Leveraging the Proteus Effect to Motivate Emotional Support in a Serious Game for Mental Health

By

Long Ting Chan

A thesis

presented to the University of Waterloo

in fulfillment of the

thesis requirement for the degree of

Master of Science

in

Public Health and Health Systems

Waterloo, Ontario, Canada, 2019

Author's Declaration

This thesis consists of material all of which I authored or co-authored: see <u>Statement of Contributions</u> included in this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

Statement of Contributions

Portions of the materials, ideas, tables, figures, and videos in this dissertation have previously appeared in the following peer-reviewed conference publications:

Chan, L. T., & Wallace, J. R. (2018). Changing peer support attitudes with avatar-based gamification. *Extended Abstracts of the 2018 CHI Conference on Human Factors in Computing Systems.* https://doi.org/10.1145/3170427.3188497

Chan, L.T., & Wallace., J. R. (2018). Changing peer support attitudes with avatar-based gamification. *Massachusetts Institute of Technology 3rd Symposium on computing and mental health: Understanding, engaging, and delighting users*, 2018. Montreal.

Chan, T., & Wallace, J. R. (2018). Changing peer support attitudes with avatar-based gamification. *International conference on persuasive technologies* 2018, waterloo.

Chan, T. (2019). Do female avatars encourage mental health support in gamified peer to peer (P2P) cognitive behavioural therapy (cbt)? *W3 represents: A research symposium,* 2019. Waterloo.

Chan, T. (2018). Designing for engagement in peer-to-peer support using cognitive behavioural therapy with gamification and the Proteus Effect. *Inter-university workshop*, 2018. Toronto.

Abstract

Researchers have explored how online communities can be leveraged for peer support, but general disinterest and a lack of engagement have emerged as substantial barriers to their use in practice. To address this gap, we designed *Merlynne* using the Elaboration Likelihood Model (ELM) and games user research, a serious game that motivates individuals to become peer supporters using the Cognitive Behavioural Therapy (CBT) techniques, through play. We conducted a mixed-methods, exploratory study to evaluate Merlynne's design and specifically studied the Proteus Effect, hypothesizing that players using a stereotypically helpful avatar would have higher usage rates and a higher change in helping attitudes scores than players using a stereotypically unhelpful avatar. Merlynne had high engagement evidenced by usage rates and meaningful participant responses, and serious game techniques were used as effective cues for motivation. Emerging themes from thematic analysis of semi-structured interviews were supported with usage data and survey responses. We also found that avatar appearance influenced player-avatar connectedness and engagement through the frequency of empathy expressed in solutions. In reflecting on our findings, we discuss design challenges such as Ludonarrative dissonance, designing for emotional fatigue, and players' overconfidence, and present design considerations such as using avatars to promote empathy for those seeking to motivate participation in mental health support and the use of serious game techniques to encourage participation in health interventions.

Acknowledgements

Table of Contents

List of Tables

List of Figures

Terminology

This section defines chosen terminology used in the context of this thesis.

Human-computer interaction (HCI): The design, evaluation, and implementation of interactive computing systems, including digital systems for individual and population health and wellbeing.

Proteus Effect: The phenomenon where player behaviours and attitudes are influenced by the stereotypes of their visual representations, such as their avatars in a computer game.

Games for Health: Games used to facilitate a health goal. They are not exclusive to games designed for the purpose of health care but can also include commercial games such as *Wii Sports* used for exercise.

Serious Games: Games designed for the purpose of a "serious" goal, such as a business or a prosocial goal. A prosocial goal could be improving mental health and wellbeing.

Gamification: Use of game elements in non-game environments. The application is not necessarily presented as a game.

Cognitive behavioural Therapy (CBT): Short-term psychotherapy explaining thoughts, behaviours, and emotions are linked, thus altering one aspect affects another. Cognitive therapy, where deliberately modifying thoughts to change emotion is one approach to CBT.

Cognitive reappraisal: Re-orienting a negative thought into a positive or neutral trajectory to regulate emotion. It is one technique used in CBT. For example, if someone is upset since they "feel useless", they could cognitively re-appraise the thought by seeking evidence of productivity and improve emotion.

