

A Game-based Assessment of the Effects of Rejection on Young Adults

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Rejection consists of a range of behaviors from ignoring another to explicitly excluding someone from an encounter. Currently available experimental tasks have shown that rejection has strong emotional, behavioral, and physical effects, but the tasks have some limitations. We argue that video games can address these limitations and have developed a new experimental task (ScrollQuest) to show the potential of video games as rejection research tools. The primary goal of the present study was to explore the effects of ScrollQuest. We analyzed data from 116 young adults who played both ScrollQuest and the rejection experimental task Cyberball. Playing ScrollQuest had more negative effects on mood, more negative interpretation effects were observed after playing ScrollQuest, and ScrollQuest was perceived as more enjoyable, compared to Cyberball. Our findings suggest that ScrollQuest might be an effective new experimental task to study rejection in a digital environment, but more work is needed to improve ScrollQuest.

CCS Concepts: • Human-centered computing ~ Human computer interaction (HCI) ~ Empirical studies in HCI • Applied computing ~ Law, social and behavioral sciences ~ Psychology • Social and professional topics ~ User characteristics ~ Age ~ Adolescents

KEYWORDS: Rejection; Experimental Task; Video Game; Mental Health

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1 INTRODUCTION

Rejection is a common and sometimes necessary human experience [1]. It consists of a range of behaviors, including ignoring someone, excluding them from an encounter, or making them feel rejected [2]. Despite its ubiquity, rejection can have devastating consequences. When people are repeatedly rejected, especially early in life, the pain of these experiences often leads to an increase in sensitivity to rejection [3, 4]. Both rejection and rejection sensitivity have been linked to increased mental health problems such as anxiety and depression [5-8].

In the past 20 years, studies have successfully shown that rejection² has strong emotional, behavioral, neurological and physical effects [9-13]. However, there are some limitations to the most common experimental tasks used in this field. These tasks often fail to capture the complexity of social situations and lack the opportunity to study behavioral responses (e.g., withdrawal and retribution) during the actual experience of being rejected. Moreover, most tasks have been used for many years and are often perceived as boring or outdated. Especially in research with young people, we need tools that mimic the quality of their daily digital experiences and keep them engaged. In this paper we argue that a video game could address these limitations. We have developed a new experimental task (ScrollQuest) to show the potential of video games as rejection experimental tasks.

In this paper we provide the rationale behind the development of ScrollQuest and the specific design choices that were made. However, the primary goal of the present study was to explore the effects of ScrollQuest. If effective, ScrollQuest could be used in a research context to study the effects of rejection in general, or in video games in particular. ScrollQuest also has the potential to be used in a clinical context in which clinicians can assess clients' responses to rejection and provide guidance to deal with difficult social situations. Finally, the development of ScrollQuest could be used as an example for the development of other (rejection) research games and applied games for mental health.

1.1 Rejection

Given the importance of the need to belong [14], human biological and psychological systems are aimed at maintaining social connections by avoiding rejection [1, 10, 15, 16]. Serious problems occur when people are continuously exposed to rejection. This continuous exposure can lead to rejection sensitivity [4, 17], which in turn has been linked to many mental health problems, such as depression and anxiety [5-8, 18]. Rejection and rejection sensitivity may be especially impactful during the transitional phase of emerging adulthood, in which many young people experiment with relationships [19].

Rejection sensitivity has been defined as “the disposition to anxiously expect, readily perceive, and overreact to rejection” [3]. People who are sensitive to rejection are more attentive to cues in social situations that might indicate potential rejection, and they sometimes perceive rejection when it is not there. Once they feel rejected (whether real or not), they are prone to overreact with either anger or anxiety [20]. These maladaptive responses may in turn lead to more rejection,

¹ Whenever we are using the word rejection in this paper, we are referring to the experiences of rejection, ostracism and exclusion.

leading individuals to spiral into a vicious cycle of aggressive or withdrawn behaviors and rejection, ultimately leading to a disruption of social lives and the emergence of mental health problems [18, 20, 21].

In addition to being the result of rejection sensitivity, mental health problems can also be the cause of rejection and maladaptive responses to rejection. People with depression tend to act in ways that elicit rejection from others [22]. For example, young adults who have higher depressive symptoms induce lower positive affect in others when dating, which leads to them being rejected after a date [23]. Considering the effects of rejection on mental health problems and vice versa, researchers in the last decades have tried to better understand the nature of rejection through a number of different methodologies, in order to explain its short- and long-term effects.

1.2 Rejection experimental tasks

There are three types of rejection studies: (1) studies that use questionnaires to tap into what happens in the real world, (2) studies in the lab that use rejection priming experiments (e.g., the life-alone paradigm [24], in which participants are primed to imagine ending up alone in the future), and (3) experimental studies which tap into responses during actual rejection situations in a controlled lab setting. The main limitation of using questionnaires to measure what happens in the real world (type (1) of rejection studies) is that they do not allow the determination of causal effects (is rejection causing distress or is showing distress causing rejection?) [9]. Furthermore, questionnaires and rejection priming experiments (type (1) and (2) of rejection studies) do not allow for assessments during the actual rejection events. When questionnaires are administered during rejection events in the real world (e.g., in ecological momentary assessments [25]), they are susceptible to selection or social desirability biases.

Experimental tasks in the lab (type (3) of rejection studies) can address these limitations by creating actual stressful rejection contexts and assessing responses to those contexts. Being rejected through these experimental manipulations leads to a decrease in mood and self-esteem and increased feelings of psychological threat [9, 11, 12]. There is a variety of rejection experimental tasks [26], including Cyberball [27], O-cam [28], Ostracism online [29], Operator Challenge [30], and Getting Acquainted [31], which are simple and controllable research set-ups to elicit rejection. Cyberball, for example, is a digital version of a ball-tossing game in which the participant no longer receives the ball after a number of throws, while other players continue tossing the ball to each other. A wide range of studies have successfully used these different experimental tasks to empirically study important issues such as, but not limited to, player enjoyment in multiplayer games [30], social pain [10], performance [32], neuroticism [33], social anxiety [34], and prosocial behavior [35].

Although current rejection experimental tasks have yielded a great deal of valuable insights in the study of rejection, most of them have some limitations. First, and perhaps most importantly, even though rejection experimental tasks aim to mimic real-world rejection, most of the time they do not provide participants with any behavioral opportunity to respond directly to the rejection (e.g., to repair the relationship, show aggression, or withdraw). For example, in Getting Acquainted [31] or in other studies that elicit rejection through rejection of the participants' profiles [36], the research participants are told they have been rejected by other participants, but they do not get the opportunity to interact with their rejecters directly. This might be problematic,

given that in most real-world rejection situations, whether digital or non-digital, some kind of response is being prepared for, expected, and delivered within the context of the rejection episode. If behavioral measures are included in rejection research they are usually administered after the rejection episode, by either asking participants with questionnaires how they would have responded if they had had the opportunity, or by eliciting a behavioral response that does not match a real-world situation (e.g., rating the rejecters [36], or choosing a specific amount of hot sauce that will be given to the rejecters [37]). A few of these behavioral measures have even been openly criticized [37, 38]. We argue that having the opportunity to respond directly to rejection is important because we expect that behavioral responses influence how young adults experience rejection in the moment, as well as how they feel about it afterwards. Since most rejection experimental tasks are essentially passive experiences, individual differences in behavioral responses and related emotions cannot be identified.

