

# Kindness is Contagious: Exploring Engagement in a Gamified Persuasive Intervention for Wellbeing

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## ABSTRACT

Students are continually exposed to a variety of stressors during their academic career, and this can have significant negative effects on their mental health and subjective wellbeing. In this paper we explore how gamified persuasive interventions can promote engagement in performing random acts of kindness to improve wellbeing and help students manage stressors more effectively. In a pilot study we investigated how participation levels in a gamified persuasive intervention that promotes random acts of kindness at University, are influenced by (1) different persuasive message types, and (2) different game challenge categories. Furthermore, we analysed the impact on behavioural intention by comparing pre-intention and post-intention to perform random acts of kindness. Participants were assigned 5 different quests each morning, for two days, and asked to complete as many as possible by the end of each day. Participants were divided into 2 groups and received different types of persuasive notifications during the day: Group A received messages that set out group goals and used the social comparison strategy, while Group B received messages that set out individual goals and used the self-monitoring strategy. The findings from the pilot study will inform the design of a larger study to investigate persuasive game-based interventions for subjective wellbeing.

## ACM Classification Keywords

Human-centered computing. User studies. Applied computing. Computer games

## Author Keywords

Persuasive Games; Kindness; Wellbeing; Rewards; Engagement; Adaptation; Personality;

## BACKGROUND

The number of students in UK Universities who require mental health care is increasing very rapidly and the problems they experience are becoming more and more complex [1]. Approximately 75% of students experience high levels of psychological distress, manifesting in the forms of intense stress, anxiety,

depression and loneliness [19, 1]. This can lead to numerous health complications and have a major negative influence on student confidence and academic performance. It is, therefore, critical that students receive appropriate support tailored to their needs, throughout their academic journey. However, mental health support services in Universities are struggling to meet the overwhelming rising demand for care provision [8]. Thus, preventive models that target the reduction of risk factors and enhancement of protective factors have attracted considerable attention in recent years and initiatives which focus on proactive responses, promoting general wellbeing, are highly desirable solutions [28].

Persuasive interventions can motivate, shape and reinforce beneficial behaviours, as well as help individuals avoid and reduce the negative impact of risk factors [6]. While digital behaviour change interventions can be delivered using various approaches, persuasive games have attracted attention in recent research work, due to their strong motivational pull [23]. Persuasive games are very interactive and require active engagement from participants, which can increase the emotional quality of the intervention [20] and contribute as an incentive to keep users engaged with the intervention [12]. An increasing number of persuasive games have been developed in recent years as novel solutions for motivating healthier behaviours, such as encouraging physical activity and balanced nutrition [10, 26, 2, 11].

Despite the growing interest in persuasive games, there remains a need for further research into their application in the wellbeing domain and design of games which promote happiness. Games may facilitate the integration of preventive models and enhance current proactive strategies. Using technology to promote wellbeing would encourage initiative, empower individuals, promote self-care and improve self-management skills. Approximately 54% of students who experience mental ill health, feel nervous about receiving care and do not seek support from their institution or local practitioners [1]. Thus, a digital persuasive game would allow a larger number of individuals to access support remotely and would facilitate early detection of symptoms, reducing time costs and financial expenses for mental healthcare providers.

Our wider research project investigates the design of a persuasive game for preventing mental health problems and improving subjective wellbeing in a student population [4]. The intervention will use persuasion to promote student engagement in meaningful, achievable and enjoyable challenges, that increase

happiness and help students manage stressors effectively. Our work is inspired by positive psychology research, as described in [13], and focuses on adapting happiness-inducing challenges, which suit user values and interests. Recent work in Positive Psychology has shown that practicing kindness has a positive impact on one's subjective wellbeing [15]. In this paper we present the results of a pilot study which investigates how a gamified persuasive intervention can encourage random acts of kindness and the effect of different persuasive notifications on participant engagement levels. The findings from the pilot study will inform the design of our larger studies to investigate persuasive game-based interventions for subjective wellbeing.

## STUDY DESIGN

The aim of this pilot study was to investigate how engagement levels are influenced by different game challenge categories and different persuasive notification types. We also wanted to explore how gamified persuasive interventions affect behavioural intention towards performing random acts of kindness. The experiment ran over the course of two days, with participants being provided with 5 daily quests each morning, a persuasive notification during early afternoon and a daily questionnaire in the evening. A pre-questionnaire and post-questionnaire were also completed by the participants. To achieve our aims, all quests involved performing small random acts of kindness and were centered around 5 key categories that inspire positivity and promote wellbeing: being positive, having meaningful interactions, expressing gratitude, being helpful and cheering up or encouraging others.

