The Guardians: Designing a Game for Long-term Engagement with Mental Health Therapy

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***Abstract*—This work introduces *The Guardians: Unite the Realms*, a novel free-to-play and publicly released mobile game that encourages the adoption of healthy real-world behaviours in exchange for rewards that enrich the gaming experience. We describe the game, its grounding in a mental health therapy known as behavioural activation, and how we designed it to keep players engaged over time. Instead of using traditional digital health gamification techniques such as badges or leaderboards, *The Guardians* creates a motivational pull by embedding the therapy into a complete mobile game. In-game items earned via the therapy have an immediate purpose in the game and, thus, they are considered intrinsically valuable by players. Analysis of game interaction data from 7,782 real-world users suggests 15-day and 30-day retention rates of 10.0% and 6.6%, respectively, which is more than double the average retention levels of most digital mental health interventions. Furthermore, players reported completion of a healthy real-world task on 69.0% of days played (37,574 completed tasks in 54,461 total days). We also report interaction metrics with game features and the effectiveness of the players' chosen real-world activities.**

***Index Terms*—digital mental health interventions, mobile game design, serious games, real-world user data, well-being, behavioural activation.**

I. Introduction

Levels of mental health conditions – such as depression and anxiety – are rising globally, with rates accelerated by the COVID-19 pandemic, and healthcare systems struggling to meet the increased demand for mental health services [1]. Digital channels provide an accessible and scalable route for delivering evidence-based psychotherapy protocols to those in need. However, despite the growing availability of digital mental health interventions (DMHIs), most apps suffer from low user retention when released *in the wild* [2].

To address this challenge, we developed and released *The Guardians: Unite the Realms*[1] – a free-to-play mobile game that incentivises players to regularly complete healthy real-world tasks in exchange for in-game rewards (virtual pets and other game items) that have immediate and intrinsic value in the game (Fig. 1). The design of the mental health intervention in our game is informed by *behavioural activation theory* – an evidence-based framework that helps individuals to reduce depressive symptoms by encouraging them to engage in adaptive and pleasant behaviours [3], [4]. Importantly, surrounding this intervention is a full game experience, with a rewards mechanism that we distinguish from *gamification* – a design pattern that is often used in digital health [5]. While both gamification and *The Guardians* reward players for taking real-world actions, the *realisable value* of these rewards to a user is considerably different, both in nature and extent.

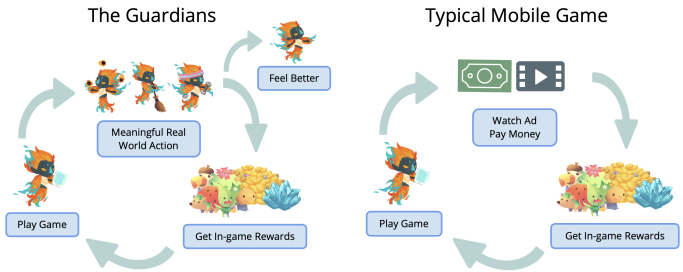

Fig. 1. *The Guardians* (left) grants players in-game rewards that further their goal of completing the game in exchange for completing healthy real-world actions. This has parallels to typical mobile games (right), where players must watch ads or pay money to receive in-game rewards.

This difference in value can be explained by how the rewards are integrated into the user experience. In gamification, rewards have cosmetic value; for example, a player might receive a badge or see their name on a leaderboard. However, the rewards are rarely given intrinsic value in the mechanics of the digital experience, leading some to argue that many implementations of gamification are superficial [6], [7]. By contrast, in *The Guardians*, rewards are designed to add to the depth and enjoyment of the gaming experience. By acknowledging factors such as challenge, fantasy, and curiosity that make games inherently motivating [8], [9], rewards in *The Guardians* are designed to further a player's goals within the game. The rewards are therefore given a context and inherent value predicated on how they enable the player to further indulge in the challenge, fantasy, or curiosity of the game. Furthermore, as the values of these rewards can be immediately realised by the player after completing their task, they do not need to account for *delayed gratification* when assessing the cost-benefit of taking healthy real-world actions.

This paper makes three main contributions. First, we describe the design of *The Guardians*, with details of its mechanics, narrative and intended player experience. Second, we

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[1]*The Guardians: Unite the Realms* is available for free and without in-game advertising on iOS from the US App Store and Android from the US Google Play Store. Visit https://guardians.media.mit.edu/ to learn more.

present an analysis of real-world engagement with the game and its underlying therapy protocol based on data from 7,782 players. Finally, we present an analysis of interactions with specific game features and the effectiveness of the chosen real-world tasks on player well-being. We hope these analyses will provide interesting insights to audiences interested in advancing game design for mental health interventions.

