

Perceived Toxicity and Well-Being in Online Gaming: The Impact of Gratitude Interventions and Emotional Accumulation

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ABSTRACT

This study investigates the impact of gratitude expression and emotional accumulation on reducing perceived toxicity and enhancing well-being in online gaming environments. Utilizing a multi-wave experimental design with League of Legends players in Taiwan, the experimental group was instructed to regularly express gratitude toward in-game elements. The findings revealed a marginally significant reduction in perceived toxicity for the experimental group, suggesting the potential of gratitude interventions in improving gaming environments. Besides, gratitude emotion enhanced players' well-being, while anger had the opposite effect. This study provides a new perspective on the mental health of online gamers.

CCS CONCEPTS

• Human-centered computing ~ Human computer interaction (HCI)~HCI design and evaluation methods ~ User studies

KEYWORDS

Online gaming, Perceived toxicity, Well-being, Gratitude intervention, Accumulated emotions

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1 Introduction and Related work

The rapid growth of multiplayer online games has created new opportunities for toxic behaviors, leading to various psychological issues among gamers[1,15]. A Unity report highlights an increase in gamers experiencing toxic behavior, rising from 68% in 2021 to 74% in 2023[22]. Perceived toxicity not only negatively impacts gamers' mental health but also damages the reputation of game developers. To address the toxicity issue, gamers tend to adopt coping strategies like avoidance, while game companies implement positive reinforcement(e.g. give reward) and punishment [3,18], which often prove to be marginally effective.

Recent research underscores the positive effects of regularly expressing gratitude, including broadening the mindsets of those who practice it [5] and enhancing their subjective well-being [4, 15]. Also, research suggests that prosocial behaviors strengthen positive social interactions in the game, boosting players' well-being by helping others[23]. Additionally, players with higher prosocial intentions are more likely to forgive others when offended or hurt [8]. While gratitude interventions enhance prosocial behavior intentions [2], the potential of gratitude interventions to reduce perceived toxicity has not yet been evaluated in online gaming with scarce embodiment and limited accountability [16], motivating this study to fill this research gap. Accumulated emotion refers to the sum of emotional intensity (scores) over a specific period. According to the Mood-Congruent Memory (MCM) principle, individuals tend to remember information that aligns with their current emotional state[11]. This study extends the principle to explore how accumulated event-related emotions influence perceived toxicity and well-being. By innovatively examining the long-term influencing factors of players' psychological state, this research aims to provide deeper insights into how emotional accumulation shapes online gaming experiences and contributes to the overall mental health of players.

This study aims to explore two research questions. First, do gratitude interventions in online gaming communities help reduce players' perceived toxicity and enhance their well-being? Second, in what ways do accumulated emotions influence gamers' well-being and their perception of toxicity?

2 Method

The participant criteria for this study were as follows: (1) Players who play at least two League of Legends matches per week. (2) Willingness to download our self-developed app. (3) Consent to the use of relevant data collected during the study for analysis. 59 participants completed all steps—30 in the experimental group and 29 in the control. All recruited participants were aged 18 or older.

This study utilized nine scales: seven for emotions (frustration, anger, gratitude, satisfaction, shame, guilt, pride) with five-point Likert responses, and one for perceived toxicity, measuring frequencies of negative behaviors from "never" to "always," as well as a well-being scale, also using a five-point Likert response. All scales were translated, adapted to the online gaming context, and piloted with nine online game players for clarity. All scales were translated into Chinese, with items modified to fit the context. A test was conducted by researchers to ensure clarity and refine wording as needed. Question order was randomized, and each scale included an item for attention check to ensure data validity. Sources and reliability details are provided in Table 1.

Table 1: Summary of Scales and Reliability

Scale and Resource	Cronbach's Alpha	Scale and Resource	Cronbach's Alpha
frustration [6]	0.728	satisfaction [13]	0.960
anger [6]	0.867	shame [14]	0.839
gratitude [7]	0.966	guilt [14]	0.820
perceived toxicity [20]	0.894	pride [21]	0.935
well-being[10]	0.928		

The study comprised four stages, with fourteen days in each. After completing the perceived toxicity scale for the pre-test, all the participants rehearsed app use during a 14-day practice period. The data collected were excluded from analysis. In the following three stages, all participants were asked to identify their most impressive games from a list of latest games played and then completed the emotion scales corresponding to the most memorable emotion in the nominated games (the first five notes in Figure 1). The game list was compiled through accessing web-scraped game data(<https://www.leagueofgraphs.com/zh/>). The app sent reminders to the participants who did not complete the scale. If the reminders were ineffective, we followed up with manual personal messages or phone calls. We also gauged the level of well-being in the end of both stage 1 and 2. All participants completed the perceived toxicity scale again for the post-test. The experimental group was asked to express gratitude before they were administered with the well-being scale, a step omitting for the control group.