Participants were divided into 2 groups and received different types of persuasive notifications during the day: Group A received messages that set out group goals and used the social comparison strategy, while Group B received messages that set out individual goals and used the self-monitoring strategy. Numerous persuasive strategies have been identified to influence behavioural determinants, in order to promote behaviour change. For example, Fogg [6] has developed 7 persuasive approaches, Cialdini [3] has developed 6 principles of persuasion, and Oinas-Kukkonen [21] built upon this work to identify 28 persuasive system design principles. Furthermore, Michie et al. [17] have recognised 93 techniques for promoting behaviour change. Social comparison is a strategy which allows participants to compare their performance with others and setting group goals allows participants to work towards a shared objective. This strategy was chosen as it has been increasingly used in interventions, as humans feel motivated to perform better if they are competing with their peers [6]. Self-monitoring provides the means for participants to track their progress and builds on self-understanding. This strategy was selected as Health Interventions that combine self-monitoring with other persuasive strategies (e.g. setting goals) have been shown to be more effective than other types of interventions [16]. Participants' pre-intention and post-intention to perform random acts of kindness pertaining to the key categories were also evaluated.

## Research Questions

The pilot study was designed to investigate the following 3 main research questions:

1. How do different persuasive message types affect participant engagement?
2. How do different game challenge categories influence participant engagement?
3. What is the impact on behavioural intention?

## Participants

For the pilot study, we recruited a total of 10 unique participants to take part in experiment (5 females and 5 males, age ranges between 24 and 43 years old). Participants' geographical territories of origin were Asia and Pacific (2 participants), Europe (4 participants), Africa South of the Sahara (2 participants) and The Middle East and North Africa (2 participants). Participants were postgraduate research students and postdoctoral researchers, recruited from the Computing Science Department at University of Aberdeen. Participants reported that they generally played phone or computer games a few times per year (5 participants), a few times per week (2 participants), every day (2 participants) and almost never (1 participant). Participants were not offered any monetary payment or reward to take part in this pilot study. Table 1 shows demographics and group division of participants.

Participants took part anonymously and did not know there were 2 groups or which of the groups they were assigned to. However, given some participants shared offices and the public nature of some of the tasks, participants may have become aware of the identity of other participants. This may have had some influence, which we tried to minimise by participants not knowing they have been distributed into groups. Additionally, some participants knowing the experiment leader, and hence the source of the persuasive messages, could have had an impact (see [18] on the impact of the source of persuasive messages). We ensured these participants were distributed evenly over the groups.

**Table 1. Participants' demographics and division into groups**

Group	Participants			Goal Type	Strategy
	Total	Males	Females		
A	5	3	2	Group Goal	Social Comparison
B	5	2	3	Individual Goal	Self-Monitoring

## Materials

We created 10 quests that were assigned to the participants each morning. Table 2 shows the resulting quests for the first day (Q1 to Q5) and the second day (Q6 to Q10). On the first day we used group and individual goal-based persuasive reminders ("If participants cumulatively reach the target of at least 30 completed quests in total for today, everyone will receive fruit and cake as a reward"; "If you reach the target of at least 4 completed quests for today, you will receive fruit and cake as a reward";). For the pilot study we chose a tangible reward because it was the easiest to operationalise, whilst meeting ethical constraints (e.g. ethics board

raised issues regarding social status rewards). Future work will need to investigate both intangible rewards and different types of tangible rewards. On the second day of the study we used encouragement messages focused on social comparison (e.g. "This is the Top 5 leader board for yesterday! Very well done, you are on the second place with 4 quests completed. Let's see if you can maintain your position in the top or even improve it!") and self-monitoring ("Very well done, you have completed 4 quests yesterday! Let's see if you can keep up or even improve your performance today!"). Additionally, we provided designated poster areas, cards, coloured markers and a submission box for participants to complete their quests.