II. Related Work

A. Engagement with Digital Mental Health Interventions

Digital channels provide a way to scalably deliver established mental health therapy protocols to those in need. However, engagement with digital experiences and adherence to the protocols they administer are critical challenges. A recent review of real-world mental health app usage by Baumel et al. [2] suggests that across a sample of 93 mental health apps (with median total installs of 100,000), median Day-N retention rates at 15-day and 30-day stages were only 3.9% (IQR 10.3%) and 3.3% (IQR 6.2%), respectively. Baumel et al. propose that because digital mental health interventions (DMHIs) require users to manage their health away from traditional care settings such as face-to-face therapy, the experiences must compete with other stimuli in everyday life, including other digital media. Furthermore, many other contextual factors – such as the nature and severity of a user's mental health symptoms and the extent the intervention is tailored to individual characteristics and preferences – can influence user engagement patterns with DMHIs [10].

The concept of engagement with digital media has been explored at length in both the game and digital health literature [11], [12], [13], [14]. It represents a multi-faceted construct, with behavioural, cognitive, and affective dimensions, which vary in strength over different time periods (e.g., within a usage session versus across multiple sessions). Combined, these components associate with different profiles of user retention, for example long-term users versus immediate churners. Furthermore, they contribute to more subjective sensations of engagement, such as *immersion*, *presence*, and *flow*, that a user feels as they partake in the digital experience [11], [13].

In DMHIs, the notion of *effective engagement* is of additional interest. It refers to forms of engagement which correlate with achieving the intended health outcomes, rather than simply any form of engagement [12]. To isolate it from more general manifestations of engagement requires a more nuanced study, using data free from biases that might modify engagement behaviours such as clinical trial protocols and incentives [15]. To achieve this, several experts have called for more transparent real-world reports on DMHI usage, where multimodal data streams are assessed to identify the *optimal doses*, *effective features* and *mechanisms of action* the correlate with intervention effectiveness [11], [16], [17].

B. Video Games and Gameful Design

Humans engage deeply with video games. This engagement is created as video games are intrinsically rewarding, providing players with situations and challenges which help them to feel immediate senses of competency, autonomy, and relatedness [9], [18]. In turn, this motivates players to play the video game more, as humans are more motivated to take actions in contexts where they feel they will have an effect on outcomes – a phenomenon addressed by *Self-Determination Theory* [19]. Central to creating scenarios of such psychological poignancy are the game *mechanics* and the patterns of player *dynamics* they invoke. Therefore, through careful engineering of challenges, feedback and progress, a game designer can create an experience that keeps a player's long-term interest, rewarding them for their curiosity, dedication, and mastery.

Such impressive outcomes on human behaviour have thus led many to introduce game features into more serious contexts such as health management [20], [21], [22], [14], a trend referred to as *gameful design* [23]. These efforts have been conducted at a variety of scales, from *gamification* [5], which uses game components such as leaderboards or badges to bring excitement to non-game systems but does not introduce a full game mechanic, to *serious games* [14], [13], which employ a full game mechanic but where the narrative and gameplay is tailored to real-world contexts such as lifestyle management.

Notable examples of game-like systems with mental health applications include SPARX – a fantasy game that provides players with an interactive cognitive behavioural therapy (CBT) experience [24]. SuperBetter is another example, which promotes building resilience by integrating features such as *power-ups* and *quests* into the real-life story of the player [25]. Finally, EndeavorRx is a game for individuals with attention-deficit hyperactivity disorder (ADHD) which makes cognitive and motor skill exercises more enjoyable [26]. Several recent review papers provide further detail on the use of *gameful design* in mental health contexts [22], [20]. *The Guardians: Unite the Realms*[2] is distinct from this previous work as, to the best of our knowledge, it is the first time behavioural activation theory has been embedded into a free-to-play mobile gaming experience and deployed publicly.

III. Design and Development of The Guardians

The Guardians: Unite the Realms was designed to incentivise real-world tasks via a rewards mechanism (Fig. 1), where rewards are given context and value via their central purpose in the broader game mechanics. This has parallels to rewards mechanisms in typical mobile games, but differs in how a player earns a reward: they complete activities to manage their well-being, rather than spend money or spend time watching ads. In *The Guardians*, rewards consist of *pets* – characters that complete in-game *missions* – and other virtual currency, such as items that boost the experience points (*XP*) gained from missions. By collecting these rewards, a player can progress further in the game and interact with more of its features.

To make the game appeal to a diverse audience, we chose a genre where a player's progress is not determined by dexterity or quick reaction times. Moreover, we wanted to create a

[2]This version of the game – *The Guardians: Unite the Realms* – is informed by, but different from, a previous iteration of the concept that incentivised daily diary completion and was assessed in a private clinical trial setting [27].

