Badges'. The badges have been

created to improve on previously tested interventions, after which it was created and tested. This resulted in a reusable design, and design principles, for an intervention to reduce the adverse effects on well-being due to social comparison, which can be applied by social networking sites, to improve the well-being of their users.

The effectivity of the Profile Badges were examined with a between samples experiment. Two research questions, formed the basis of the experiment:

- o   Research Question 1 (RQ1): 'Is the well-being of female students who see profile badges differently affected than the well-being of those who did not?'
- o   Research Question 2 (RQ2) : 'If any, what is the difference in the effect of the Profile Badges between individuals who socially compare more and individuals who socially compare less?'

The research questions led to the following hypotheses:

- o   H1: 'The well-being of female students who saw the Profile Badges, was less affected (negatively) than the well-being of those who did not.'
- o   H2: 'The profile badges are not negatively affecting people who socially compare less, while having a positive impact on people who socially compare more.'

2 METHOD

This study follows a design science research approach. Since this study develops a new solution for a known problem, it could be seen as 'improvement' research, according to the paper of Gregor and Hevner, in 2013. This type of research typically examines existing literature, after spotting an opportunity for a new solution. The knowledge is translated into an artifact, after which the artifact is validated. Desirable test outcomes could lead to new principles or artifacts, which can be used for further research, or implemented [8].

2.1 Literature search

Following the design science approach, the research started with a literature search, in which existing knowledge was examined. Scopus and Google Scholar have been used to search for literature. The topics examined were the negative side effects of social media, the role of social comparison, other influences on negative effects, interventions tested, content labelling, and badges.

2.2 Design of the Profile Badges

The literature search gave input for the design of the Profile Badges, which in itself did, and could not take much time (< 2 days). The icons used, come from the platform Canva [19]. The design of the profile badges relies on requirements, which stem from the existing knowledge.

2.3 The experiment

In December 2022, an experiment was conducted to test the effectiveness of Profile Badges. Despite that the behavior of social comparison occurs more in teens below 18, thus high-school students [4], it was chosen to conduct the experiment at the University of Twente, where the researcher studies as well, due to the short available timespan of three months.

It was chosen to conduct the research with only female students for three reasons. Firstly, females engage more in the behavior of upward social comparison [14]. Secondly, it was assumed that females were more open to participate in an experiment regarding the topics of well-being and social media. Lastly, narrowing down to one gender, removed the effects of gender on the study results, which increases the chances of finding significant results when measuring the independent variable in the small research sample.

The study included 40 participants, aged 18 to 26 (mean=20.7), all studying at the University of Twente. In the research sample, 16 different nationalities were represented, where the majority came from West- and East-Europe. The selection of participants was done randomly, by approaching people in a study center. To attract participants, they were given an option to take part in a lottery for two cinema tickets. Before conducting the experiment, it had been reviewed by the University of Twente Ethics Committee, to ensure that it met ethical standards.

The effectiveness of the Profile Badges was tested in a Between-Samples experiment. Based on a flip of a coin, the participants were randomly assigned to either the control group, or the experiment group.

The setup for both groups was the same. Participants could take place at a table in a quiet, public room, at the university. At the table lied a mobile phone, a laptop, and a booklet. The participants were guided through the experiment by a Google Form, to minimize the effect of the researcher being present. The form was presented on the laptop.

The order of the experiment is as follows (See Table 1). Before starting the survey, the experiment group received a sheet, on which the icons and their warning texts were printed. They were asked to read through them, for two minutes, so that they could remember the messages. The control group did not receive this sheet. Both groups were asked to watch a video of the prototype on the mobile phone. The control group saw a video of an Instagram feed without profile badges, and the experiment group saw the same video of that feed with the Profile Badges.

40 participants		
20 in experiment group	20 in control group	
Get badge descriptions		
Both	PANAS	Activities
Video with intervention	Video without intervention	
Both	PANAS	
Both	INCOM + systematic factors	

Table 1. From top to bottom, the chronological order of steps which the participants performed is presented. When a task covers the full width of the table, it had to be performed by both the experiment group and the control group.