Another limitation of rejection experimental tasks is that they are usually relatively short experiences. Although some real-world rejection situations only last for a short amount of time, there are many situations that last longer, for example when playing a team-based video game with strangers or when hanging out at a bar with peers. To be able to study longer rejection episodes we need research tools that allow for longer experiences. A meta-analysis on Cyberball studies has shown that the length of the Cyberball experience does not predict the average effect of the rejection, suggesting that a three-minute rejection experience generates the same feelings as a 20-minute one. This could be due to the simplistic design of Cyberball. We propose that this is unlikely in real-world contexts, in which social situations are more complex. Moreover, due to the simple design of methods like Cyberball, experimental tasks in actual research practice are usually limited to no longer than five minutes [12].

Finally, and related to the previous point about the average duration and simplistic design of most experimental setups, rejection experimental tasks are often considered “boring” by participants [39, 40]. Boredom can impact the accuracy of data [41, 42]. Using a measurement tool that engages participants and motivates them to continue the experience should create a situation that is better at approximating real-world rejection episodes and allowing for the assessment of more natural responses. Online interactions, such as those found within video games, are increasingly part of young people’s day-to-day social lives [43, 44]. Thus, a rejection experience in an engaging video game would make intuitive sense to young adults, because they are used to these kind of interactions in their everyday lives. A lack of engagement might also impair repeatability. Repeatability, however, is crucial if we want to study the effects of repeated exposure to rejection, for example in developmental studies. If a rejection experimental task can be used more than once, we can also use it to test the effects of interventions that target adaptive and maladaptive responses to rejection [45].

We argue that video games could address above-mentioned limitations of the most commonly used rejection experimental tasks. Video games can be designed to include complex social situations with opportunities to respond to other players in a variety of ways. By building in interesting and diverse levels, a video game as an experimental task is (re)playable over time, without players becoming bored or guessing the aim of the study. Moreover, video games can provide an engaging experience, motivating players to derive social and emotional meaning from the experience. Finally, since video games are part of young people’s day-to-day lives, using a

video game as an experimental task does not only increase how realistic the studied experience is, but it also specifically allows us to study complex (negative) social situations young people encounter in commercial video games (e.g., cyberbullying [46]).

There is an emerging field of developing and researching applied video games, including for mental health. Applied video games for mental health focus for example on prevention [47, 48], treatment [49] or lowering stigma [50, 51]. There are also examples of games that have been used in research on the effects of rejection [30, 52]. Although we believe those games have addressed some of the abovementioned limitations, they still lack the opportunity to respond to the rejection and rejecters within the game or they are essentially lab tasks, not video games that are engaging. For this reason, we have developed a new cooperative role-playing video game called ScrollQuest. ScrollQuest was designed to represent complex social situations with interesting levels and variety in gameplay behavior, in which feelings of rejection could be elicited.

1.3 Present study

The primary goal of the present study was to explore the effects of rejection in the video game ScrollQuest in young adults, using a within-subject design. First, we expected that rejection in ScrollQuest would negatively influence mood from pre- to post-test (H1). Second, we expected negative effects of ScrollQuest on basic psychological needs, feelings of rejection and feelings of group cohesion. Since these effects are measured solely after playing ScrollQuest, we aimed to validate the effects of ScrollQuest, by testing it against the rejection experimental task Cyberball [27]. We expected ScrollQuest to elicit, at the very least, similar feelings of rejection as Cyberball, on the following measures: mood (H2); basic psychological needs (H3); feelings of rejection and feelings of cohesion (H4). We chose to include measures for potential behavioral responses that were administered *after* playing the game, since Cyberball does not allow for behavioral responses *in* the game and because the in-game tracking system for behavior in ScrollQuest had not been validated yet. Since we expected that participants would be at least equally affected by ScrollQuest as by Cyberball, we expected that participants would indicate that they would show similar or more negative behavioral responses (retribution and withdrawal) after playing ScrollQuest compared to after playing Cyberball (H5).

Because ScrollQuest was developed to be more engaging than other rejection experimental tasks, a secondary aim of the study was to test whether participants indeed rated ScrollQuest more positively than Cyberball. We hypothesized that participants would like ScrollQuest more than Cyberball (H6). A third and final aim of the study was to explore whether baseline differences in rejection sensitivity and mental health symptoms would have an effect on how participants responded to both ScrollQuest and Cyberball. Looking at individual differences will help in exploring meaningful variation in rejection situations [9]. We expected participants who were more vulnerable to rejection (defined by higher scores on rejection sensitivity, anxiety symptoms or depressive symptoms), compared to those less vulnerable, to have stronger negative emotional and behavioral responses (as defined in H1 to H5) to ScrollQuest compared to Cyberball (H7).

2 METHOD

2.1 Procedure

Participants were recruited through flyers (online and offline) at higher education institutes and the city center in [concealed for review process]. Participants were told that the study concerned the evaluation of two social video games. Inclusion criteria were 1) age between 18 and 35 years old and 2) fluent in Dutch or English. Exclusion criteria were: 1) physical impairments that prevented participants from understanding the instructions and playing a computer game; 2) a history of neurological or psychiatric conditions; 3) suicidal thoughts at pre-test (indicated by scoring 1 or higher on question 9 of the Beck Depression Inventory II (BDI-II) [53]); and 4) potential clinical depression at pre-test (indicated by a score of 29 or higher on the BDI-II).

Participants completed a pre-test survey online before they were invited to the lab which included an informed consent form, questions on demographic information and gaming behavior, rejection sensitivity, anxiety symptoms, and depressive symptoms³. If participants scored 29 or higher and/or scored 1 or higher on question 9 of the BDI-II they were contacted before their first session to discuss their high BDI-II scores, give them advice on where to seek help, and inform them that they would be excluded from the study.

For the game sessions in the lab participants were randomized to play either ScrollQuest or Cyberball first. If they played ScrollQuest, they watched an instructional video about the game, answered three questions about their mood, then played the game with three other players online. If they played Cyberball, they started with the mood questions and then played the game. Due to its simplistic design, no instructional video is needed for Cyberball, while pilot testing showed that participants needed an explanation of the controls and goals of ScrollQuest. Participants came to the lab twice, once for each game, with approximately two weeks in between.

In Cyberball the three other players were programmed, but participants were told that they were real people. In ScrollQuest, confederates controlled the three other players. While the ideal research game would have programmed co-players, this was not yet possible with ScrollQuest. With the complex behavior that can be displayed in ScrollQuest, it is very difficult to program believable AI-based co-players and it is also costly. For this reason, we have used confederates to control the three other players. If results are promising, our goal is to use the patterns of play that we trained confederates to exhibit for the basis of coding future AI-programmed players (or NPCs: Non-Player-Characters). The confederates had a strict script to follow, so that every study participant had the same experience. After each game, participants answered the three questions about their mood again and a perceived rejection check was conducted. After each game session, participants completed questionnaires assessing threats to psychological needs, intensity of rejection, group cohesiveness, previous knowledge about and experience of the game, liking of the game, and behavioral responses. After the two game sessions, participants were debriefed in person about the true goal of the study. Participants received 25 euros in gift certificates or course

³ More measures were included during pre-test for the purpose of a Master's thesis, but they were not part of the goal of this study. All measures and their relative timepoints can be found in Appendix A.

credit for their participation. The study was approved by the ethical committee of the Faculty of Social Sciences at Radboud University Nijmegen (ECSW2017-3001-465).

2.2 Sample size

A priori, the sample size was based on the expected difference (estimated effect size $f = .15$) between Cyberball and ScrollQuest outcomes on mood, psychological threats, feelings of rejection and behavioral responses. Because we expected ScrollQuest to perform similar or better than Cyberball, we expected a small effect size, implying in this case a relatively small mean difference. Using G-power [54] we calculated a necessary sample size of 90 to reach a power of .80 ($\alpha = .05$) using an ANOVA Repeated Measures (expected correlation among repeated measures = .50).