Fig. 2. Screenshots of general gameplay in *The Guardians*. 1) The main screen where players interact with pets; 2) The mission board; 3) Assembling a pet team for a mission; 4) Collecting mission rewards; 5) The item shop; 6) The spirit gem upgrade tree; 7) Pet management; 8) Merging duplicate pets.

Fig. 3. An overview of the embedded behavioural activation protocol. 1) Players open the game and see a large shining button prompting them to choose a real-world task / adventure for the day; 2) The game gives them tips on successful BA techniques; 3) The player chooses from 75 pre-made tasks or chooses a custom one; 4) The player completes the behavioural activation task in real life; 5) The player reports their task is complete; 6) The player is prompted to reflect on whether the behaviour helped their mood; 7) The player receives rewards, including new pets; 8) The new pets and rewards can be used to further the player's progress in the game.

eudaemonic gaming experience and narrative to evoke positive feelings for players, such as productivity, motivation and inspiration. Therefore, we designed *The Guardians* as a pet collection strategy game, where players collect and level up pets by sending them on missions with an end-goal to free each *realm's Guardian* from evil characters known as *Scorians*. The general gameplay and behavioural activation features of *The Guardians* are presented in Figs. 2 and 3.

A. Embedding Behavioural Activation into a Game

A critical design challenge for *The Guardians* was how to embed the behavioural activation protocol. Behavioural activation (BA) is an evidence-based psychotherapy that helps individuals to reduce depressive symptoms, through a combination of features including tracking perceived correlations between mood and activities, engaging in adaptive activities, and receiving psycho-education [3], [4]. Depressive mood can persist due to an individual's disinterest in engaging in pleasant activities (i.e., *anhedonia*). BA functions to counteract this inertia by encouraging patients to engage in pleasant activities that are initially discordant with mood. Eventually, after consistent practice, patients enjoy engaging with pleasant activities again. Conventionally, BA has been administered with a therapist *in-the-loop* to guide and motivate individuals through the process. However, more recently, *self-help* digital versions of the protocol have been developed [28] which help scale the therapy to more individuals, including to those who may not have access to a therapist.

The variant of BA embedded in *The Guardians* focuses solely on encouraging players to choose, perform, and reflect on adaptive real-world activities (Fig. 3). Players are presented with a curated list of activities from categories of "Basics", "Fitness", "Fun", "Social", "Art" or "Other", where specific activities were informed by BA treatment manuals [3], [29] and chosen for their ability to create feelings of productivity, achievement, creativity, or fun. Each activity lasts between 3-60 minutes, and once this time has elapsed, the player receives a notification to return to the game. On returning, they are prompted to briefly reflect on how they feel after performing the action, and then they receive their rewards which can be used immediately in the game. Players are only rewarded once per day for performing one real-world task[3], and as rewards augment a player's ability to vary their gameplay and make progress towards the game's objectives, players are incentivised to complete tasks consistently and over an extended period of time. Performing these adaptive and pleasant tasks on such a schedule is conducive to converting the practice of self-care behaviour into a habit, a construct that is associated with positive long-term health outcomes [30].

The decision to incorporate a lightweight BA protocol reflects a core design principle to keep the *The Guardians* as *gameful* as possible. In *The Guardians'* BA protocol, players are asked to complete real-world tasks and reflect on how they make them feel, where the reflection step is considered critical for reinforcing the benefits of the task [31]. However, players are not presented with BA-specific historical trends such as

[3]Completing more than one real-world task per day is not permitted as it was felt this would lead to rapid completion of the game which would be counterproductive to the goal of encouraging long-term engagement in self-care behaviours. Additionally, users can still play the game on days where they do not wish to complete a real-world task, though these days yield less progress towards the game's objectives.

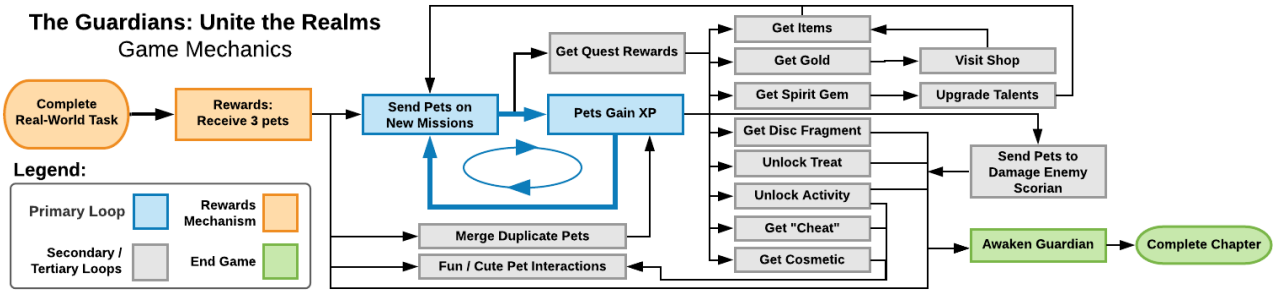


Fig. 4. *The Guardians* contains a *primary loop* focused on pet missions and several *secondary* and *tertiary loops* to add depth and variety to the game.