2.4 Surveys

Before and after viewing the video, the participants had to fill out a survey which measures their well-being. This survey uses the

Positive Affect Negative Affect Scale (PANAS), which is a frequently used scale in Social Sciences. The scale consists of ten words which represent positive feelings, and ten words which represent negative feelings. The respondents had to indicate per word how much the described feeling describes their state at that moment. Where they can choose from 5 Likert-scale options [16].

After the experiment, the participants were also asked about their tendency to engage in social comparison in their daily lives. To measure this, a shortened version of the INCOM was used [4].

Lastly, the participants were asked about their age, nationality, study, and opinion about the intervention (if applicable).

2.5 Prototype

To test the effectivity of the profile badges, they had been added to an Instagram feed. This was done by copying content from a real Instagram feed into a prototype on Figma [20].

Instead of letting users scroll themselves, it was chosen to let the participants watch a video of the feed. This, because the well-being of a user can be subject to the time spent on watching the news feed or watching certain posts. By making a video, scrolling is done at the same pace for every participant. The video lasted 4 minutes, every participant had to watch it until the end.

In the prototype, the badge name was added to the interface, to aid the participants in recognizing the meaning of the badge. In a practical setting, this would probably be excluded, to reduce the impact on the interface (See Figure 1).
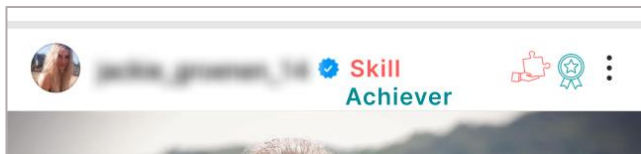

Fig. 1. The profile badge on an Instagram profile (upper-right corner)

2.6 Analysis

To analyze the data, SPSS has been used, which is a tool for statistical analysis [9]. The data has been analyzed on significant differences between the control group and the experiment group. Results with a p-value lower than .05 are considered significant, results between .5 and .10 are considered somewhat significant. Multiple statistical tests assume a normal distribution of the data. Since the sample size was relatively small (40), there is an increased probability of a deviation from a normal distribution. To determine the appropriate statistic test, the distribution of the data has always been examined first, using Q-Q plots, histograms, and the Shapiro-Wilk's test.

Firstly, the influence of covariates was measured. A preferred method to analyze the influence of covariates as age, time on social media and nationality is a multiple regression analysis. Since not all covariates were normally distributed, multiple regression could not be used. Therefore, alternative methods have been used to measure the influence of covariates, such as One-Way ANOVA, T-Tests and Mann-Whitney U tests.

The variables of interest were the Positive Affect and Negative Affect, which were measured by the PANAS scale. The majority of the statistical tests were performed on a composite of the positive or negative affect before (PAB and NAB respectively) and the positive or negative affect after (PAA and NAA respectively)

watching the video. This composite was created by subtracting the affect after the video, from the affect before, which resulted in the variables PABminPAA and NABminNAA. However, statistical tests have been performed as well on the results of the affects before and after separately, thus without using the composite.

To answer the RQ1, the difference between the control group and the experiment group is the subject of interest. In case the samples were normally distributed, significant differences between samples were examined with an Independent T-Test's. When comparing a situation within one sample, which was normally distributed, the Paired Sample T-Test was used. If the data was not normally distributed, the Mann-Whitney U Test was used to find significant differences between two samples. The data was split on the question SETUP, which determined whether the participant was in the control or the experiment group.

To answer RQ2, part of the analysis was examining what correlations exist in the research sample. When the data was normally distributed, a Bivariate Correlation Analysis was performed using the Pearson's Correlation Coefficient. If not, the correlation analysis used Kendall's Tau as correlation coefficient. Also, differences in the influence of the badges on well-being between low-scoring and high-scoring individuals on social comparison behavior have been examined with a Mann-Whitney U-Test.

3 LITERATURE REVIEW

3.1 Social comparison on social media

A considerable contributor to the problem of social comparison is the positivity bias on social media, which implies that social media give a more positively biased view on the situation of the life of others[17]. This results from the behavior of humans to disclose more positive than negative information about themselves. Therefore, it is easy to fall into the trap of making an unjust conclusion that someone else is more popular or fun, which results in a lower self-esteem and a lower well-being.