Peer to Peer (P2P) Support: Informal support given between persons with shared experiences.

Service User (SU): Person who has accessed mental health services.

Non-service user (NSU): Person who has not accessed mental health services.

Chapter 1: Introduction

The rising rates of mood disorders such as anxiety and depression have increased the use of informal mental health services (Findlay & Sunderland, 2014). One informal option for symptom management is online peer to peer (P2P) support, seen on social media sites and disease-specific platforms. However, compared with face to face (F2F) P2P methods, there are high dropout rates for online groups (Andersson, 2014). Previous research by Morris (2015) studied the efficacy of crowdsourcing strangers to assess each other's mental health experiences online using the Cognitive behavioural Therapy (CBT) process. In-lab results showed therapeutic value, yet the commercialized product was criticized by the public as unengaging (Bot-Hub, 2016), a documented barrier to platform engagement (Edelmann, 2012).

Criticism extends to the greater P2P mental health support services, such as reproving the culture of biases formed in peer support communities predominant in service users (SU), individuals who have used mental health care services in the past with experiences limiting their abilities to be objective (Mead, Hilton, & Curtis, 2001). Designs for P2P mental health services should encourage participation from non-service users (NSU) to add diversity of experiences to its community and to validate that skills learned in P2P groups become transferable to day to day life. However, NSUs with low anxiety states may be disinterested in participating in P2P networks (Deloatch, Bailey, Kirlik, & Zilles, 2017), and thus may need to be appealed to differently than SUs. Male-identifying individuals, prefer action-oriented support (Kliewer et al., 2014; Seidler et al., 2018) and are hesitant to use P2P (Ray et al., 2017), and this preference should be considered in the design of mental health tools (Seidler et al., 2018).

This thesis uses a research through design (Zimmerman, Forlizzi, & Evenson, 2007) approach, and describes the design and evaluation of a serious game, titled *Merlynne*, to motivate disinterested groups to participate and engage in online P2P using CBT techniques. The Elaboration Likelihood Model (ELM) (Petty & Cacioppo, 1986) was used as framework to design game elements. I focussed on studying the influence of avatar designs in P2P CBT behaviours and attitudes with male-identifying participants. Observed changes in player responses attributed to differences in avatars used would imply the *Proteus Effect* –the phenomenon where stereotypes of players' visual representations influence their behaviours or attitudes (Yee & Bailenson, 2007).

Merlynne is a computer game designed using games user research in human-computer interaction (HCI) and guidelines for internet-based CBT (iCBT), and inspiration from current commercial games. Players, termed *helpers*, were asked to provide emotional support to the negative thoughts of others, termed *seekers*, within a fantasy role-playing game interface, using either a stereotypically "helpful" or "unhelpful" avatar.

The engagement, attitudes, and game experiences between avatar groups in *Merlynne* were compared and presented in this thesis, along with findings, implications, and future work.

Assuming the Proteus Effect will occur, I hypothesized that participants in the helpful avatar group would have (1) higher engagement in Merlynne; and (2) greater change in attitudes towards helping others post-play.

1.1 Chapter outline

In Chapter 1, I introduce the motivations behind the research and describe the structure of the thesis. In Chapter 2, I describe the current literature guiding the research design and identify gaps in research this thesis aims to fill. In Chapter 3, I define the academic, industry, and public health implications of thesis study findings. In Chapter 4, I document the research through design approach, and Merlynne's game design and development. In Chapter 5, the research study design and methodology including measurement tools, equipment, and data analysis is explained. In Chapter 6, the quantitative research findings are presented, followed by the qualitative findings in Chapter 7. Chapter 8 discusses findings converged and their implications. Chapter 9 identifies study limitations and area of future work to extend our contributions. Chapter 10 presents the thesis's conclusion and applied contributions.

1.2 Contributions

The contributions of the study include:

1. A prototype and evaluation of Merlynne, a serious game to motivate engagement in P2P supports using CBT.
2. An evaluation of the Proteus Effect for motivating helpful behaviour and attitudes in Merlynne.
3. Identification of design challenges and considerations for serious games for P2P support using CBT, and non-game mental health applications.