their past moods and real-world tasks completed. This feature was excluded due to (i) concerns about *data-induced guilt* – where a user feels shame or regret about their actions (or lack of actions) relative to the trends the system displays and, thus, may be discouraged from using it [32], and (ii) as part of the appeal of games results from their ability to offer an escape from reality and to start afresh, it was felt that including a feature that contains a large amount of real-world data would run contrary to the escapist aesthetic we wanted to create (as, e.g., it may remind users of how depressed they have been feeling). Nonetheless, it represents the most significant deviation of the game from the traditional BA protocol and future work will assess the impact of its exclusion.

Finally, it is worth noting that other psychotherapy protocols could have been chosen for this project. However, behavioural activation was favoured for two reasons: (i) it is a simple yet effective intervention for depression [4], and (ii) it is more aligned with the spirit of the game. Namely, the characters in this game go on adventures and completing BA tasks can be interpreted as going on adventures.

B. Overall Gameplay

In *The Guardians*, players are tasked with completing five objectives per *realm*: to collect all the pets and *medallion pieces*, to unlock all *activities*, to complete a *realm-specific objective*, and to defeat the *Scorian*[4]. To do so, they must collect pets and items via completing daily BA tasks, referred to as *daily adventures*. The player then sends these pets on missions in order to increase their skills, where each mission has specific skill requirements for the pet team that can complete it. The player is only shown a small subset of available missions at a time, and each mission requires *stamina*, which regenerates in real-time. Therefore, the player must carefully choose which pets to use in which missions in order to most efficiently complete the objectives of the realm.

Pet missions are always completed successfully after a short period of time, and when the pets return, they are rewarded with experience in a particular skill. Additionally, the player is rewarded with various currencies, cosmetic items, or tools to aid their progress through the game (cf. Fig. 4). As pets level up, more missions with higher skill requirements are unlocked. By levelling up enough pets, completing enough missions, and completing other realm-specific tasks, the player will eventually be able to send their most powerful pets to free the *Guardian* of the realm and defeat the *Scorian* invader.

To foster long-term interest, *The Guardians* is divided into specific realms, each of which unlocks after 21 days, regardless of player progress. This was intended to bring back lapsed players. Each realm contains unique gameplay mechanics. First, players complete *Twilight Forest*, a plain introductory realm. The next realm is *Duskfall Manor*, which introduces *candy* that the pets must collect in some missions and then use to partake in others. Finally, the last realm – *Festival of the Sun* – introduces the *flare* mechanic, where each pet *flares* and receives double rewards every five missions and, thus, must be managed to maximise *flare* bonuses.

C. Contextualising Rewards in the Game Mechanics

The rewards mechanism in *The Guardians* is informed by *Gacha* games, and gives players random pets (and other virtual currency) as a reward for completing real-world tasks. The pets can be sent to improve their skills as described, as well as customised via costumes and nicknames. This way, players are drawn back each day by several factors: the curiosity of what pets and abilities they will receive next; the desire to continue improving and interacting with pets they have invested in (via the *sunk cost fallacy*); and, the desire to continue their progress towards completing the game and making their pets the heroes.

Fig. 4 shows the main game loops in *The Guardians* and how they contextualise the value of a pet reward. The blue shading represents the *primary loop*, where pets are repeatedly sent on missions to gain XP. The green shading represents the *end-state* of each realm in the game, and the grey shading represents the *secondary* and *tertiary loop* components, which give depth and variety to the gaming experience. The BA rewards mechanism is shaded in orange. It is worth noting that the orange shading alone would represent the scope of a purely cosmetic implementation of gamification, with no further game features to contextualise the value of the pet rewards. By contrast, in *The Guardians*, it is through the various intertwined game loops that rewards gain their value.

[4]A *realm* is a level of the game with unique theming, designed to last around three weeks to complete. Medallion pieces are *macguffins* to work towards collecting. *Activities* are cosmetic actions that pets can do in the background while idle (e.g., placing pets by the fire to toast marshmallows). *Realm-specific objectives* are tailored to the realm, such as finding and feeding pets *s'mores* in the *Twilight Forest*.