Despite that social comparison causes problems on social media, it is natural behavior of humans. Especially for teens and adolescents, social comparison is a way to define who they want to be [17]. Thus, filtering out content, could not be a desired intervention [4].

What on the other hand could be a resource for an intervention, is the awareness of users. A qualitative study learned that individuals who often engage in social comparison, see the content of a poster on social media as a representative of their real life, while individuals who do not engage in this behavior tell that they are aware of the skewness of the posts [17].

3.2 Design theory about badges

Badges nowadays are used commonly in games and online platforms and forums. Their purpose is often to motivate and steer behavior. It is also a way for other users on the platform to quickly see what the status is of a person they interact with. Thus, badges are also a means through which people present themselves.

A badge has multiple functionalities. Firstly, it is a visual summary of skills and achievements of someone. Secondly, people tend to work for a badge. Often, a badge is earned when someone performed an activity at a certain level or frequency. Once users are

getting close to the required boundary to receive the badge, they tend to increase their engagement in the activity [1]. Thirdly, badges can be a way of pro-active self-maintenance. By earning badges, people try to compete with their peers [11]. In this way they, sometimes unconsciously, maintain certain behavior, and thus also themselves.

3.3 Previous interventions

Earlier research has tested whether adding a prime reduces the adverse effects of social media on the well-being. On the highlight reel of others' social-media posts, they added a text to remember that the content was positively skewed, and that the profile owner had bad days as well. Despite reducing the negative effects on well-being in individuals engaging more in social comparison, individuals who engaged less, had a higher level of negative affect than when they would not see the intervention [17].

In regular media, such as television or billboards, labelling was common practice, to make consumers aware of something, such as body image. So did traditional advertisement campaigns sometimes come with warnings when photoshop had been used. Though, most studies researching the effectiveness of such warnings, did not show any improvements in body image of participants [7].

Also, labels have been used to reduce body dissatisfaction on social media. One study, let the poster of the content add warning messages, such as: 'I took many photos before the right one was shot', or 'I had acne here, this is a lot of makeup'. Despite telling the user that the content is positively biased, the study did not find any improvements in body image of consumers. On top of that, an adverse side-effect of this approach was, that users developed a negative attitude towards the content creators. This negative attitude was most likely because of the controversy of the content makers, warning their followers for their own behavior [7].

Lastly, it appears that reducing social comparison behavior, or the negative side-effects thereof, is not an easy objective. Tiggeman stated, in 2022, that multiple factors could contribute to the absence of an effective intervention in reducing the negative side-effects of social comparison. Firstly, social comparison is automatic behavior. Secondly, women might look for certain 'positively skewed' content on purpose. And lastly, an image says a thousand words. The viewer gets attracted to the pictures, and easily skips over the priming message[13].

4 REQUIREMENTS

This paragraph describes the interpretation of the existing knowledge, which is the basis for the creation of the requirements which have been created for the Profile Badges, where the goal is to improve on existing solutions and knowledge, by reducing the negative effect of social media on the well-being.

4.1 Social comparison

Social comparison is frequently seen as the major contributor to a lower well-being after social media usage. Thus, to improve well-being of the users, social comparison behavior must be reduced, which will be the aim of the intervention.

4.2 Interpretation of previous studies

A potential problem with previous studies, is that the priming messages might have been implausible. The messages in the

experiments were added as if the content poster would have added them themselves. It might raise doubt, when the poster of a post adds the message: 'I looked bad here but modified the picture to look good'. Not only do consumers of the content perceive the content maker as untrustworthy, users also develop a negative attitude towards the poster; 'Why post it if you are aware of the problems such content raises?'. Moreover, because of the length of messages, they had a considerable impact on the interface if they are placed above, or under the messages. Also, the posts had a slightly negative tone. Which might have contributed to worse, or less entertaining time, when consuming content. Thus, I perceive several flaws in previous interventions, due to which users might have felt less positive, or more negative, even when their social comparison might have been reduced due to the intervention. A more subtle, and positive approach might be desired, where someone else than the poster labels the content.