Chapter 2: Related works

In this section, background is provided on digital presentations of CBT for mental health therapy, the use of P2P support, serious games, and the influence of avatar designs on prosocial interactions in games.

2.1 Mental health

Mental illness in Canada is estimated to have cost workplaces $20 billion in 2013 due to lost productivity, with mood disorders such as anxiety and depression being the greatest contributors (Public Health Agency of Canada, 2014). Mood disorders affected 3 million Canadians (11.6%) over the age of 18 in the same year, with 27% reporting that their disorder affected their life "quite a bit" or "extremely" in the last 12 months (Mental Health Commission of Canada, 2017). Of those affected, only 67% reported that their needs were met, citing time (73%) and inaccessibility (19%) to be barriers to treatment (Statistics Canada, 2015). These reports suggest that mental health tools and resources designed for quick use and easy access could fill gaps to facilitate mood disorder management.

2.1.1 Cognitive behavioural therapy (CBT)

An evidence-based method to treat anxiety and depressive symptoms is CBT (Centre for Addiction and Mental Health, 2012). CBT has been repeatedly shown as effective for a wide array of disorders, with meta-analyses supporting its use in anxiety disorders, somatoform disorders, bulimia, anger control problems, and general stress (Hofmann, Asnaani, Vonk, Sawyer, & Fang, 2012). CBT purports that a person's thoughts, emotions, and behaviours are connected, and one approach, *cognitive therapy*, explains that challenging one's thoughts can lead to changes in one's emotions and behaviours (Beck, 1979). The CBT technique *cognitive reappraisal* asks individuals to reframe their negative automatic thoughts to decrease undesired behaviours and has evidenced therapeutic success in digital mediums (Gilat & Reshef, 2015).

Although CBT is a short-term psychotherapy, the treatment is still considered to be difficult to deliver F2F (Hofmann et al., 2012). One problem is accessibility, such as where disenfranchised youth, or persons in rural areas with limited mental health resources may have difficulty seeking treatment (Hofmann et al., 2012). Another barrier is cost, as CBT is not publicly funded in Canada outside of inpatient units (Hofmann et al., 2012; Gilbody et al., 2015), or select community care units (Elliot Fung of Waterloo Wellington Local Health Integration Network, personal communication, June 26th, 2018) in Canada.

2.1.2 Computerised cognitive behaviour therapy (cCBT)

cCBT programs are CBT programs delivered through a computer, successfully decreasing costs and improving accessibility of CBT treatment (Gilbody et al., 2015). A subset of cCBT is internet-based CBT (iCBT) featuring online programs with material accessible from home or on personal devices (Andersson,

2014) including smartphones (Lindner, Ivanova, Ly, Andersson, & Carlbring, 2013; Miloff, Marklund, & Carlbring, 2015). iCBT programs have been shown to be effective in supporting mood disorder management, such as depression recovery (Brooks & Fox 2015; Forsell et al., 2017).

There are four categories of iCBT, the open-guided, open-unguided, closed-guided, and closed-unguided (Andersson, 2014). Open programs have unrestricted access by the public, as opposed to closed programs which require selective membership, such as being clients of a specific clinic. Unguided programs have no human guidance, where functions such as tracking, assessments, and feedback, are automated, but guided programs on the other hand, would perhaps involve a health provider giving manual updates and highly personalized assessments to the client (Andersson, 2014). Open-unguided iCBT programs are affordable and accessible options (Andersson, 2014), with long-term economic success (Hedman et al., 2014).

Unguided iCBT programs can achieve higher reach with less personnel costs, but a concern from in-house HCI experts is that there is no auditing process by a professional to prevent inappropriate self-appraisal of thoughts in CBT exercises, like cognitive reappraisal, where an individual reframes their own thoughts independently. Unreliability of self-reported progress were also criticized by the HCI experts of non mental health self-help apps such as calorie tracking or smoking cessation, and unguided self-help exercises with no human feedback, such as pen-and-paper cognitive journaling (Ullrich & Lutgendorf, 2002). A potential solution is explained in 2.3 Crowdsourcing for cognitive behavioural therapy.