TABLE I
DESCRIPTION OF THE GUARDIANS REAL-WORLD USER DATASET.

Item	Description
Dataset size	Anonymised data[a] from 7,782 users was collected, corresponding to 54,461 interaction days. The data was collected between the dates 26th April 2020 (launch day) to 10th October 2020, and a date filter is applied to remove users who installed within 60 days of the end of the observation period.
App interaction data	The date the user installed the app is recorded. Dated gamestate objects are also created regularly following pertinent events such as completion of the real-world task or closing the app.
In-game interaction logs	Records of real-world task selection, completion and rating. Interactions with game features such as realms completed, missions completed, items collected, and gems/gold gathered and spent. Further interactions by individual pet, such as personalisations through naming and cosmetics, and dragging.

[a]*The Guardians* takes measures to protect the privacy of its users. No user demographics or location data are collected. Our privacy policy: https://guardians.media.mit.edu/privacy/.

Whether a player is motivated by unlocking everything, interacting with their pets, seeing the end of the story, becoming the hero, proving mastery over the game mechanics, or any other intrinsically motivating goals that the game inspires, the rewards are inherently useful towards that goal.

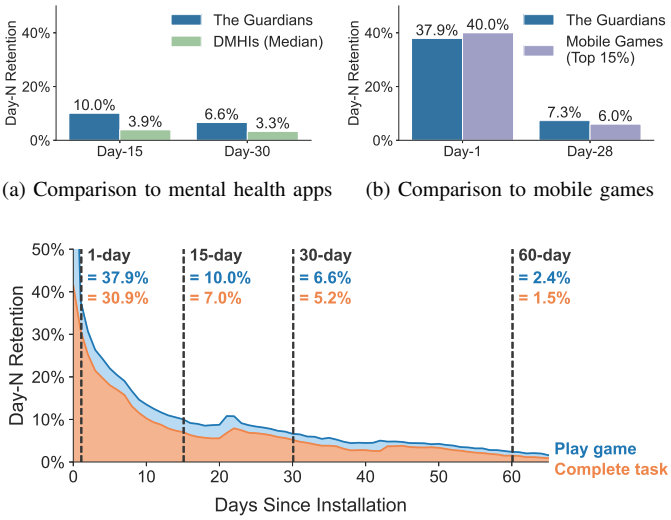
D. Character and Narrative Design

Focus groups involving 14 individuals were conducted early in the design process. The findings from this qualitative study were threefold. First, for pets to be likeable they should be easily recognisable and based on concepts that players are familiar with, e.g., "it's a tree-turtle!", or "I want to level up the strawberry-hedgehog!". Second, players need to feel a connection between their daily task and the game, and thus the story of *The Guardians* is tailored to echo the goals and lessons of behavioural activation. Finally, the evil *Scorians* were added after overwhelming feedback that players wanted some villain to fight, even in an otherwise peaceful game.

IV. THE GUARDIANS GAME DATA ANALYSIS

A. Outcome Metric Definitions and Data Collected

We perform analyses that pertain to both the concepts of *engagement* and *effectiveness*. *The Guardians* was designed to explicitly target engagement, without dedicated design to improve effectiveness beyond what might be expected from other behavioural activation protocols. However, we still report effectiveness results, as these may be useful reference points to readers. This paper's analysis of engagement is strictly behavioural. We processed anonymous user-level game statistics to derive metrics such as play retention, protocol retention, and feature popularity. Regarding effectiveness, *The Guardians* collects an explicit rating of well-being improvement when a player completes a real-world task. The question asked is "How do you feel after your adventure?" and players respond on a 5-point scale: "Worse", "Not As Good", "The Same", "A Little Better", "Much Better". While this measure does



(a) Comparison to mental health apps (b) Comparison to mobile games

(c) Day-N play and real-world task retention for *The Guardians*

Fig. 5. Day-N (hard) user retention (a-c) represents if a user played the game on day N after installing *The Guardians* on their device. Day-N real-world task retention (c) measures if players complete and return to rate a behavioural activation task on day N (i.e., they complete the flow in Fig. 3). The data sources for (a) and (b) can be found in [2] and [33], respectively, and these sources drive the days chosen for comparison.

not provide a complete assessment of the effectiveness of the embedded BA protocol on user well-being, its value suggests the relative efficacy of the tasks.

A summary of the data collected by *The Guardians* and used in the analysis is presented in Tab. I. *The Guardians* was publicly released on 26th April 2020 and marketing was only performed through Twitter and media articles.