4.3. Usage of badges

Previous literature about the use of badges, state that users are often increasing the engagement in a behavior when they are closer to the boundary of receiving a badge. Therefore, it could be that labelling posts which raise social comparison behavior, comes with the negative side-effect of an increasement of those posts. Although I believe that this behavior can indeed occur, I do not see it as a problem. Since users can determine who to follow and who not, the labelling of content allows them to easily filter out content they do not like to see. And thus, the side-effect of badges do have to be perceived as a problem. Secondly, with assignment rules, or a proper algorithm, this behavior can be reduced as well.

4.4 Requirements

The interpretation of the previous knowledge led to the following requirements for an intervention to reduce social comparison and its adverse effects on the well-being of social media users. The system should:
- o   Mitigate or stop the negative effects of social media on the well-being
- o   Have a positive effect on people who tend to socially compare more, while not negatively affecting people who socially compare less
- o   Enable users to ignore the intervention if they do not need it
- o   Not be ashaming for someone who received a profile badge
- o   Not contribute to make social media a negative experience
- o   Not let the content creator label their own content

5 PROFILE BADGES

The requirements led to the intervention called Profile Badges (See Figure 1). The badges are added to a profile when posts of a certain category are made by a determined frequency. The list of categories defined are achiever, promoter, traveler, happiness, real-life, skill and beauty (See Figure 2). For each category, there is a warning for users, focused on why it is not fair towards themselves to socially compare to the profiles. The users can access the warning message by clicking the icon in the interface. The advantage of this approach

is, that the prime is subtle, though recognizable for the people who (want to) benefit from it. So, people who report low on social comparison can ignore it, and people who report high on social comparison can pay attention to it.

Each badge comes with a warning message (See Appendix 1). The messages warn the user of the kind of content, and how it might raise social comparison behavior. The warning messages are written with a positive tone. This should prevent a reduction of entertainment on social media. Also, should it prevent that having a profile badge on their profile is ashaming for the content maker.
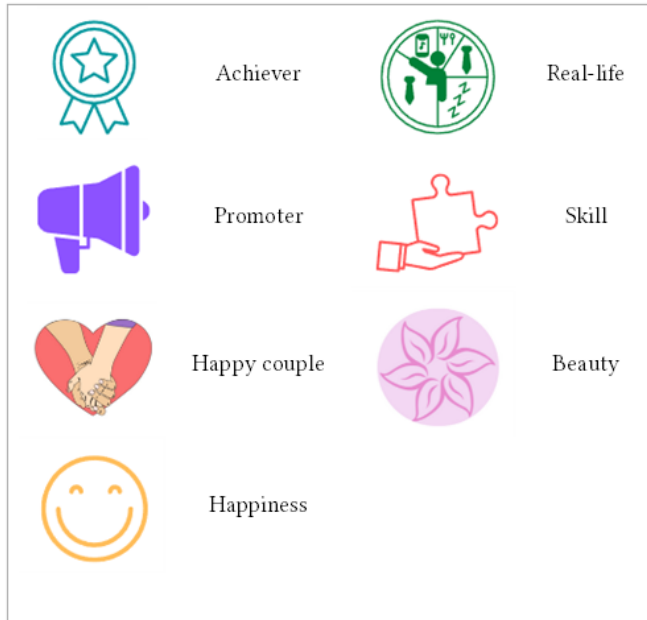

Fig. 2. The profile badges and their names.

5.1. The design process

Due to the short timeframe, it was not possible to think through all the details of the intervention before testing. Therefore, the goal was to create a minimum viable product within a timespan of a week. Currently, the icons come from Canva.com, which is a tool for creating presentations, brochures, and more. Despite, it is allowed to directly use the icons in a social media design, according to the terms and conditions in February 2023. Thus, the Profile Badges can be copied and used [19].

6 EXPERIMENT RESULTS

6.1. Abbreviations

In the results section, various abbreviations are used to ease reading for :Positive Affect (PA), Negative Affect (NA), Positive Affect Before (PAB), Positive Affect After (PAA), Negative Affect Before (NAB), Negative Affect After (NAA). In the PAB and NAB, 'before' means that the variable is measured before the participant watched the video. In the PAA, and NAA, 'after' means the variable is measured after the video watched the video.

Also, two composite variables have been used in the majority of analyses, which are the PABminPAA and the NABminNAA. PABminPAA is retrieved by subtracting PAA from PAB.