2.1.3 Adherence

Despite iCBT's growing potential, it still faces problems of adherence like cCBT (Anderson, 2014; Gilbody et al., 2015). In an evaluation of the iCBT program *MOODGym*, the completion rate was only 20% compared to the 80% completion of human guided iCBT (Andersson, 2014). This observation is consistent with findings in a systematic review in the United Kingdom (UK) of cCBT for preventing depression relapse, where despite evidence to support cCBT's effectiveness (Kaltenthaler, Parry, Beverley, & Ferriter, 2008), there were high drop-out rates and recruitment difficulties (Woodford, Farrand, Bessant, & Williams, 2011).

Notably, a stepped-care model is used in some countries such as Canada and the UK (Murray et al., 2003) where Kaltenthaler et al. (2008) conducted the systematic review (not exclusive to UK literature). A stepped-care model offers the most non-invasive and cost-effective option to patients first, with cCBT offered among earlier options like bibliotherapy and group CBT before F2F therapy (Murray et al., 2003). In another UK study by Murray et al. (2003), iCBT options were viewed as inferior to F2F in usefulness amongst patients who were not exposed to the treatment. In response, experts have suggested a stratified model, where suitability is prioritized over cost, instead of the stepped model for offering cCBT to avoid

negative attitudes towards effective options (Aboujaoude & Starcevic, 2015). Therefore, some of the dropouts for iCBT in comparison to F2F therapy may not be because of iCBT's lack of usefulness, but the patient's baseline perceived usefulness for the therapy. In line with this argument, person-related factors also influence uptake, for example, younger persons in rural areas have less knowledge of psychological treatments thus will not seek it out (Aboujaoude & Starcevic, 2015). Person-related factors associated with high adherence include having high self-esteem, independent personalities, and higher baseline depression severity and appropriately, higher baseline perceived usefulness of cCBT (Aboujaoude & Starcevic, 2015).

Presenting unpopular mental health solutions with different mediums and contexts could improve the appeal of effective options like iCBT and P2P and can be done within the current stepped-care model (Andrews & Williams, 2015). In an Australian study comparing a cCBT game to traditional F2F treatments, the cCBT group yielded higher remission rates for clinical depression (Merry et al., 2012), and another study in Finland found iCBT comparable to F2F treatments for depression (Lappalainen et al., 2014).

2.2 Peer to peer (P2P) support

Another form of mental health support for non-severe mood disorders is P2P support. Mead et al. (2011) defines P2P support as "a system of giving and receiving help founded on key principles of respect, shared responsibility, and mutual agreement of what is helpful," and emphasizes that it is not based on psychiatric models but formed from the empathy of each other's emotional and painful experiences. P2P support can take F2F forms such as in person support groups, or online forms, connected over forums, chats, or social media. In a systematic review on the effectiveness of online forums for youth with mental illnesses — despite fewer high-quality studies which evaluated the effectiveness of P2P support specifically— P2P was a consistent feature of online interventions and were most effective for anxiety and smoking cessation (Ali, Farrer, Gulliver, & Griffiths, 2015; Melling & Houguet-Pincham 2011). Notably, there are also groups which prefer P2P over professional support due to the stigma of seeking formal mental health assistance, and instead reaching for support of others with shared experiences (Ray et al., 2017).

2.3 Crowdsourcing for cognitive behavioural therapy (CBT)

Crowdsourcing involves requesting information from the public, such as asking questions over the internet on social media or forums. In recognizing the power of social interactions, Richard Morris explored the use of crowdsourcing on the traditionally solitary CBT process of cognitive reappraisal, and developed a platform called *Panoply* for his PhD dissertation at the Massachusetts Institute of Technology (MIT) (Morris, 2015). Panoply invited persons with identified stress problems to help each other and employed trained volunteers to reply to queries that were left unanswered. Participants (seekers) in the *Panoply* group would express a concern to the other participants (helpers), who would then appraise the concern using a

guided CBT-based format (Morris, 2015), as seen in *Figures 1- 2*. There were both immediate concerns, such as test anxiety, as well as long term concerns such as body image problems included in the study (Morris, 2015).