B. Overall Game and Protocol Engagement

Day-N user retention[5] is displayed in Fig. 5. We define Day-N retention as the proportion of users that interact with the game or complete a protocol task on the Nth day since they installed the game[6], where Day-1 is the first day after installation, and the denominator is the number of users who install the game on Day-0. The 15-day and 30-day overall app retention rates (Fig. 5a) of 10.0% and 6.6%, respectively, compare favourably to the average retention rates for mental health apps reported by Baumel et al of 3.9% (IQR 10.3%) and 3.3% (IQR 6.2%) [2], with *The Guardians* showing an improvement of more than a factor of two over the median. Furthermore, the 1-day and 28-day retention of 37.9% and 7.3%, respectively, suggest *The Guardians* is in line with rates observed from the top 15% of mobile games [33] (Fig. 5b).

Retention with the embedded BA protocol is also shown in Fig. 5c, where a player is counted as retained if they return to rate their real-world activity. The 15-day and 30-day real-world task retention rates of 7.0% and 5.2%, respectively, suggest that *The Guardians* is also keeping the players who continue

[5]Hard retention is an alternative term for Day-N retention.

[6]Consistent with [2] we only consider users on Day-0 who installed and opened the app.

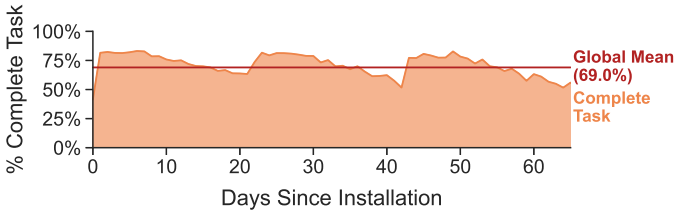


Fig. 6. The percentage of daily active users that complete the daily BA task. Global mean represents the average task completion over all days played (i.e., 37,574 tasks in 54,461 total days).

to play the game engaged in performing and reflecting on the real-world tasks it is designed to incentivise. Fig. 6 further supports this finding, where here real-world task completion is reported as a percentage of the number of daily active users. Accordingly, we report that tasks are completed on 69.0% of days played (37,574 tasks in 54,461 days).

Another interesting trend in Fig. 5c & Fig. 6 are the bumps around 21 and 42 days when new realms unlock. This suggests that new gameplay reengages lapsed players: both with the game and the BA protocol. The 2-day retention increase (Fig. 5c) from Day-20 & Day-41 is 23.1% & 6.3%, respectively, for playing, and 41.9% & 42.6% for task completion.

C. Engagement with Specific Game Features

To investigate specific game features associated with player retention, Fig. 7 shows the proportion of players that are retained after Day-0 given their actions on Day-0. We see that completing in-game missions (i.e., the *primary game loop*) results in the largest difference in the proportion of players that are retained after Day-0, closely followed by some optional pet interactions – dragging and dressing up with cosmetics. Completing the real-world BA task also results in a considerable difference, however nicknaming pets seems to be less decisive. Overall these trends suggest that it is important for players to interact with both the game features and the BA protocol on Day-0 if they are to be retained.

To assess longer term engagement trends, Fig. 8 presents how user behaviour in the first 7 days since installation associates with the overall time a user is retained (via *retention buckets*)[7]. We observe several interesting trends. First, overall game usage (Fig. 8a) and BA task completion (Fig. 8b) in the first 7 days are an indicator of longer overall retention, with 50% of the users that play 7 days or complete 6-7 tasks in the first 7 days remaining active for ≥ 31 days. This may suggest that encouraging consistent play from the outset is advisable for long-term engagement. However, while completing the BA task is a strong retention indicator for some users, it is noteworthy from Fig. 8b that 560 users complete no real-world tasks in the first 7 days but many keep playing over a longer horizon. As aforementioned, *The Guardians* can be played even if the user does not partake in the BA protocol, which may explain this group. Second, we note that BA task ratings in the first 7 days (Fig. 8c), as well as their variety

[7]We standardise the observation window length for these metrics to remove any sources of bias between the buckets (e.g., progression to a new realm)

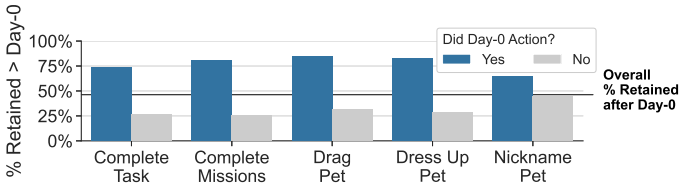


Fig. 7. Proportion of users retained after Day-0 given their actions on Day-0. "Complete Task" refers to completing and rating the BA task; "Complete Missions" refers to sending pets on in-game missions; the other items refer to optional in-game actions. NB: retention here is inclusive of any user that is seen again after Day-0, not just the users that are seen strictly on Day-1.