**Table 2. Daily Quests**

Category	Quest Description
Being Positive	(Q1) Write a nice anonymous card addressed to a PhD Student; (Q6) Write a nice anonymous card addressed to a member of staff;
Meaningful Interactions	(Q2) Ask someone how they are; (Q7) Introduce yourself to someone you have not talked to before;
Expressing Gratitude	(Q3) Leave a note about one thing you are grateful for in your work; (Q8) Thank someone or a group of people;
Being Helpful	(Q4) Volunteer to help someone in your department with a small task; (Q9) Take someone on a short walk around the University;
Cheering Up Others	(Q5) Leave a joke or a funny message; (Q10) Make a small, nice drawing;

### Procedure

Participants were told that the purpose of the pilot study is to investigate what influences behavioural intention change and engagement in a persuasive game that promotes random acts of kindness. Consent forms and information sheets were provided and participants were informed that taking part in the study was voluntary and that they could withdraw at any time, for any reason. All materials produced by the participants were stored securely.

### Pre-Questionnaire

After the collection of demographic information, participants were asked to describe their happiness level on a scale from 1 (not very happy) to 7 (very happy) at the time of completion. The Subjective Happiness Scale [14] was used to measure the global subjective wellbeing of the participants. We were interested to learn about the participants' pre-intentions for performing random acts of kindness. We asked questions about their intention for performing 8 different acts of kindness reflecting the selected 5 key categories (as described in Table 3) and used a semantic differential scale to measure their attitude towards random acts of kindness. In the final section of the pre-questionnaire we assessed participants' level of gratitude, using the VIA scale [22], as well as level of altruism (sub-scale of Agreeableness) and friendliness (sub-scale of Extraversion)

using the NEO-PI-R inventory [9]. Participants were then asked to fill in the TIPI scale [7] to determine their personality.

**Table 3. Target Behaviours promoting Kindness**

Category	Behaviour
Being Positive	I will try to make a spontaneous nice gesture for someone;
Meaningful Interactions	I intend to have meaningful conversations with someone; I will try to listen to someone share their emotions and experiences;
Expressing Gratitude	I plan to express my thanks to those who have been kind to me; I intend to reflect on things I am grateful for in my life;
Being helpful	I intend to volunteer to help someone with a small task;
Cheering up others	I will try to cheer others up; I plan to encourage others;

### Day 1

An email notification was sent to participants, outlining the 5 daily quests for Day 1. A detailed description is provided in Table 2 (Q1 to Q5). Materials required by participants were made available in the indicated locations. Early afternoon, a reminder was sent to the two groups. Participants in Group A were told that there would be a fruit and cake reward if all those who are taking part in the study cumulatively reach a target of at least 30 quests completed in that day. Participants in Group B were told that there would be a fruit and cake reward if they individually reach a target of at least 4 quests completed in that day. At the end of Day 1 participants filled in a questionnaire describing their experiences. For each quest participants were asked if they have completed it. If the answer was "Yes", participants were asked further questions about the quest, as detailed in Figure 1. If participants answered "No", they were asked to explain why they have not completed those quests.

**Figure 1. End of Day Questions for Completed Quests**

Completing this quest: \*

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree or Disagree	Slightly Agree	Agree	Strongly Agree
Made me feel happy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Was enjoyable.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Was motivating.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Was meaningful.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

What motivated you to complete this quest?  
Your answer \_\_\_\_\_

Please tell us more about your experience when completing the quest:  
Your answer \_\_\_\_\_

## Day 2

Participants were sent a new email notification in the morning, containing the daily quests for Day 2. A detailed description is provided in Table 2 (Q6 to Q10). An encouraging message was included in the notification for each group. Participants in Group A were shown a Top 5 Leaderboard displaying participant codes and numbers of quests completed on the previous day and encouraged to maintain their record or even improve it. For Group B, the message informed participants of their own performance only on the previous day and encouraged them to maintain or improve this during the course of Day 2. In the evening, participants filled in the questionnaire which asked them which of the tasks they have completed, what motivated them to take part, which tasks they did not do and why.

## Post-Questionnaire

In the post-questionnaire, participants were asked to describe how the different reminders and encouragement messages influenced them when completing the quests during the two days. We reassessed the attitude towards performing random acts of kindness using the same semantic differential scale as in the pre-questionnaire. Finally, we measured participants' post behavioural intention to perform the 8 acts of kindness described in Table 3 in the upcoming 2 weeks.

## RESULTS

Having described our approach, we now present our findings. The results are structured around the research questions we investigated in the pilot.