NABminNAA is retrieved by subtracting NAA from NAB. Thus, if participants have a higher NABminNAA, this means that their negative affect has decreased while watching the video. If someone has a higher PABminPAA, this means that their positive affect has decreased while watching the video.

6.2. Reliability of scales

The PANAS is used to measure the positive and negative affect. A shortened version of the INCOM was used to measure how often someone compares in their daily lives. The results of the INCOM are measured in the composite variable 'DailySocialComparison'. Firstly, the scale reliability was examined with Cronbach's alpha. A scale would usually be perceived as reliable if the Cronbach's alpha is higher than 0.7. The PANAS was used for four measures, namely the positive affect before PAB, PAA, NAB, and the NAA. Cronbach's alpha of all four measures had been calculated and was higher than .8 for all measures, with an average alpha of .85. The DailySocialComparison did not seem to be reliable with a=.558. Therefore, two questions have not been included to measure daily social comparison, to increase the reliability to a= 0.660. This was considered to be sufficient because the questions are not measuring exactly the same behavior, and therefore it might be that answers differ, which might cause a reduction of the Cronbach's Alpha. However, they both are related to social comparison, wherefore the scale was considered usable.

6.3. Hypothesis 1

The data has been analyzed, to answer the research questions. Here I started with RQ1: 'Is the well-being of female students who see profile badges differently affected than the well-being of those who did not?'. This led to H1: 'The well-being of female students who saw the Profile Badges, was less affected (negatively) than the well-being of those who did not'.

There were differences in the NABminNAA and PABminPAA between the control and experiment group. The mean of the NABminNAA in the experiment group was 0.055, the mean of the control group was -0.1125. Thus, the average NABminNAA in the experiment group was 0.1125 (p=.220) higher. This means that the negative affect increased more in the control group than in the experiment group, while watching the video.

The mean of the PABminPAA in the experiment group was 0.3562. In the control group the mean was 0.6820. This means that the PABminPAA was 0.420 higher in the control group, which is a significant difference according to the Independent T-test (p=0.014). Thus, in both groups, the positive affect decreased while watching the video, however, it decreased more in the control group.

Since in the experiment group, the negative affect increased less on average, and the positive affect decreased less on average, H1 cannot be rejected for this research sample. Thus, the difference between samples seem to indicate that the Profile Badges reduce the effect of social media on the well-being.

6.4. Hypothesis 2

RQ2 was: 'If any, what is the difference in the effect of the Profile Badges between individuals who socially compare more and individuals who socially compare less?', which led to the H2: 'The profile badges are not negatively affecting people who socially compare less, while having a positive impact on people who socially compare more.'

To answer this question, correlations between the INCOM variable 'DailySocialComparison' and the PABminPAA and the NABminNAA have been analyzed with a Bivariate Correlation Analysis and the Pearson Correlation Coefficient. Also, the research sample which was part of the experiment group has been split into two groups, one which reported relatively high on social comparison, and one which reported relatively low. After splitting them, the effect of the intervention on individuals who scored high on social comparison, and individuals who scored low on social comparison could be examined.

6.4.1. Correlations
No significant correlations were found between the composite DailySocialComparison and PABminPAA. To not rule out that there is no correlation with social comparison behavior in the participants daily lives, the components of the DailySocialComparison scale were also analyzed individually. Since the data on the individual questions is discrete, the Pearson's Correlation Coefficient could not be used to test for correlations. Instead, Kendall's Tau was used. Two significant correlations were found in the control group, and one in the experiment group.

The first correlation was found in the control group, between the PABminPAA and CompareAccomplishments (r=.458, p=0.042), which is a moderate positive correlation. Thus, participants in the control group who self-reported higher on CompareAccomplishments, also had on average a bigger decrease in positive affect. This correlation did not exist in the experiment group.

Secondly, a moderate positive correlation had been found in the control group between FeelingWorseAfterComparing and the PABminPAA (r=.379, p=.035). Which again means that participants in the control group who scored relatively high on FeelingWorseAfterComparing, also had a bigger decrease in positive affect while watching the video. Again, this correlation was not found in the experiment group.

In the experiment group, a moderate negative correlation has been found between ThinkAboutPresentToOthers and the PABminPAA (r=-.429, p=.059). Which implies that participants in the experiment group who think more about how to present themselves to others, also had on average a bigger increase in positive affect. This correlation was not found in the control group.