(Fig. 8d), do not show a clear association with long-term retention. This may suggest that the nature of the initial BA tasks is not overly important for long-term engagement, so long as a task is chosen and practiced regularly (cf. Fig. 8b).

Finally, we observe a variety of retention trends given interactions with game features in the first 7 days (Fig. 8e-j). For completing missions ((e); i.e., the *primary loop*) and optional features such as talent upgrades (f) and dragging pets (g), there is a clear trend that higher usage of these features in the first 7 days associates with longer retention. As talent upgrades and dragging pets are not essential for game progress, higher usage of the former feature may suggest a subtype of player who enjoys mastering the game, and higher usage of the latter may suggest a subtype who enjoys exploring/immersing themselves in the game's interactions regardless of making progress. However, for the remaining *tertiary loop* features

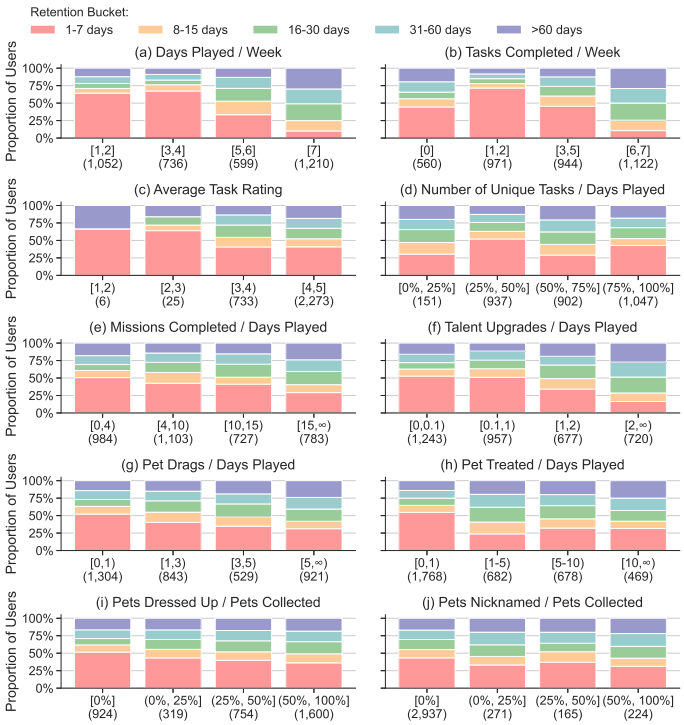


Fig. 8. Proportion of users in each *retention bucket* given their actions during the first 7 days of being a user. A retention bucket represents how long the user remained active. Users are also sorted into buckets based on the frequency / average value of actions in the first 7 days. NB: $[x, y)$ is interval notation and the sample size of each bucket is listed in parentheses under each label.

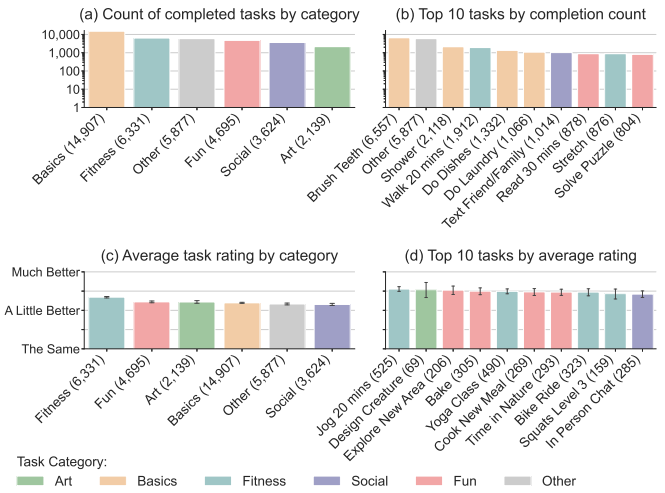


Fig. 9. Real-world task popularity and average rating by type of activity. NB: counts (a-b) are on a log-scale and sample size of each bar is in parentheses.

(h-j) – treating pets, dressing up pets, and nicknaming pets – the association between the usage level and retention is less clearcut, which may suggest these features have lower long-term value to users (i.e., they keep users less engaged across sessions). Future work will extend this analysis by identifying user subgroupings across all engagement metrics (e.g., by using clustering analysis) and testing if these i) predict long-term retention and ii) indicate user psychographic profiles.