### Q1: Influence of persuasive message types

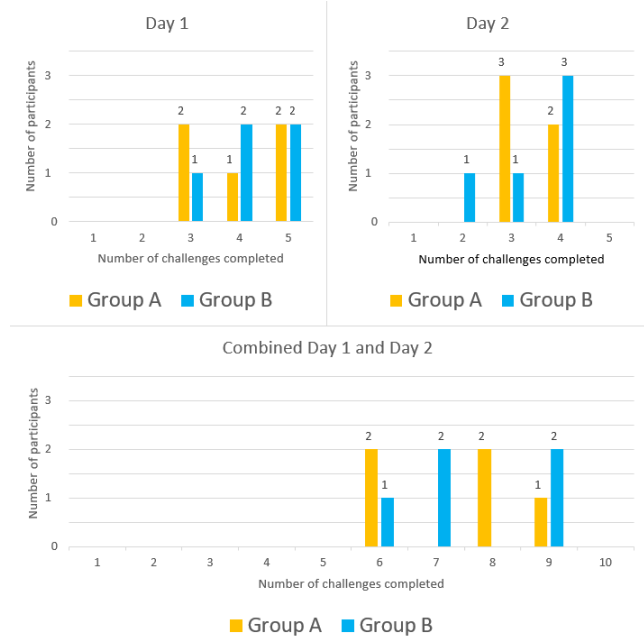
A total of 75 challenges have been completed during the pilot study. On Day 1 participants cumulatively completed 41 challenges (20 challenges were completed by Group A and 21 challenges by Group B). On Day 2 a total of 34 challenges have been completed (both Group A and Group B completed 17 challenges). Table 4 summarizes the mean and standard deviation in changes of participation levels for each group over the two days of the pilot. For both groups there is a negative mean change in participation over time potentially motivated by time constraints and other commitments of participants.

**Table 4. Means and SD for number of quests completed**  
Mean (SD)

	Group A	Group B
Number of Quests Completed on Day 1	4.00 (1.00)	4.20 (0.83)
Number of Quests Completed on Day 2	3.40 (0.54)	3.40 (0.89)
Number of Quests Completed in Total	7.40 (1.34)	7.60 (1.34)

Figure 2 shows the distribution of completed quests for Group A and Group B based on different persuasive message types. Based on qualitative responses, the persuasive messages influenced both Group A and Group B to complete quests. However, there is a larger cluster of participants from Group B who individually complete more quests than in Group A: the median number of quests completed in Group B is 4 compared to 3 in Group A. This suggests that individual goals and self-monitoring may lead to increased levels of participation, in comparison to group goals and social comparison. However, this result does not reflect how participants perceived

**Figure 2. Daily Challenges Completed by Groups A and B**



the messages influenced them. Overall, participants in Group A reported that the messages had a stronger impact on their performance than those in Group B.

On Day 1, participants in Group A reported that the persuasive notification motivated them to attempt to complete a higher number of quests. Two participants were encouraged by the potential reward offered if the group goal was achieved (PA5: "I wanted to complete more quests because I like cake"; PA4: "I thought fruit and cake can be a good opportunity to share ideas and feelings"). Participants also mentioned that the notifications allowed them to maintain progress (PA2: "I was reminded that there was a task I had not done that I could complete"). One participant (PA1) said that the reward was not a motivating factor as they "enjoy doing good things". Similarly, the majority of participants in Group B (PB2, PB3, PB4) reported that the persuasive message had very little influence on them as they "were not expecting a reward for doing acts of kindness".

On Day 2, all participants in Group A said that the leader board encouraged them to try and maintain or even improve their performance (PA2: "It was motivating to see I had done so well"; PA1: "I wanted to maintain my position in the top"; PA5: "I wanted to do better"). The social comparison strategy influenced one participant who felt motivated to see that other participants are also performing well (PA3: "I can see a lot of good people around me. I am proud of it"). Most participants in Group B reported that the self-monitoring strategy had very little influence on them (PB5: "I would have tried to do my best on the second day too"; PB1: "I was already motivated to complete the quests"). One participant (PB3) said that the notification "brought competitive spirit" to the experience.



## Q2: Influence of game challenge categories

To evaluate each of the 5 key challenge categories we analysed participants' responses on how happy the challenges made them feel and how enjoyable, motivating and meaningful they found the quests to be. In general, participants said that the quests made them feel happy, were enjoyable and meaningful. However, the quests were considered to have a lower impact on the participants' motivation. Figure 3 shows how participants engaged in different challenge categories and Figure 4 shows how participants rated the quests in the 5 key categories.