When compared to a one-way expressive writing control (10 sessions, averaging 3.17 minutes and under 500 words per session), the Panoply platform had higher engagement (21 sessions, averaging 9.3 minutes and over 800 words per session) (Morris, 2015). Participants reported in post-study interviews, that they began to use the CBT techniques in their own lives as well (Morris, 2015). This phenomenon could be explained by Social Cognitive Theory (SCT) which states that through observational learning —the process of associating value to a behaviour by seeing others' improvements— can liken the adoption of another's behaviour for the desired benefits (Glanz, Rimer, & Viswanath, 2015). SCT supports the uptake of CBT techniques when seeing others benefit from its practice in P2P CBT through Panoply and can potentially be replicated in other P2P platforms for mental health.
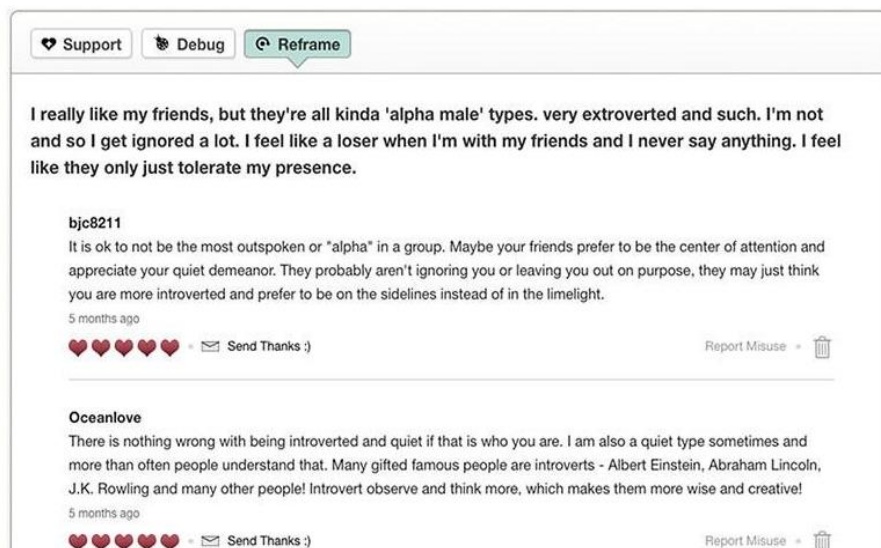
Figure 1. Query from Panoply from the view of the query submitter (Morris, 2015).

Figure 2. View of someone attempting to cognitively appraise a stranger's query (Morris, 2015).

In another study, Davison, Pennebaker, & Dickerson (2000) conclude that persons with stigmatized illnesses (i.e., prostate cancer) who sought support groups outnumbered those with less stigmatized illnesses (i.e., heart disease). Additionally, if an illness was described as embarrassing, socially stigmatizing, or disfiguring, the individual received more support messages than their counterparts. Davison et al. (2000) also explains that embarrassment was a barrier for persons to use their normal circle of social support and thus the anonymous online P2P support was more valued in these cases. Online P2P support is also supported by Davison et al. (2000) as an attractive option to those not confident with social factors such as voice, appearance, or social skills. Despite online P2P support bringing unique value for those fearing embarrassment due to an illness or social factors, there are fewer perceived benefits for those without stigmatizing disorders to social difficulties. Nonetheless, online P2P support could have non-discriminatory effectiveness, reach, and economic efficiency regardless of embarrassment (Davison et al., 2000).

2.3.1 Support on social media

Due to the number of Canadians reporting unmet mental health needs (Statistics Canada, 2015), it is important to expand mental health services to cater to NSUs. Social media can be effective in delivering P2P support, such as shared supports between Alzheimer's caregivers (Bateman et al., 2017), but it is not always desired due to lack of anonymity. In a study where people requested encouragement from their *Facebook* friends on a math test, most reported they felt uncomfortable doing so, and "friendsourcing" was not preferred (Deloatch at al., 2017). SCT explains that possible embarrassment can cause one to assimilate

to a norm of not asking for help on social media (Deloatch at al., 2017). However, as mentioned by Davison et al. (2000), once removed from existing social networks, under anonymity, embarrassment is less influential and contradicts SCT. This opinion further justifies anonymous P2P mental health networks as it can extend supportive benefits of mainstream social media sites.