D. Real-World Task Effectiveness

Fig. 9 reports the popularity and average rating of real-world tasks performed by users of *The Guardians*. Overall a broad range of activities are being performed across the main categories (Fig. 9a) and on average they are helping users to feel at least a little better (Fig. 9c). Fig. 9c suggests that fitness activities are the most effective, though we note that the difference in averages between the categories is small.

Regarding the popularity of individual activities from Fig. 9b, it is interesting that "Brush Teeth" is the most popular. It is the first activity displayed in the task menu, and it is also the quickest to yield a reward (3 minutes). Therefore, its popularity may reflect cheating of the rewards system. Furthermore, it is noteworthy that the "Other" / "Custom" activity is the second most popular in Fig. 9.b. This suggests that more task types could be introduced to appeal to players, although it is unlikely to represent further cheating, as the "Other" activity takes 30 minutes to yield rewards.

Finally, Fig. 10 displays the average real-world BA task rating over time. A slight increase by days since installation is observed, suggesting that as users play the game for longer they rate their real-world tasks slightly higher. As the direction of causality is not known, this trend may indicate that either i) users who feel more benefit from the embedded BA protocol are encouraged to play the game for longer, or alternatively ii) that users who play the game for longer gradually benefit more from the BA. Investigating this trend further by assessing user subgroups is left as important future work.

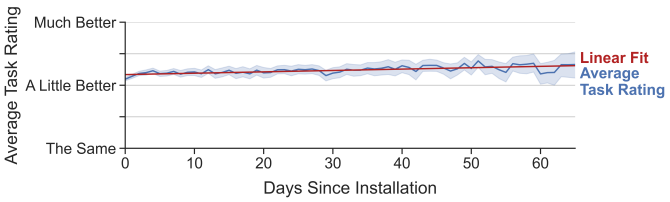


Fig. 10. Average real-world task rating by days since installation. A linear fit (day as independent variable) shows a slight increase in rating by day. A likelihood ratio test confirms the linear model is a significantly better fit for the data versus an "intercept-only" model ($p \ll 0.05$).

V. Discussion and Future Work

Our analyses suggest that *The Guardians: Unite the Realms* is succeeding at improving long-term player engagement relative to digital mental health intervention benchmarks. The finding that retention statistics are more comparable to top mobile games than to mental health apps (Fig. 5) begins to validate the design hypotheses that a) an in-game rewards mechanism – where rewards are contextualised within the game mechanics – can be used to foster long-term engagement; and, b) that a lightweight therapy protocol can be integrated coherently into a game in a way that does not detract significantly from the core enjoyment of the gaming experience. Furthermore, analysis of specific feature interactions has identified some in-game behaviours that associate strongly with long-term player retention, such as using the talent upgrades and dragging pets, and others that do not associate strongly, such as the variety of the selected BA tasks and the use of other in-game features such as nicknaming pets. Future analysis and game iterations will further test these associations to enable a deeper understanding of how specific features of *The Guardians* influence long-term engagement.

This work has limitations. First, the BA protocol only focuses on encouraging users to select, perform and reflect on real-world tasks, which is a subset of the full BA protocol. While this decision was made knowingly to minimise *data-induced guilt*, it may have implications on the effectiveness of the protocol. Second, we currently only report metrics of behavioural engagement and only use a single metric for effectiveness. Third, we do not actively control for cheating (e.g., by linking physical activity tasks to smartphone fitness trackers). This decision was made given i) the complexity and limitations such features would introduce and ii) the assumption that the draw of *The Guardians* is that it helps your mental health, and thus players who are not interested in the BA part of the game are not likely to continue it and will play other games instead. While it seems reasonable to conclude that the extent of cheating is confined to users who choose "Brush Teeth" in Fig. 9b – as this is the fastest task to yield a reward (and, thus, it can be seen as a *honeypot* to cheaters) – our interpretation may be incorrect and cheating may be more widespread. Fourth, we chose to prioritise our users' privacy by not collecting identifying information. As such, we cannot analyse our users by demographics or other common segmentation dimensions such as personality. A future study of

player interactions with *The Guardians* in a clinical context is being designed to further our understanding of these factors. Finally, beyond these limitations, future work will consider variants of the game mechanic, narrative and graphics, and we are interested in hearing from various communities about the features that would appeal to them most.

VI. Conclusion

This work introduced *The Guardians* – a publicly released free-to-play game that is helping players to perform real-world actions that make them feel better. *The Guardians* engages users at more than twice the average rate of digital mental health apps, and playing the game often results in users completing the embedded behavioural activation intervention. This suggests that *The Guardians'* rewards mechanism – that is contextualised by the game's mechanic – is incentivising users to keep playing and keep completing real-world actions over extended periods of time. We intend to run a controlled study to formally assess this effect in our future work.

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