### Being Positive Quest Category

Participants indicated that quests from the "Being Positive" category were the most efficient at providing a feeling of happiness and meaningfulness. The quests in this category were also perceived as enjoyable and motivating, more than most of the other challenge categories. Participants mentioned that they were motivated to complete this type of challenge mostly due to a pre-existing desire to acknowledge a colleague or member of staff, based on personal experience (PB1: "I wanted to tell a member of staff that they have improved a student's experience", PB5: "Staff is great and I have things to thank them for", PA4: "I am being thankful for the people in the department"). Respondents were also encouraged by the fact that the quest was to be completed anonymously, considering that this makes the process of recognizing a colleague or member of staff for their merit easier (PB5: "I like to acknowledge and thank staff for the help I get, and it's even better anonymously"; PB1: "This is a good way to give someone praise without the anxiety of a response"). Participants argued that one issue is that this challenge category requires a certain amount of creative effort to complete (PA1: "I had to think about what to write", PA2: "I intended to say something motivational or inspiring but it was difficult at first"). On each of the days, only 3 out of 10 participants did not complete the challenge belonging to this category, with "time constrains" being the reported cause.

Figure 3. Participation in Different Challenge Categories

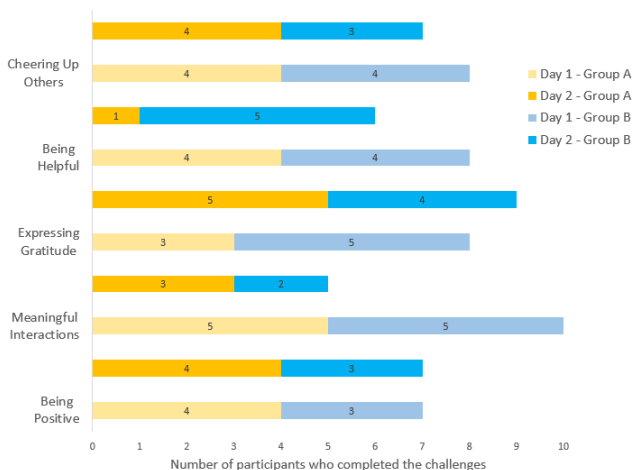
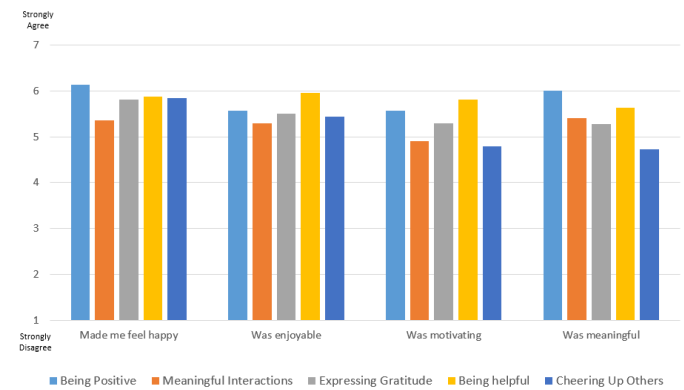


Figure 4. Participants' Perceptions of Different Challenge Categories



### Meaningful Interactions Quest Category

When asked to introduce themselves to someone new or to ask someone how they were, participants indicated that their engagement levels were mainly influenced by their perception of the meaningfulness of the challenge. Overall, this category of quests was considered the least effective at giving participants a feeling of motivation. It is important to note, however, that on Day 1, this challenge category has the highest percentage of non-completion throughout the entire duration of the experiment, with only half of participants completing it. The main reason for this is that some participants felt it was difficult to engage in conversation with strangers (PB5: "Personally, I find it difficult to strike a conversation with new people"). An interesting observation is made with participants who although reluctant, completed the task (PA1: "Even if I didn't like introducing myself to a stranger at first, it wasn't that bad", PB4: "Randomly asking someone how they are might seem strange, although it could turn into a conversation starter"). The overall difficulties that some individuals encounter when communicating with strangers may account for lower perception of benefits that participants gain from this type of quest.

### Expressing Gratitude Quest Category

Participant responses indicate that the Expressing Gratitude category was very well received by most, based on existing reasons to be grateful towards colleagues. These quests provide the drive for participants to engage themselves in recognizing the efforts of those around them and experience feelings of genuine gratefulness (PA4: "I felt the gratefulness coming with thanking people", PB1: "Feeling genuinely thankful towards some people", PA3: "This may be the most enjoyable quest from my perspective", PB5: "I love thanking people", PA2: "It is one of the best ways of appreciating other people."). This type of challenge was also the most engaging, with only three participants failing to complete the quest over the two days period. Time constrains were listed as the main reason. Participants rank this type of quest highly, with small variations between how happy, enjoyable, motivating or meaningful the experience was, as opposed to how other type of challenges were perceived.