2.3 Participants

In total, 151 people signed up for the study and 25 were excluded (23 had suicidal thoughts and two scored 29 or more on the BDI-II). Eight participants dropped out (one due to personal circumstances, two due to time constraints and five did not provide a reason). In total 118 participants completed the lab sessions. One participant was excluded from the analyses because during debriefing he revealed that he knew the purpose of the study. One participant was excluded for being older than 35 years old and had been included by accident. This left a total sample of 116 participants for the analyses.

The mean age of the participants was 22.01 ($SD = 3.05$) and most participants were Dutch (41%) or German (35%). More than half of the participants were female (59%) and half studied Psychology (50%). Most participants indicated that during the week they never played video games (50%) or less than one hour a day (30%). During the weekend less than half indicated they never played video games (41%) and almost a third indicated playing at least an hour per day (35%). Four participants indicated they had heard of ScrollQuest before, but none had ever played it. Five participants had heard of Cyberball and two had played it before.

2.4 Research games

2.4.1 ScrollQuest development. ScrollQuest was developed to elicit a stressful response to rejection. Previous work has shown that performance tasks elicit a strong stress response specifically when people are motivated to perform the task [55]. A video game can be considered an excellent medium for eliciting a stressful response to rejection, since gameplay can be considered a performance task that people are motivated to execute. Other important requirements for a stressful task are (1) uncontrollability, (2) forced failure scenarios during which participants cannot perform well regardless of their effort, and (3) a social-evaluative threat [55].

In order for a threat to be considered a social-evaluative threat, the interaction with others should have social meaning. Elements of a socially meaningful interaction include achieving shared goals, helping each other and sharing goods [56]. In the context of a rejection experimental task the socially meaningful interaction should then be followed by perceived social rejection. Rejection consists of a range of behaviors, including ignoring someone, excluding them from an encounter, or giving a negative evaluation [2]. Specifically for the experience of rejection, participants need to clearly perceive that rejection has occurred [57], meaning that it is important for participants to interpret the social-evaluative threat as rejecting. Rejection expectations and

perceptions potentially contribute more towards perceived rejection [57]. The situation in which the rejection occurs should allow for ambiguity, so that participants can have their own interpretation of the rejection. Moreover, in order for participants to be able to perceive an act of rejection, there should be clearly-defined moments that allow for a period of reflection.

Table 1. Psychological mechanisms, related game mechanics and the translation of mechanics in ScrollQuest.

Psychological mechanisms		Game Mechanics	Translation in ScrollQuest
Performance task	Performance	Level design with an end goal per level	Fight levels are won by the team when all chests have been opened.
	Motivation to perform	Engaging gameplay	A role-playing game, similar to popular games in the past.
Uncontrollability		Limited communication between players	Players can only communicate by using a “thumbs-up” or “thumbs-down” emoticon.
Forced failure scenarios		Moments in the game in which a player is unable to perform	Players are obliged to vote someone out in the Vote level. The voted-out player cannot play in the next Fight level.
Social-evaluative threat	Social meaning	Cooperative gameplay and narrative	Players in ScrollQuest have to work together to defeat monsters and reach the end goal. The narrative emphasizes the cooperative nature of the game.
	Ignoring someone	Gameplay that allows for smaller groups to be created within the bigger group	The difficulty of the Fight levels is set so that at least 2 or 3 players are needed to complete the level, but not 4.
	Exclusion	Moments in which one player can be excluded from gameplay due to other players’ choices	Players are obliged to vote someone out in the Vote level. The voted-out player cannot play in the next Fight level.
	Negative evaluation	Negative communication option	The “thumbs-down” emoticon.
Perception of rejection		Ambiguity through limited communication between players	Players can only communicate by using a “thumbs-up” or “thumbs-down” emoticon.
		Reflection moments in the game: pauses within the game with no time-limit and no end-goal	Campfire levels in which players have no end goal for that level and the level only ends when all players agree to do so.

For the development of ScrollQuest we have used a design thinking framework for digital mental health interventions [58]. This framework has three core elements: (1) empathy (keeping users at the center of the development process), (2) multidisciplinary ideation (generating solutions through cross-disciplinary teamwork and collaboration), and (3) experimentation (rapid testing and iterative prototyping). Several iterations of ScrollQuest were developed and pilot tested

with young adults to assess responses and usability of ScrollQuest in a research context. In Table 1 the psychological mechanisms underlying a successful rejection experimental task are listed, together with the related game mechanics and the final translation of those mechanics in ScrollQuest. In the next section on the play experience of ScrollQuest, more details are provided on the specific gameplay elements.

2.4.2 ScrollQuest play experience. ScrollQuest is presented to players as a cooperative casual role-playing game that is played on a PC. At the beginning of the game players are presented with a short background story that emphasizes the cooperative nature of the game. The game also allows for competitive strategies (e.g., trying to get the most gold in the game or attacking other players), but they are not highlighted. The cooperative narrative of the game puts the later rejection into context: the rejection is not because the game forces the players to reject one specific player continuously, but it is a social choice that can contribute to perceiving the rejection as a social-evaluative threat. After the introduction the controls of the game are explained in text, and a tutorial level is started which allows players to practice the controls. The game includes fights with monsters, healing other players, trading gold, upgrading your character, and exploring the story.

ScrollQuest consists of a combination of three types of levels: Fight (F), Campfire (C) and Voting (V). In the Fight levels (see Figure 1) players defeat monsters and look for gold in chests. They can help each other by aiding in fights with monsters and using a magic wand to heal others, but they are not obliged to do so. Players on different PCs in different locations can only communicate by using a “thumbs-up” or “thumbs-down” emoticon. We included limited communication to create a more ambiguous situation in which rejection expectations and perceptions potentially contribute more towards perceived rejection. Limited communication also contributes to the element of uncontrollability, since the rejected player cannot request the other players to stop excluding them.

Every Fight level is followed by a Campfire level (see Figure 2). In the Campfire level players are able to heal themselves, upgrade their character, revive other players, and trade gold, but similar to the fight level they are not obliged to do so. The Campfire level serves as a moment of reflection, which provides the opportunity to reflect on the rejection and perceive it as such. The campfire level also provides opportunities for either prosocial or more self-serving behavior. The third level is the Voting level (see Figure 3) in which players decide who will be voted out of participating in the next Fight level. During voting all votes from other PCs are masked, and the result is only shown after all players have made their choice. The player with the most votes is voted out and cannot play in the next Fight level. This causes a forced failure scenario during which the player cannot perform well regardless of their effort. Another reason for including the Voting level was to create an explicit rejection situation that cannot otherwise be interpreted than as rejection. However, it is not made clear to the player why the rejection occurred which allows for variation in appraisals of the situation. We expected that this variation would allow for individual differences to become more pronounced.



Fig. 1. Screenshot of a Fight level in ScrollQuest.