One significant moderate correlation was found between NABminNAA and DailySocialComparison in the control group (r=-.348, p=.036). Thus, participants who scored higher on DailySocialComparison, also had a bigger increase of negative affect. This correlation had not been found in the experiment group.

Thus, looking at the correlations, multiple expected correlations between a decreased well-being and social comparison had been stopped in the experiment group, while they were present in the control group. Which also supports H1.

6.4.2. Differences between high comparison and low comparison group
Since RQ2 could not yet be answered by examining the correlations, the differences between high- and low-comparing individuals were examined as well. The data had been split on the outcome of 3.5 on the variable DailySocialComparison. This roughly divided the research sample in two equal groups. Participants with a score of 3.5 or higher were put in the high comparison group (N=23): 'HComparison'. Participants with a score lower than 3.5 were put in the low comparison group (N=17): 'LComparison'. The differences between the samples in positive affect and negative have been analyzed in four tests, which were all measuring the

difference between the experiment and control group (See table 1). Thus, the four tests are measuring HComparison-PABminPAA, HComparison-NABminNAA, LComparison-PABminPAA, and LComparison-NABminNAA. Since the sample sizes are small and deviating from a normal distribution, differences have been investigated with the Mann-Whitney U Test.

	Mean E	Mean C	Difference (C-E)	p	Result
HComp.-NA	-0.0615	.3400	0.4015	.026	Less/no negative in E-group
HComp.-PA	-0.4308	-0.84	-0.4092	.032	Lower reduction in E-group
LComp.-NA	-0.0429	-0.1150	-0.0721	.475	Slightly higher in E-group
LComp.-PA	-0.2177	-0.5240	-0.3063	.076	Lower reduction in E in E-group

Table 2. Statistical difference per sub-group, where the research sample is split on the median (3.5) of DailySocialComparison. E-group=Experiment group, C-group=Control group, p=p-value.

Two significant differences have been found. Firstly, the mean of the NABminNAA in the HComparison-sample was on average 0.4015 (p=.026) higher in the experiment than in the control group. Thus, the increase of negative affect was significantly higher for participants who were in the control group and in the HComparison-sample, than in those who were in the experiment group.

Secondly, the mean of the PABminPAA in HComparison, was on average .4092 (p=.032) lower in the experiment group. Which means that the participants who were in the control group and sub-divided in the HComparison-sample, had a significantly higher decrease in positive affect while watching the video, than those who were in the experiment group.

No significant differences between the control group and experiment group in the LComparison-sample, when analyzing the NABminNAA with the Mann-Whitney U Test. As Table 2 shows, the increase of negative affect was slightly lower in the control group after watching the video, compared to the experiment group. Which indicates a slight (.0721), but neglectable negative effect of the Profile Badges in the LComparison-sample.

Lastly, also a fairly significant difference (p=.076) was found between the experiment and control group in the LComparison-sample. The PABminPAA was .3063 lower in the experiment group. Thus, the decrease of positive affect was .3063 higher in the control group. So, even in the LComparison-sample, there is an indicator that the Profile Badges reduce negative effects of social media on the well-being.

To summarize, both the LComparison, as the HComparison group had a less decreased positive affect in the experiment group. For HComparison, the negative affect did decrease in the experiment group, while it increased significantly in the control group. There was a neglectable difference between the experiment and control group in the LComparison-sample. Therefore, H2 cannot be rejected.

6.5. Covariates

To get an insight in the true causalities, it must be checked whether there are influences, other than the Profile Badges, on the variable of interest, which is the participant's well-being, measured with the PANAS. Therefore, correlations between the PANAS and age, time on social media or Instagram, and nationality have been evaluated.

6.5.1. Age
Firstly, the age has been evaluated with a Bivariate Correlation Analysis. When analyzing for the entire group, no correlation has been found, which means that the age has probably not interfered with the PANAS.