### Being Helpful Quest Category

When asked to provide assistance to someone, participants that completed the quest reported very positively on how happy the task made them feel and also how enjoyable, motivating and meaningful it was. This type of challenge was received well by participants, as they were motivated to complete it because it offers the possibility of direct benefits for themselves (PB3: "Helping the person, I gain knowledge", PB5: "I took a break from writing my report"). However, the style of the quest poses a significant effort, with some participants having difficulties diverting time from work to complete the task or difficulties in engaging with someone that requires assistance. This was the main reason accounting for six non-completed quests, but was also noted by those who completed it (PA2: "I did not speak to anyone who might need help with something", PB2: "I was busy working"). Considering how well this type of task was perceived by participants, but also the extra effort required to complete it, it is suggested that more complex tasks can provide higher emotional rewards.

### Cheering Up Others Quest Category

The tasks of cheering up others either by leaving a joke or drawing was perceived by participants as the least motivating or meaningful of all the categories. However, participants agree that this category of task was enjoyable and made them feel happy. The task received good overall participation with only five non-completions due to time constraints as the main reason for not completing the quest. Participants considered the challenges to be motivating, as it required them to do an activity that they generally consider enjoyable (PB1: "I enjoy jokes and puns", PA4: "It is very funny, and it may make people smile as it made me"). Some participants noted that this type of challenge can be seen as a strenuous creative task (PA2: "It is difficult to think of something to draw", PA3: "A little bit frustrating. It was hard to make a joke", PB5: "I generally doodle stuff but it doesn't feel like a meaningful or motivating action"). This characteristic reflects in the low motivation and meaningfulness mentioned by participants.

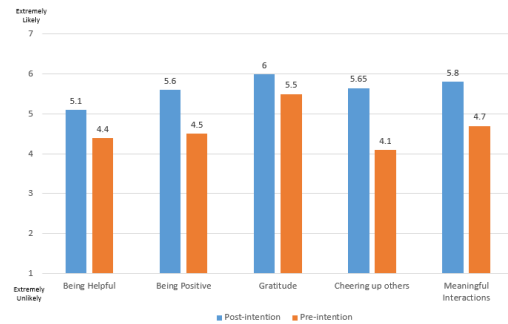
### Q3: Impact on Behavioural intention

Overall, behavioural post-intention shows an increase from the baseline pre-intention, suggesting that a persuasive game-based intervention can encourage people to perform more random acts of kindness. A Paired Samples t test was used to compare the behavioural pre-intention and post-intention. There was a significant average difference between pre-intention and post-intention scores ( $t(9) = 2.484, p < 0.05$ ). On average, post-intention scores were 1.02 points higher than pre-intention scores (95% CI [.091, 1.948]). Figure 5 shows means of pre-intention and post-intention to perform acts of kindness pertaining to the challenge categories.

### CONCLUSIONS AND FUTURE WORK

Our findings in this pilot study help us conclude that different persuasive message types and different quest categories influence the level of engagement in game challenges that promote random acts of kindness. The results provide us with an indication of how behavioural intention can be improved by engaging with the persuasive game.

Figure 5. Behavioural Pre-Intention and Post-Intention



In general, employing individual targets and self-monitoring as persuasive strategies had a higher practical impact on the level of engagement than group targets and social comparison. Overall, participants found all challenge categories enjoyable, motivating and meaningful, but expressed a preference for quests belonging to the "Being Positive" category.

A future study could build on the findings from the pilot experiment and investigate the influence of persuasive message types and challenge category in a virtually-delivered persuasive game. A larger number of participants will be recruited and the influence of other characteristics will be measured as well (e.g. personality, wellbeing level). For example, it has been found that adapting messages to personality may impact persuasiveness [24, 25], and we have done some initial qualitative research on how to adapt challenge complexity to personality, stress level and attitude [5]. Further investigation is needed on how behavioural intention is changed and the influence of the persuasive game-based intervention on actual participant behaviour. Additionally, we will investigate other persuasive message types, building for example on the work by Vargheese et al [27].

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