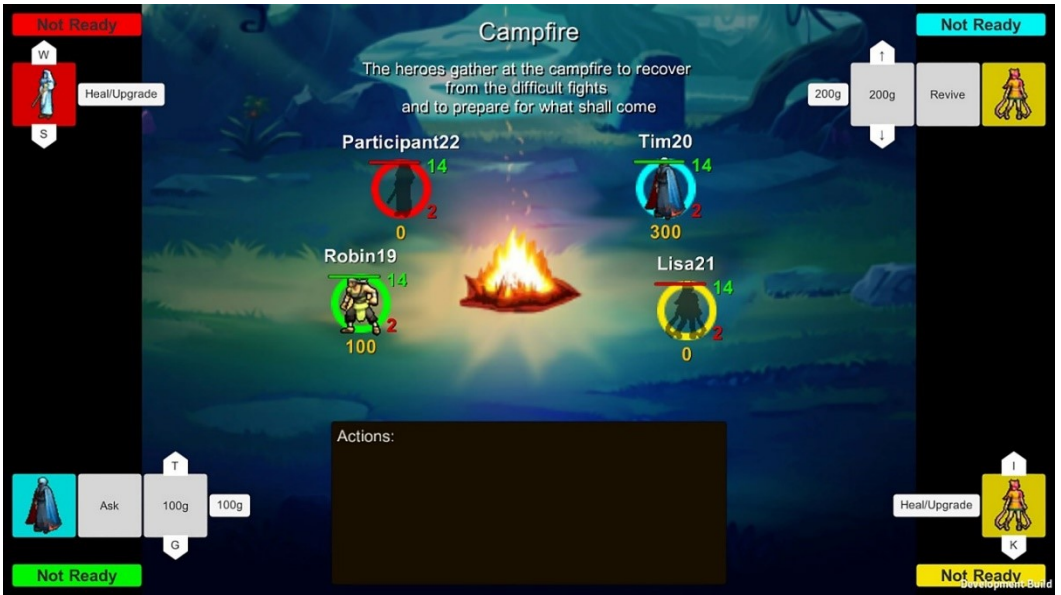


Fig. 2. Screenshot of a Campfire level in ScrollQuest.

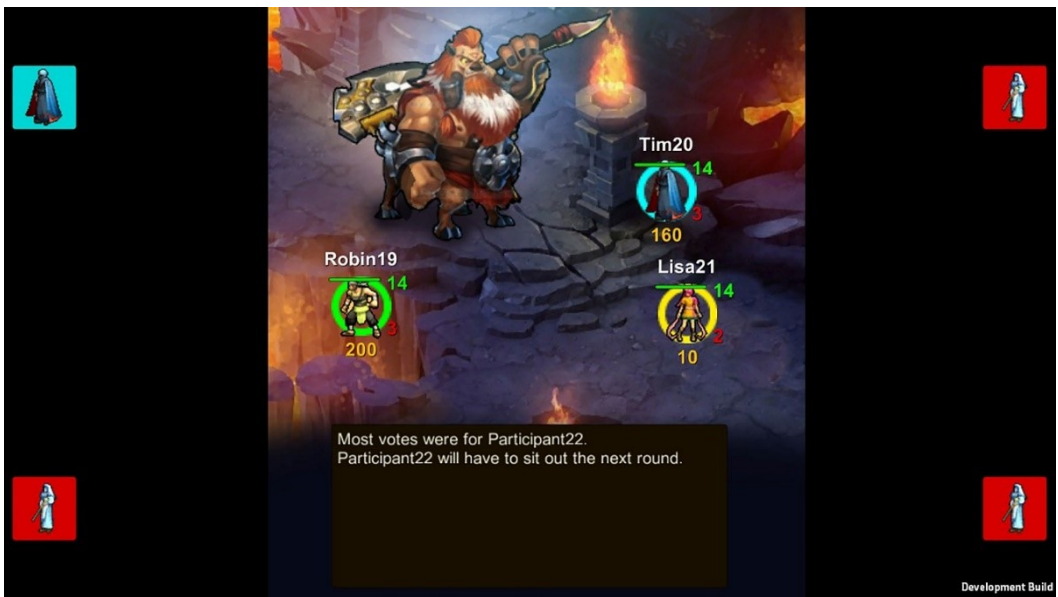


Fig. 3. Screenshot of a Vote level in ScrollQuest.

The game ends with a final Voting level. The player who is voted out will not reach the end of the game. In the final scene the heroes of the game are shown, except for the voted-out player (this player is erased). This feature was added as a potential final moment of rejection. One round of gameplay consists of the following sequence of levels: Tutorial - Fight1 – Campfire1 – Fight2 – Campfire2 – Voting1 – Fight3 – Campfire3 – Voting2 – Fight4 – Campfire4 – Voting3 and typically lasts between ten to 20 minutes.

In this study, participants played four rounds of ScrollQuest with three other players. At the start of the game, players were asked to fill in their name and age and pick an avatar. During the game all players saw the chosen avatar, name, and age of the other players. The three other players were controlled by three confederates who played in another room. Participants were told that they would play with other participants within the study. By having the participants add more personal information, we aimed to make the deception more believable and the rejection feel potentially more personal.

The protocol for the confederates followed an ABAB design (partial ostracism). This meant that in the first and third round (A) the other three players played co-operatively. During the last campfire and vote in the first and third round the rejection was initiated. In the second and fourth round (B) the other three players completely ignored and excluded the participant, meaning they would not heal the participant, not help them defeat monsters, not revive them, not ask for or give money to them, and vote for the participant to be excluded in the Fight levels. Any interaction with the participant would be avoided, except for using the “thumbs-down” emoticon if the participant succeeded at something (e.g., finding gold or defeating a monster) or “thumbs-up” emoticon if the participant had a difficult time (e.g., being defeated by a monster or being frozen in the Fight level). The first co-operative round (Round 1) was aimed at creating a bond to make the following rejection more meaningful. The second co-operative round (Round 3) was added to

provide participants with more opportunities to respond to the previous rejection. A game (four rounds) usually lasted a little less than an hour. The full protocol for the confederates can be found in Appendix B.

2.4.3 Cyberball. Cyberball v.5.2.9 [27] was used to program the Cyberball experiment. Participants were instructed to mentally visualize the experience and were told that their ball tossing performance was not important. Four avatars representing the players were shown on screen. When participants received the ball, they could choose to whom to toss the ball by clicking one of the other players' avatars. Similar to ScrollQuest, Cyberball had an ABAB design: participants were included in the first and third round, and were excluded in the second and fourth round. There were 48 throws in total, separated into four rounds of 12 throws each (there was no pause between each round). In the first round, participants were scheduled to receive the ball four times, including the twelfth throw. In the second round, participants started off having the ball, and then did not receive the ball until the twelfth throw. In the third round, participants started off having the ball, and then received the ball three times, including the twelfth throw. In the fourth round, participants again started off having the ball, and then never received the ball again. The game lasted for about three and a half minutes.

2.5 Measures

2.5.1 Perceived rejection check. To check whether the rejection was perceived by participants, participants were asked for Cyberball how often they received the ball [27]. For ScrollQuest they were asked how often they were voted out.

2.5.2 Mood. Mood was assessed using the Self-Assessment Manikin Scale, which has good psychometric properties [59]. Participants answered three 5-point Likert scale questions on their feelings of happiness, arousal and dominance before and after each game.

2.5.3 Basic psychological needs. Feelings of threats to basic psychological needs were assessed using the Need Threat Scale (NTS [60]). The NTS was specially developed for assessing the effects of Cyberball on basic psychological needs and consists of four scales (Need to belong, Need for control, Self-esteem and Meaningful existence) with each three 9-point Likert scale items. Average scores were calculated for each scale. A higher score indicates a more positive feeling for a specific need. The NTS has reasonable reliability [60] and reasonable validity [61]. In our study Cronbach's alphas for Need for control were .65 for ScrollQuest and .71 for Cyberball. Cronbach's alphas for Self-esteem were .60 for ScrollQuest and .77 for Cyberball.

Item 2 in the scale Need to belong ("I felt as though I had made a "connection" or bonded with one or more of the participants during the Cyberball/ScrollQuest game") did not correlate with the other two items and was therefore not used in the calculation of the scale score. Cronbach's alphas for Need to belong after deleting item 2 were .84 for ScrollQuest and .82 for Cyberball. Item 1 in the scale Meaningful existence ("I felt that my performance had some effect on the direction of the game") did not correlate with the other two items and was therefore not used in the calculation of the scale score. Cronbach's alphas for Meaningful existence after deleting item 1 were .85 for ScrollQuest and .79 for Cyberball.