6.5.2. Countries
Secondly, the influence of nationality of the participants on the PABminPAA and the NABminNAA were analyzed. To increase the power of the statistical test, countries have been divided over four (sub-)continents: Africa, Eastern-Europe, Asia, and Western-Europe. When analyzing on the entire research sample, a significant difference was found between nationality and the PABminPAA with a One-Way ANOVA test (p=0.049). The East-Europeans scored on average lower than average and are more represented in the experiment group. This could contribute to a lower PABminPAA in the experiment group. Since the Asian respondents score on average higher than the rest, and they are more represented in the control group, this might have caused a higher PABminPAA in the control group. To further investigate whether the continents had a significantly different outcome, a second test had been done with the Wilcoxon Mann-Whitney U test. Which showed a significant different outcome for West-Europe (p=0.060) and for East-Europe (p=0.060). Asia (p=0.32) and Afrika (p=0.208) did not show significant results, which might be a result of the low number of respondents from those countries.

6.5.3. Difference in PA baseline test
There appears to be a difference in the baseline of the PAB between the control group and the experiment group. The PAB in the control group is .42000 higher than in the experiment group (p=0.063). There is no difference in the NAB. This indicates an influence of the setup of the experiment.

7 DISCUSSION OF EXPERIMENT RESULTS
The first requirement for the solution was to mitigate or stop the negative effects of social media on the well-being of its users. Whether this objective was obtained, was tested by RQ1, which led to H1: 'The well-being of female students who saw the Profile Badges, was less affected (negatively) than the well-being than those who did not'. The reduction of positive affect was significantly less in the experiment group. This indicates that the Profile Badges were able to reduce the effect of social comparison on the positive affect. Also, an increase of negative affect was not measured in the experiment group, while there was a slight increase in the control group. Thus, it appears that the experiment group was less affected by the adverse effects of social media. Therefore, H1 could not be rejected, which seems to indicate that the Profile Badges are an effective intervention against adverse effects of social media on the well-being.

Also, the impact of the intervention on several expected correlations seem to indicate the effective reducing of adverse effects of social media by the intervention. In the control group, moderate correlations between a higher score on social comparison behavior were found. If participants scored higher on social comparison, they were likely to either have a bigger increase of negative affect, and a bigger decrease in positive affect. This correlation was not found in the experiment group. Thus, a pattern which is found in multiple studies, namely that more comparing individuals experience a lower well-being due to social media, was mitigated or stopped in the experiment group. Which probably is a strong indicator that the Profile Badges reduce the adverse effects on the well-being of social-media users.

Another requirement for the solution of Profile Badges was, that the intervention should positively influence those who tend to socially compare, while not affecting those who lack this tendency. This requirement led to H2: 'The profile badges are not negatively affecting people who socially compare less, while having a positive impact on people who socially compare more.' The profile badges reduced the adverse effects on positive affect in both those who self-reported high on social comparing behavior, as in those who self-reported low on social comparing behavior, and they did not negatively impact any of the sub-groups significantly.

Also, increase of negative affect was significantly higher in the more often comparing individuals who were in the control group, than in those who were in the experiment group. Thus, the intervention adheres to the requirement of benefitting both less frequently, as more frequently comparing individuals. Which leads to the conclusion that also H2 cannot be rejected.

7.1. Limitations
The experiment had some limitations, due to which the true causality could not be proven. Firstly, a difference between the experiment group and the control group was found, when analyzing the baseline positive affect. This might indicate that the setup of the experiment influenced the results, which could be due to the warning messages that the experiment group had to read before filling out the baseline PANAS. Thus, the control group started 'earlier' with the baseline PANAS survey.

Secondly, there appeared to be a significant difference between nationalities form different continents. West-Europe and Asia got lower decreases in positive affect, while East-Europe got bigger decreases This might also have influenced the results of the PANAS. However, there were no significant differences between continents in the baseline positive affect, thus, it is unlikely that the distribution of countries is the reason for the aforementioned difference in baseline positive affect between experiment and control group.

Thirdly, the intervention seems to be an addition for both individuals that are relatively less engaging in social comparison, as for individuals who engage relatively often. However, the research sample had been divided in half, based on the median. What could be the case, is that there is a higher proportion of individuals that engage in the behavior more often in the research sample, than there is in the research population. Which could have resulted in a 'Low Comparison' group, which is not really a group which does not socially compare often. In that case, it might appear as if individuals who do not socially compare often are helped by the intervention, while this was not really measured.