2.3.2 Threats and opportunities of online support

Persons with severe mental illnesses benefit from online P2P support, but knowledge gained must be transferable to the offline world (Naslund, Aschbrenner, Marsch, & Bartels, 2016). Naslund et al. (2016) notes that risks include receiving misleading information, echoing Mead et al.'s (2001) concern that a closed bubble of culture can normalize abnormal behaviour due to shared biased experiences. Naslund et al. (2016) supports Davison et al.'s (2000) observation that persons who use online social supports often experience social isolation and the online medium may be one of the few ways to reach this group. Engaging NSUs in P2P with SUs could also have benefits to simulating offline interactions for this group to give them the necessary skills for improvement for real offline interactions.

2.3.3 Non-service user (NSU) inclusion in peer to peer (P2P) communities

Given as a theoretical perspective by Mead et al. (2001), there are benefits to including NSUs with mild or undiagnosed needs in P2P programs traditionally for only those with identified illnesses. For example, a P2P support group exclusively made up of SUs risks the ability to evaluate subjective experiences and can normalize the abnormal (Mead et al., 2001). The narratives in closed P2P groups separates the diagnosed with the undiagnosed, which Mead et al. (2001) purports to be counter-constructive for mental health education. Mead et al. (2001) wishes to redirect the mental health narrative away from illness and disability and the concepts of "others" (Mead et al., 2001), which is in line with the WHO's holistic approach to health further described in Chapter 4: Research through design.

Stress is universally experienced and participating in P2P support groups of practicing CBT exercises is of value (Centre for Addiction and Mental Health, 2010), regardless of SU or NSU status. Benefits could include 1) building resilience for mental illness prevention, and 2) contributing to and strengthening social support networks for communal and personal health. Mental health is a fluctuating state, where more inclusive support systems can destigmatize the treatment seeking process (Mead et al., 2001). This inclusion further extends to SUs without stigmatized illnesses, or social difficulties as identified by Davison et al. (2000) to be drawbacks in participation in P2P systems.

2.4 Gender differences in support seeking

In this thesis, the two genders of male and female were used, as non-binary and other genders have unfortunately not been adequately explored in relevant literature. Sex assigned at birth was not used due to no assumptions of relevance in this study context. Gender has been documented to predict certain support-seeking behaviours in children and adults. In a 1990 study on an anonymous hotline for kids aged 6-11, girls were more likely to call asking for advice on interpersonal situations, whereas boys were more likely to ask for resources (Kliewer, Lepore, Broquet & Zuba, 1990). This trend was also seen in a study by Lehdonvirta et al. (2012) which observed gender differences when seeking support in online games; players with male avatars asked for more informational support than players with female avatars. (Lehdonvirta et al.'s (2012) study is explored further in 2.7.3.5 Gender.) The authors termed the way males sought support to be indirect and noted that the "male-patterned support seeking" should be considered in the design of health applications involving P2P support (Lehdonvirta et al., 2012).

Different messaging may be needed to appeal to NSUs with unique outlooks of P2P support (Clark, 2016). In our interest of gender, men prefer P2P support over professionals for mental health due to stigma of help-seeking, and literature review suggests NSUs are mostly men (Men's Health Forum, 2014). Complementing public health campaigns to promote support systems use, Seidler et al. (2018) also stresses the need for designing support systems for men who seek participation which consider diverse and complex masculinities.

In considering attitude change, we turn to the *Elaboration Likelihood Model* (ELM).