2.5.4 Feelings of rejection and group cohesion. The negative impact of rejection was assessed with four 9-point Likert scale questions on perceived intensity of rejection and perception of group cohesiveness [27]. The cohesion questions were reverse scored and an average score was

calculated. A higher score indicates lower feelings of group cohesiveness and therefore a more negative impact of the rejection. Cronbach's alphas for the cohesion scales were .64 for ScrollQuest and .83 for Cyberball. The second rejection question on whether participants felt like they were being "noticed or included" was reverse scored. Higher scores on the rejection items indicate higher feelings of rejection. Because of the low alpha for ScrollQuest ($\alpha = .44$; for Cyberball $\alpha = .70$) we decided to use the individual rejection items as outcome variables.

2.5.5 Game evaluation. Cyberball and ScrollQuest were each evaluated with one question: "How much did you like this game" on a 5-point Likert scale.

2.5.6 Behavioral responses. We used the behavioral items of the Behavioral Responses to Rejection Scale (BRRS [62]) to assess behavioral responses after playing Cyberball and ScrollQuest. When used with hypothetical situations the BRRS has good to excellent reliability [20]. In our study, participants were asked what they would do if they would meet the other participants who played the game with them after the survey. They were presented with eight behavioral items of the BRRS which could fall into three categories: withdrawal (three items), retribution (three items) and filler item (two items), and they were asked for each behavior whether they would show the behavior (on a 5-point Likert scale from agree strongly to disagree strongly). Retribution here serves as a form of aggressive behavior. Cronbach's alpha for withdrawal was .79 for ScrollQuest and .88 for Cyberball. Cronbach's alpha for retribution was .88 for ScrollQuest and .89 for Cyberball.

2.5.7 Rejection sensitivity. Rejection sensitivity was assessed using the Rejection Sensitivity Questionnaire (RSQ [3, 5]) which has adequate psychometric properties [63]. The RSQ consists of 18 hypothetical social situations in which people ask others for things and rejection could occur. Similar to the method in the study by [64], we calculated a score for rejection expectations by reversing the expectation items ("How likely would it be that the person in the situation would respond positively to your request") and adding up all 18 reversed scores. A score for anxious rejection sensitivity was calculated by adding up the anxiety items ("How concerned or anxious would you be about the other responding in a positive or rejecting way"). Cronbach's alphas were .88 for anxious rejection sensitivity and .84 for rejection expectations.

2.5.8 Mental health symptoms. Trait anxiety symptoms were assessed with the standardized 20-item State-trait Anxiety Inventory (STAI [65, 66]), well-known for its good reliability and validity [67]. Cronbach's alphas were .89 for the English version and .91 for the Dutch version. Depressive symptoms were assessed using the highly reliable and valid 21-item Beck Depression Inventory II (BDI-II [53, 68]). Cronbach's alpha was .85.

2.6 Strategy of analysis

All analyses were done using IBM SPSS Statistics version 25 [69]. Less than 5% of data was missing, therefore no imputations were conducted. Pre- to post-analyses for mood were done using paired t-tests. Main effects were analyzed using Repeated Measures ANOVAs. Interaction effects were tested using Repeated Measures ANCOVAs with the moderators as covariates. We found artifacts in the repeated measures ANCOVAs, which caused an incorrect alteration of the main effects. To solve this, all moderators (anxiety symptoms, depressive symptoms, anxious rejection sensitivity and rejection expectations) were centered around their mean [70]. Differences

between correlations for ScrollQuest (SQ) and Cyberball (CB) were analyzed using an interactive calculator [71].

3 RESULTS

3.1 Descriptives

Depressive and trait anxiety symptoms were relatively low, ranging from 0 to 27 for depressive ($M = 6.66$, $SD = 5.63$), and 23 to 60 for anxiety symptoms ($M = 39.67$, $SD = 5.63$). Scores for anxious rejection sensitivity and rejection expectations were also low, with scores from 27 to 86 for anxious rejection sensitivity ($M = 51.71$, $SD = 14.50$) and from 23 to 90 for rejection expectations ($M = 46.23$, $SD = 9.97$). The table of Pearson correlations between all relevant measures at all time points can be found in Appendix C.

3.2 Perceived rejection check

In CB, players received the ball 16.67% of the time. Most participants (71%) indicated that they thought they received the ball 20% of the time or less ($\bar{x} = 20.41$, $SD = 10.47$). In SQ, players were voted off 66.67% of the time. Most participants (65%) indicated that they thought they were voted off at least 60% of the time ($\bar{x} = 62.96$, $SD = 22.42$). These results indicate that the rejection manipulation was successful in both games.

3.3 Main outcomes

3.3.1 Mood (H1 and H2). Participants felt less happy after playing SQ ($t(115) = 6.20$, $p < .001$), had higher feelings of arousal ($t(115) = -2.51$, $p = .01$), and lower feelings of dominance ($t(115) = 5.20$, $p < .001$), compared to the scores on these measures before playing SQ. SQ and CB differed significantly on all mood measures, and in all comparisons, SQ had a larger impact on mood than CB (see Table 2). CB did not affect arousal while SQ increased arousal, and did so significantly more than CB ($\eta_p^2 = .07$; see Figure 4). Players felt less happy after playing both SQ and CB, and that difference was significantly larger for SQ compared to CB ($\eta_p^2 = .07$; see Figure 5). Similarly, feelings of dominance decreased for both SQ and CB, and the decrease was significantly larger in SQ ($\eta_p^2 = .06$; see Figure 6).

3.3.2 Basic psychological needs (H3). Similar to the results on mood, participants felt significantly more threatened in their feelings of belongingness ($\eta_p^2 = .16$), self-esteem ($\eta_p^2 = .15$) and their feelings of having a meaningful existence ($\eta_p^2 = .05$) after playing SQ than after playing CB (see Table 2). We found no significant difference in feelings of control (see Table 2), meaning both games had an equal effect on feelings of control ($\eta_p^2 = .01$).

3.3.3 Feelings of rejection and group cohesion (H4). Participants had significantly stronger feelings of rejection ($\eta_p^2 = .24$) in SQ than in CB and felt the group of players was less cohesive ($\eta_p^2 = .11$) in SQ than in CB (see Table 2). Contrary to our expectations a trend effect ($p = .07$) suggested that participants felt other players noticed or included them more in SQ than in CB ($\eta_p^2 = .03$; see Table 2).

Table 2: Descriptives and Repeated Measures ANOVA Results for Hypothesis 1 – 6

	ScrollQuest		Cyberball		<i>df</i>	<i>F</i>	<i>p</i>	η_p^2
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>				
Pre-test happiness	3.77	0.76	3.89	0.71				
Post-test happiness	3.20	0.90	3.62	0.72				
Difference happiness	-0.57**	0.99	-0.27**	0.66	1,115	6.96	.009	.06
Pre-test arousal	2.30	0.93	2.37	0.81				
Post-test arousal	2.53	0.94	2.30	0.83				
Difference arousal	0.23*	1.00	-0.07	0.78	1,115	9.46	.003	.07
Pre-test dominance	3.25	0.91	3.28	0.88				
Post-test dominance	2.76	0.92	3.11	0.84				
Difference dominance	-0.48**	1.02	-0.16*	0.79	1, 115	7.25	.008	.06
Belongingness	4.53	2.16	5.67	2.18	1, 115	22.09	<.001	.16
Control	4.21	1.67	4.40	1.71	1, 115	1.03	.31	.01
Self-esteem	5.42	1.61	6.24	1.70	1, 115	22.50	<.001	.15
Meaningful existence	6.04	2.40	6.68	2.00	1, 115	6.31	.01	.05
Rejection	6.14	2.18	4.70	2.30	1, 115	35.79	<.001	.24
Inclusion	5.52	1.74	5.89	1.85	1, 115	3.26	.07	.03
Cohesion	3.83	1.44	4.46	1.49	1, 115	13.70	<.001	.11
Liking	2.85	1.12	2.17	0.99	1, 110	35.93	<.001	.25
Withdrawal	3.65	1.09	3.98	1.12	1, 110	5.07	.03	.04
Retribution	3.77	1.29	4.23	1.15	1, 110	7.08	.009	.06