Lastly, the study was conducted with 40 participants. Especially when dividing the research sample in sub-groups, the sample sizes of the groups are relatively small for reliable statistical tests. On top of that, for multiple tests, it could not be proven that the data was normally distributed, which caused the need for alternative, sometimes less reliable tests. This also hindered the performing a multiple regression analysis, which would have given a clearer insight in the influence of independent variables on the dependent variable, which was the PANAS. Therefore, external validity is not guaranteed.

8 CONCLUSIONS

In this study, Profile Badges have been designed, and tested in an experiment. The experiment showed that the negative impact of social media on the well-being, was reduced in the group who saw a video of a social media feed with the intervention of Profile Badges, while this was not the case for the control group, who saw a feed without an intervention. Also, did the Profile Badges reduce the negative effects of social media in both individuals who compare more often, and individuals who compare less often. This result is contrary to previous studies, where individuals who compared less often were negatively affected by interventions.

Although the results seem to indicate that the Profile Badges are effectively reducing the negative effects social media on the well-being, the research has its limitations. The setup of the experiment, and nationality seem to have had an impact on the independent variable, due to which the true causality could not be proven. Also, was the research sample relatively small, due to which the preferred statistical tests could not always be performed.

Therefore, it is important to further research the effectivity of the profile badges. A study with more participants, which leads to normal distributions in sub-samples, so that a multiple regression analysis can be done, should be performed to reveal the true causality between reduced negative effects in the experiment group and the Profile Badges. On top of that, it is advised to test the Profile Badges with teenagers from 10 to 17 as well, since they tend to be impacted the most by the adverse effects of social comparison.

So, this study has shown relevant, significant results, which differ from previous studies that tried to reduce the adverse effects of social media on the well-being. Therefore, this paper contains important information for researchers in Human Computer Interaction Design, Psychology, and various others, who can use the knowledge, the design, or the design principles for future study. Moreover, social networking sites, such as Instagram and Facebook can benefit from this new approach, since they can directly implement the badges in their interface.

A.1 The Badges and their Warning Messages

Achiever
This person works hard for something and wants to share that. Though, remember that achievers will post mainly about that, while other aspects of their life might not be posted, such as friends, relaxing, and time off. Looking to an achiever profile, might give you the idea that you have to work hard always, but this is not the case. Therefore, an achiever page can be inspirational, but remember that you can mostly not compare your life fairly to their social media posts.

Promotional
Influencer marketing is a common practice nowadays. A profile having this badge sells or promotes something. This means that content might be meant to convince you. Remember that this post is not only for entertainment purposes. Sometimes, the purpose of promotional posts is to give you a feeling that you really need something, or that you are worth less if you do not have / do something.

Happy couple
Relationships come with ups and downs. We love the ups, and on the other hand would like to forget about the downs. This account shares the beautiful sides of being in a relationship, however, the downs are not, or represented. Therefore, it wouldn't be fair to take this account as a reference for your relationship (status). Therefore, you better do not!

Happiness
Life can bring many beautiful moments with friends, family, or beautiful places. This person shows their happy moments to their followers. However, everybody has their struggles. This person prefers to post only about happy parts of life. Therefore, it can be fun to watch the profile of this person but comparing your life to their posts would not be fair.

Real-life
This person likes to keep it real. Many people on social media only post about the best moments in life, however this person does not mind showing also the less beautiful moments. Seeing posts of this person might give you a sense of recognition. Although every person chooses what to share about themselves and what not, this person shares fairer information about themselves than people not having this profile badge.

Skill
Becoming skilled at something takes time and practice. People with this badge are likely to have put a vast number of hours in learning the skill they currently have. It is good to remind that from time to time. Being not as skilled as them is totally fine since you made other life choices. The latter also means that comparing yourself wouldn't be fair. Be proud of what you have accomplished and accept that there is always someone working harder for it.

Beauty
The content posted will be purely focused on appearance. The owner of this profile probably posts gorgeous photos of him or herself. However, they are likely to post only their best images. Often there are 100, or even 1000 photos taken before 'the perfect one' was found, after which often some editing takes place. Although the end-result might be astonishing, it should not be seen as a standard for beauty since it is simply not real. Remember this, before you start to compare yourself to profiles having the 'beauty' badge.

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