2.5 Elaboration Likelihood Model (ELM)

The ELM is a model for attitude change, predicting how likely one is to reflect on messaging they receive. It offers two messaging routes: the central route and the peripheral route. The central route is intended for persons receptive to messaging for attitude change and the peripheral route is an alternative messaging route for persons not receptive to original messaging (*Figure* 3). However, the ELM stresses that "identifying the impact of variables on the motivation to process is necessary, but not sufficient for predicting the effects of arguments presented in a message" as explained by Gotlieb and Swan (1990) in the context of price savings used to motivate purchases. Thus, given complex systems, experimentation with research through design, explained in Chapter 4: Research through design, is appropriate when exploring the ELM.
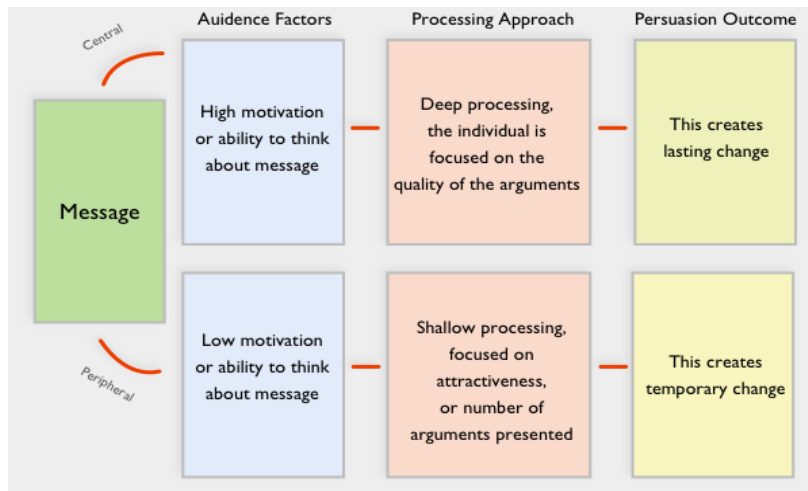
Figure 3. *ELM* (The science behind persuasion. *May 23, 2014.)*

Users of the central route in our context would be persons who are receptive to understanding how P2P participation will benefit themselves and others, such as but not necessarily the SUs. Users of the peripheral route in our context would be those disinterested in thinking about P2P benefits, but instead are interested in the peripheral messaging, such as NSUs. Peripheral messaging could be offered through presenting P2P as a serious game, explained in the section 2.6 Serious games. Application of the ELM in our game design is in section 4.7.1 Serious game elements applied to the ELM.

2.6 Serious games

Games are played across genders, ages, races, and health statuses (Lofgren, 2016), and *gamification* is the use of game techniques in non-game situations, while the term *serious games* refers to games aligned with a "serious" concept. Both terms fall under gameful design. Studies have shown that both gamification and serious games have been effective in promoting behaviours for good, such as for health management (Tallner, Pfeifer, & Mäurer, 2016; Merry et al.,2012).

Gamification of Multiple Sclerosis (MS) management platforms has evidenced higher adherence to exercise programs (Tallner et al., 2016) and CBT administered in the form of a fantasy role playing games, the serious game *SPARX*, has led to higher remission rates in clinical depression (Merry et al., 2012). Games also provide anonymity through virtual representations such as avatars and pseudonyms commonly called "handles."

Gameful design could establish a peripheral route for NSUs to participate in P2P networks in the ELM, but the peripheral route could also be effective for SUs with negative attitude towards using cCBT and online P2P due to its perceived inferiority to F2F treatment. Given the barriers of embarrassment, perceived effectiveness, and disinterest in using P2P tools (Davison et al., 2000), incorporating gameful design into

cCBT and P2P support can (1) improve attitudes towards P2P support and cCBT tools; and (2) motivate and increase P2P support behaviour with in-game objectives.