Note. * $p < .05$; ** $p < .001$

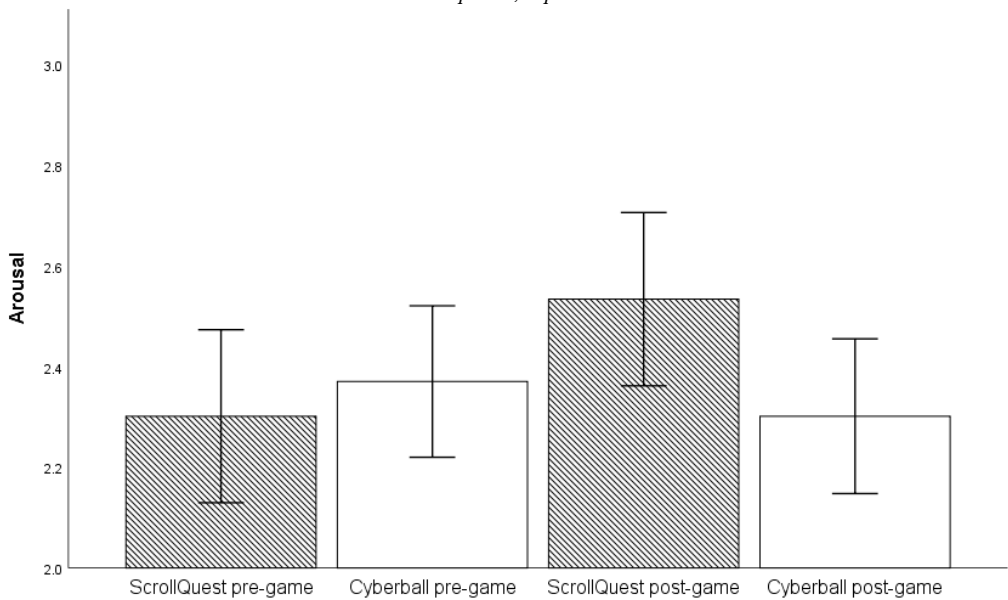


Fig. 4. Changes over time in feelings of arousal for ScrollQuest and Cyberball (Means). Error bars represent 95% Confidence Intervals.

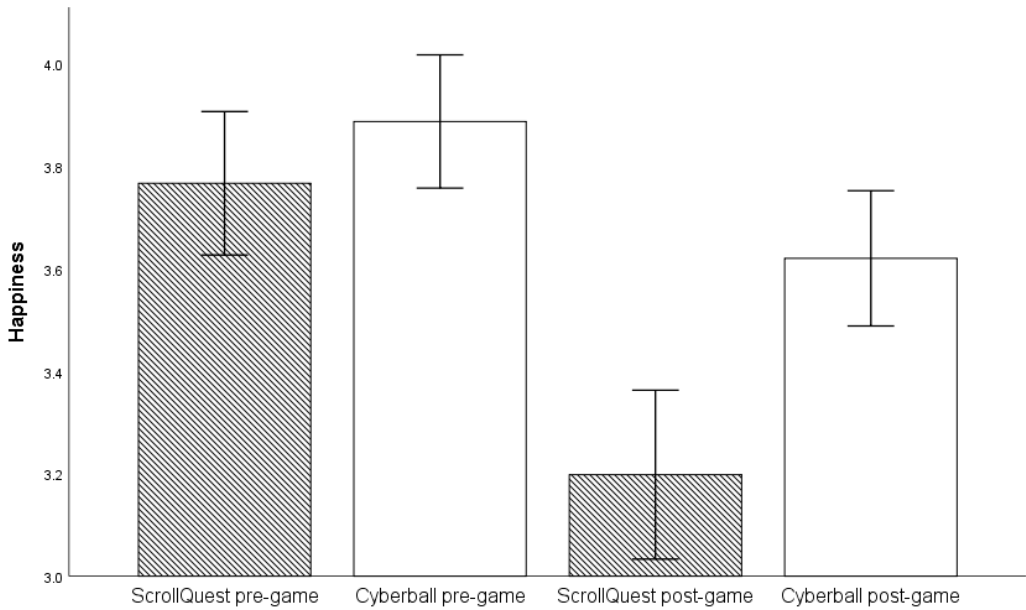


Fig. 5. Changes over time in feelings of happiness for ScrollQuest and Cyberball (Means). Error bars represent 95% Confidence Intervals.

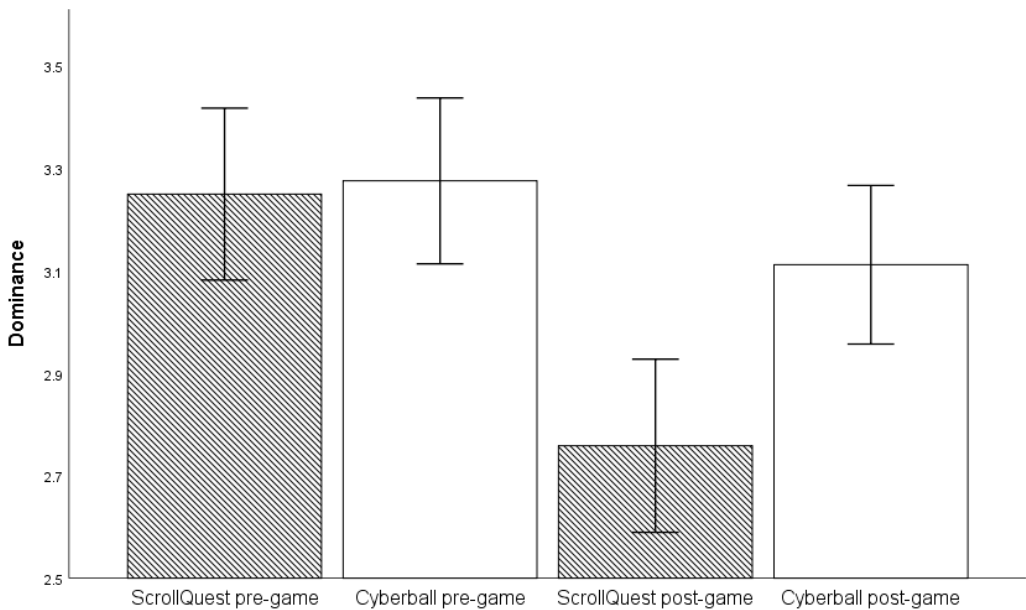


Fig. 6. Changes over time in feelings of dominance for ScrollQuest and Cyberball (Means). Error bars represent 95% Confidence Intervals.

3.3.4 Behavioral responses (H5) and liking (H6). Contrary to what we expected, participants indicated that after SQ, compared to after CB, they would show significantly less withdrawal

behavior ($\eta_p^2 = .04$) and less retribution ($\eta_p^2 = .06$) towards the other players if encountering them after the game (see Table 2). As hypothesized, participants liked SQ significantly more than CB ($\eta_p^2 = .25$; see Table 2).