On specified dates, the experimental group was asked to express gratitude for elements within the game over the past two weeks. A dialog box appears in the app to guide participants through the process of completing this task (See the 6th note in Figure 1).



Figure 1. App interface for session selection and gratitude expression

3 Analysis

3.1 Gratitude Intervention and Accumulated Emotion Impact on Perceived Toxicity

Our analysis of standardized perceived toxicity differences between pre-test and post-test with an independent t-test indicated a marginally significant between-group difference ($p < 0.1$). These results suggested that gratitude intervention may help reduce perceived toxicity. Accumulated emotion scores were calculated by summing all scores over the study period. Logistic regression analyzed their relationship with perceived toxicity reduction. In the experimental group, the test showed marginal significance ($p < 0.1$). Accumulated anger ($p < 0.05$) increased the likelihood of perceived toxicity reduction, whereas accumulated satisfaction ($p < 0.05$) decreased it. Given that a decrease in perceived toxicity was coded as 1 and others as 0, this result suggests that anger contributed to reducing perceived toxicity, while satisfaction had the opposite effect. No significant effects were found in the control group.

3.2 Gratitude Intervention and Accumulated Emotion Impact on Well-Being

We used linear regression to analyze Stage 1 well-being, with emotional variables and group categories as independent variables. Examining the coefficients revealed a significant positive effect of gratitude on well-being in Stage 1 ($p < 0.05$), indicating a notable correlation between gratitude and well-being, while no significance was observed for the group effect.

Hierarchical regression analysis was conducted on Stage 2 well-being. The first model only with Stage 1 well-being and the second model added with the group variable were both significant. In the third step, we included all Stage 2 emotion variables, resulting in a significant model with a substantial increase in R^2 . Examining the variables revealed Stage 1 well-being, Stage 2 anger, and Stage 2 gratitude were significant (p -value < 0.05), with their signs indicating that gratitude enhancing well-being, while anger reduces it.

4 Discussion

4.1 Research Findings

This study provides early evidence supporting the impact of gratitude intervention and accumulated emotion on players' perceived toxicity on online games. Gratitude intervention reduced perceived toxicity. Emotional variables such as anger and satisfaction were found to be key factors influencing perceived toxicity. Additionally, gratitude emotion significantly improved well-being, while anger decreased well-being.

4.2 Academic and Practical Contribution

This study examines perceived toxicity in online gaming, shedding lights on how accumulated emotions shape toxicity perceptions and validating the effectiveness of gratitude interventions in reducing these perceptions. By extending the benefits of mobile phone-based gratitude expression to gaming, we further demonstrate how specific emotions impact player well-being, contributing to gaming psychology and emotional regulation theories. From a practical perspective, the study confirms that regularly expressing gratitude may effectively reduce perceived toxicity, offering actionable interventions for game designers, developers, and policymakers. Based on these findings, the following recommendations are proposed. (1) Game developers should consider incorporating gratitude mechanisms into games. For instance, a "gratitude board" forum for players to express thanks could foster positive interactions among players in a healthy gaming atmosphere. (2) Post-game reflections help players address their emotions. Game designers should implement emotion management assisting players to cope with feelings, offer constructive suggestions via chatbots [9,12], lowering perceived toxicity according to our study findings.

4.3 Research Limitations

This study is limited in generalizability and interpretation. Key issues and recommendations are provided. While our sample size satisfied the minimum requirements in recommended research heuristics [19], future studies should extend our design with a larger sample size. Our sample mainly included young adults of an age range from 18 to 32. Future studies should include a broader range as well as diverse backgrounds. To counter confounding effects, future studies may assess whether app-user interactions (without gratitude) also impact the dependent variables.

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