3.4 Interaction effects (H7)

No interaction effects were found with depressive symptoms, anxiety symptoms, and rejection expectations for any of the outcome measures. However, anxious rejection sensitivity (RS) did act as a moderator for five of the outcome measures. Anxious RS interacted significantly with the game conditions and feelings of control ($F(1,1,114) = 7.28, p = .008, \eta_p^2 = .06$), self-esteem ($F(1,1,114) = 4.81, p = .03, \eta_p^2 = .04$), feelings of rejection ($F(1,1,114) = 3.98, p = .048, \eta_p^2 = .03$), feelings of cohesion ($F(1,1,111) = 4.31, p = .04, \eta_p^2 = .04$), and retribution ($F(1,1,106) = 4.04, p = .047, \eta_p^2 = .04$). Correlations showed that higher anxious RS was correlated with lower feelings of control and self-esteem and higher feelings of rejection and retribution in SQ, but that this was not the case in CB (see Table 3). Thus, participants with higher anxious RS experienced a stronger threat to their need for control and self-esteem, felt more rejected and would be less inclined to retribute after playing SQ, than participants with lower anxious RS. While anxious RS was not correlated with feelings of cohesion in SQ or CB (see Table 3), the correlations did differ significantly ($z = -2.22, p = .03$). This could indicate a similar pattern for cohesion as for the other four moderated outcomes.

Table 3: Pearson correlations between anxious rejection sensitivity and main outcomes

	Anxious RS		Control		Self-esteem		Rejection		Cohesion	
	SQ	CB	SQ	CB	SQ	CB	SQ	CB	SQ	CB
Anxious RS	-	-								
Control	-.21*	.08	-	-						
Self-esteem	-.32**	-.07	.61**	.62**	-	-				
Rejection	.27**	.05	-.67**	-.76**	-.66**	-.64**	-	-		
Cohesion	-.13	.13	.54**	.63**	.53**	.42**	-.55**	-.51**	-	-
Retribution	-.22*	.10	-.00	.10	.15	.10	-.17	-.13	-.07	.06

Note. RS = rejection sensitivity; * $p < .05$; ** $p < .01$

4 DISCUSSION

The research on rejection has a long history that has provided the field with insights on social pain [10], performance [32], player enjoyment in multiplayer games [30], neuroticism [33], social anxiety [34], and prosocial behavior [35], among other issues. We reviewed several limitations of current rejection experimental tasks, including: lack of behavioral responses, limited length, and lack of engagement in task. Our current study with young adults suggests that several of these limitations could be addressed by a video game. Our findings showed that ScrollQuest, which was specifically designed as a rejection experimental task, had a negative effect on mood. Moreover, when comparing ScrollQuest to the rejection experimental task Cyberball [27], ScrollQuest proved to be more effective at evoking negative responses from participants. Participants' mood was more negatively affected, and they felt more threatened in their basic psychological needs after playing ScrollQuest than after playing Cyberball. Moreover, participants indicated they felt more excluded or ignored and experienced less group cohesion during ScrollQuest. Interestingly, despite a range of negative emotions and experiences triggered by rejection episodes in ScrollQuest, in line with

our expectations, participants nevertheless indicated that they liked ScrollQuest more than Cyberball. Moreover, we found no difference between ScrollQuest and Cyberball in how strongly participants felt their need for control was threatened.

Contrary to our hypotheses, participants indicated they felt more noticed or included in ScrollQuest and they would show less negative behavior after ScrollQuest than after Cyberball, where we expected it the other way around. Finally, we expected that participants with more mental health symptoms or rejection sensitivity would show stronger negative responses to ScrollQuest compared to Cyberball, but we exclusively found this result for anxious rejection sensitivity and five of the thirteen outcome measures, and not for all.

4.1 Negative impact

Similar to previous research on rejection, with Cyberball [12] and with a range of rejection manipulations [9], both ScrollQuest and Cyberball had a negative effect on participants' mood. However, this effect was stronger in ScrollQuest than in Cyberball. Our results also showed that ScrollQuest had a stronger effect on whether participants felt threatened in their basic psychological needs, specifically in their need to belong, self-esteem and feelings of having a meaningful existence. Participants indicated they felt more excluded or ignored and they experienced less group cohesion in ScrollQuest compared to Cyberball. These results all suggest that the rejection in ScrollQuest had a stronger negative effect compared to Cyberball.

A possible explanation for the stronger negative effect for ScrollQuest is that ScrollQuest was designed to include moments of reflection. If the young adults in our study had more time to reflect on the rejection itself this could be why they felt the rejection more strongly. A meta-analysis on rejection manipulations [9] showed that in general, rejection experiences in the lab alters mood in a negative direction, but only towards a neutral state. Therefore, absolute negative responses might be delayed, because it requires reflection on the situation. Our results could indicate that the moments of reflection we built in were indeed used by the participants to process their rejection feelings more deeply and therefore the rejection might have affected their mood more strongly.

Second, the stronger effect of ScrollQuest could be due to the longer experience. A longer experience could simply mean that there is "more" rejection. However, if that is the case this would mean that a longer Cyberball experience would also produce stronger results. Yet, a meta-analysis on 120 Cyberball studies showed that a longer Cyberball experience does not change its effects [12], so the stronger effect of ScrollQuest is not likely solely due to the length of the experience.

Another reason that the participants were more affected by ScrollQuest than by Cyberball, could be that the experience had more meaning. Cyberball is a simple experience of tossing a ball in which participants have little opportunity to connect to the other players. In contrast, ScrollQuest involves players teaming up to achieve the same goals, and proceed by helping each other and sharing goods, elements that are important in the development of friendships [56]. Moreover, online interactions, such as those found within games like ScrollQuest, are increasingly part of young people's day-to-day social lives [43, 44]. Thus, an experience in a video game like ScrollQuest would make more intuitive sense to the young adults in our study.

Finally, ScrollQuest may have had a stronger negative effect because of the performance nature of the task. A meta-analysis on laboratory studies of acute psychological stressors showed that stronger stress responses were found when experimental tasks included a performance, had uncontrollable elements, or a social-evaluative threat [55]. Cyberball barely requires skills, and although the task is uncontrollable, there is little social-evaluative threat. Meanwhile, gameplay in ScrollQuest is more complicated than in Cyberball - it requires more performance - it is partly uncontrollable (participants are voted off regardless of their performance), and under threat of social evaluation (other players can use “thumbs-down” emoticons and vote the participant off), which could explain the stronger negative effect. Taken together the results on the impact of ScrollQuest seem to show that we were successful in creating a rejection experimental task that elicits negative feelings regarding rejection in young adults. In a broader perspective, this suggests that video games that are used in rejection research should (1) contain moments of reflection, (2) have a performative element, and (3) be designed to facilitate meaningful connections between players (e.g., through collective goals, helping behaviors and opportunities for sharing).

4.2 Positive impact

Even though participants were more negatively impacted by the rejection in ScrollQuest than in Cyberball, they nevertheless liked playing ScrollQuest better. Our results show that we seemed to have been successful in our goal of engagement. We also found that participants felt that the other players noticed or included them more in ScrollQuest, which could indicate that they felt more connected to the other players. Although the other players in ScrollQuest could still be considered strangers, digital natives such as our participants easily form relationships with others in online video games [72, 73]. If the young adults in our study felt a stronger connection with the other players in ScrollQuest, it could explain why they were more negatively impacted by the rejection. Another explanation for why the participants felt more excluded and ignored and at the same time also more included and noticed while playing ScrollQuest compared to Cyberball, could be that the participants felt like the other players in ScrollQuest noticed them, but deliberately chose to exclude them. This could have made the rejection more personal and as a result the impact of the rejection could have been more negatively felt. However, this is a hypothesis and more work is needed to explain the effect.

Even though participants were more negatively affected by ScrollQuest, contrary to our expectations, participants indicated they would respond with less negative behavior (withdrawal and retribution) if they were to meet the other players after playing ScrollQuest than after playing Cyberball. It could be that the participants valued the relationship with the other players in ScrollQuest more than in Cyberball. In Cyberball, the other “players” do not have the opportunity to display personality or emotions. ScrollQuest is a longer experience with varying types of gameplay, allowing the other players to display distinct personalities through their gameplay and display emotions through their actions and their use of emoticons. The participants could have been more interested to invest in the relationship with the players in ScrollQuest than with the relatively dull “players” in Cyberball, which would make them less inclined to show negative behavior. Indeed, it is thought that people respond more with avoidance and aggression if they value the relationship less or if their expectations for repair are lower [74]. Taken together, our results suggest that ScrollQuest is a more enjoyable and socially engaging experience than

Cyberball, eliciting negative feelings in young adults and at the same time inspiring them to potentially reconnect to their rejecters. Our results are in line with the notion that video games can contain both positive and negative experiences, while still being engaging [75, 76], and are therefore suitable to be used in more formal contexts like research or mental health treatment [30, 77-80].

4.3 Need for control

We did not find that feelings of control were more negatively affected in ScrollQuest than in Cyberball. This could be due to the fact that in ScrollQuest, participants were always able to do something in the game, even when they were rejected. They could use the emoticons to let the others know how they were feeling and if they were not frozen in the Fight level they could still go off on their own. In Cyberball, if participants did not receive the ball, they could not do anything else except watch the others. One might then have expected that Cyberball would have had a stronger effect on feelings of control than ScrollQuest, but we did not find this effect. Perhaps the low feelings of control in Cyberball were more driven by frustration in the game, while the participants did not care about doing anything else, while in ScrollQuest they might not have been frustrated with the game, but they did feel limited in what they could do in the game because they were voted off.

4.4 Anxious rejection sensitivity

In line with our hypothesis, we found that for need for control, need for self-esteem, feelings of rejection and feelings of cohesion, ScrollQuest had a stronger negative impact on participants with higher anxious rejection sensitivity than those with lower anxious rejection sensitivity, while for Cyberball it was the other way around. Since young adults who are rejection sensitive interpret ambiguous situations as rejecting and overreact to these situations [3], this would explain why in an ambiguous situation like ScrollQuest they would do the same.

Furthermore, we found that participants with higher anxious rejection sensitivity indicated they would use less retribution after ScrollQuest than participants with lower anxious rejection sensitivity, while for Cyberball it was the other way around. Young adults who are sensitive to rejection are especially interested in the possibility to repair a relationship, more so than people who are not rejection sensitive [81]. It is possible that in ScrollQuest the participants who were sensitive to rejection believed there was still a possibility to repair the relationship and they were more motivated to do so, while in Cyberball they were less inspired to interact with the other “players” and would therefore retaliate more.

4.5 Rejection expectations and mental health symptoms

Contrary to what we expected, we did not find any interaction effects with rejection expectations on the responses to both games. In our sample, anxious rejection sensitivity and rejection sensitivity expectations were not significantly correlated. It seems that participants could be anxious about rejection situations without necessarily expecting rejection and the other way around. Expectations about rejection reflect the way you look at the world. These expectations are cognitive (“How likely do you think it is that the person in the situation would respond positively?”), whereas anxiety about rejection is more emotional (“How concerned or anxious

would you be in this situation?”). It could be that expectations about rejection are less relevant in a relatively new situation compared to the emotions related to rejection. Since most participants in our study had never played ScrollQuest or Cyberball before and were primed to expect a new game, emotions might have played a stronger role than expectations.

We also did not find any interaction effects with mental health symptoms, which was contrary to what we expected. Since this study was done with a non-clinical sample, it could be that the variation in mental health symptoms in our sample was not large enough to find meaningful differences. Indeed, in our study, mental health symptoms were relatively low overall.

4.6 Strengths, limitations and future directions

Although the results showed that ScrollQuest is potentially an effective experimental task to elicit feelings of rejection in young adults, there are some limitations to this study. First, the length of ScrollQuest and Cyberball differed significantly, so it could be that the effects are due to longer exposure to rejection. However, it is likely that simply extending the length of Cyberball would not have changed the results given a meta-analysis on Cyberball has shown that a longer Cyberball experience does not increase its effects [12]. Our aim was also not to recreate Cyberball, but to build on previous work and create a more engaging, motivationally interesting rejection experience that is just as, or more, powerful than other rejection experimental tasks.

Second, in this study we were limited to the use of self-reports to study the effects of rejection in ScrollQuest and Cyberball. Although in terms of needs being threatened, self-reports have proven to be suitable in the context of rejection [11], our results on participants' mood in the moment or behavioral responses are limited. Current alternatives in measuring behavioral responses have their own challenges. Aggression experimental tasks have been criticized repeatedly [37, 38] and most behavioral measures are administered after the rejection episode. Measuring in-game behavior in a video game like ScrollQuest might solve these issues. More ideally, a back-end system can be added to video games to measure behavior (e.g., retribution or withdrawal) automatically. In that way, behavior could be measured in a more direct and objective manner.

Another methodological limitation was that the reliability of two of the scales of the need-threat scale and the rejection scale were low for ScrollQuest. Interestingly, two of the three scales (Need to Belong and Feelings of Rejection) measured the feelings towards the other players, including items on acceptance and rejection at the same time. Perhaps our results indicate that players feel both rejected and included at the same time in ScrollQuest, which could be why the internal consistency of these scales was low, while for Cyberball this contrast does not exist. Even so, our results for these specific scales and items should be interpreted with caution.

Furthermore, it must be noted that some of the results do not hold up when they are corrected for multiple comparisons (for the outcomes “happiness”, “dominance”, “meaningful existence”, “withdrawal” and “retribution”). The effect sizes of these results are small. However, we decided to report on them, since ScrollQuest is a new experimental task, and we expected at least similar effects as with Cyberball, and not necessarily stronger effects. Still, the results with smaller effect sizes should be interpreted with caution.

A different limitation of our study is the use of one item to assess enjoyment. This is rather simplistic, especially for a complex medium like a video game. More elaborate measures are

available [82, 83] and we suggest that future studies with ScrollQuest make use of these types of measures, not only to accurately assess video game enjoyment, but also to inform future development.

In addition, we have assessed participants' current video game playing behavior, but not their previous experience with video games. Although a large group of participants indicated that they currently do not play video games, this does not mean they are not familiar with video games. Since familiarity with video games might impact their performance in the game and therefore their mood and interpretation of the rejection, future studies should include assessment of previous experiences with video games in addition to current video game playing behavior.

Last, a different type of limitation is that ScrollQuest needs at least two confederates to control the other three players in the game. Ideally, to make future studies with ScrollQuest, or with other video games, more accessible to a wide range of research groups with various gaming experience, a next step would be to develop research video games which includes NPCs (Non-Player Characters). These NPCs could then be programmed to exhibit the rejecting behaviors our current confederates exhibited, in order to trigger rejection episodes. Data from studies with confederates like the current study could be used to program the NPCs.

4.7 Conclusions

This first study on the use of ScrollQuest has shown that it might be an effective experimental task to study rejection in a digital environment in young adults. The game generated strong negative mood and interpretation effects, but at the same time was perceived as more enjoyable and socially engaging than a comparable rejection experimental task. Video games like ScrollQuest allow for the study of new research topics in the field of rejection, including behavioral responses during a rejection event, effects of rejection in online, interactive environments, and developmental changes in rejection responses over time. Video games could be powerful tools to help us further understand the effects of rejection to ultimately help young people deal with rejection in an adaptive manner.

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