Morris's social media platform Panoply commercialized into *Kokobot* (Morris, Kouddous, Kshirsagar, & Schueller, 2018), a chatbot which assigns individuals scores based on the effectiveness of their contributions, as scored by others (*Figure* 4). The chatbot has received criticism from industry reviewers for its lack of appeal and incentive for people to use it (Bot-Hub, 2016). There is no study evidencing Kokobot's effectiveness for behaviour change, and it is no longer being updated by the creators who are exploring other projects (Robert Morris, personal communication, May 13, 2018).
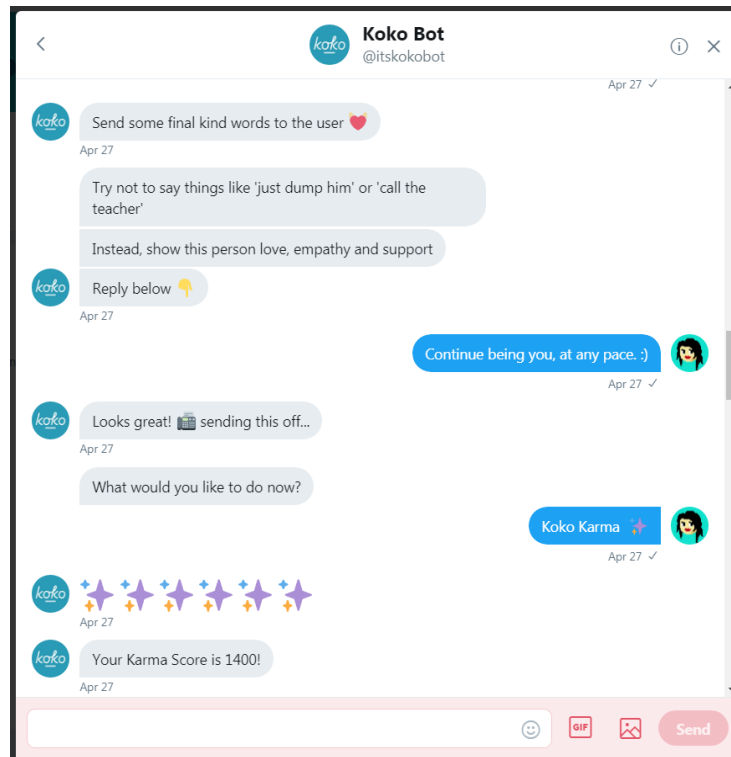
Figure 4. Kokobot chatbot integrated into Twitter. Responses are guided and there is a point system. The chatbot explains that once a certain amount of points is earned, you would be invited to contribute to the development of the app.

SuperBetter, a self-help platform also uses point rewards by rewarding players based on self-reported completion of mindfulness exercises (Kaltenthaler, 2007). However, current games research suggests that the use of badges, leaderboards, achievements, and points (BLAPs) like in apps Kokobot and Superbetter is ineffective beyond short term engagement, despite its prevalence (Barik, Murphy-Hill, & Zimmermann, 2016). Barik et al. (2016) argues that gameful designs should provide experiences beyond BLAPs, such as

in SPARX, which is an opinion shared by Scott Nicholson who explains that reward-based motivations can only fulfil short term goals (Nicholson, 2014).

2.6.1 Gamification with avatars

Tallner et al. (2016) used avatars to promote exercise for people with MS, and a systematic review of mental health games on the market listed avatars and their contextual narratives to the most prevalent gamification technique used (Lau, Smit, Fleming, & Riper, 2017). Despite the social benefits of anonymous P2P, anonymity discourages long-term relationships (Dunn & Guadagno, 2012). However, avatars and handles can provide linked anonymity to encourage building relationships between anonymous people (Dunn & Guadagno, 2012). Avatar identification can also encourage continual participation in programs by fostering intrinsic motivation (Birk & Mandryk, 2018). Thus, avatars could increase P2P engagement with mental health issues with anonymity without sacrificing connection. Prosocial avatar design is described in section 2.7.3 The helpful stereotype.

2.6.2 Perceived agency

Morris et al. (2015) used human participants and trained human volunteers to study behaviour and experiences on Panoply. Thus, when a cognitive reappraisal in response to another individual's negative thought was sent, the sender would expect a of risk to online reputation if an undesirable response was submitted. This perceived risk would encourage more thoughtful submissions. Meanwhile, the receiver of submissions may have emotional responses in knowing another person volunteered their time on their issue.

2.6.3 Agents vs avatars

Despite little reputational consequences of actions towards computer-controlled avatars, termed *agents*, there is research describing how agents can elicit responses like human-controlled avatars, generalized to *avatars* in this section of the paper, from persons who are aware they are interacting with agents.

Kothgassner et al. (2017) studied the differences between how humans exhibited prosocial behaviour after being socially excluded or included by either an agent versus an avatar in a virtual-reality (VR) ball game (Kothgassner et al., 2017) based on how close they chose to sit in a waiting room to a confederate, and how quickly or not they would retrieve a pencil dropped by the experimenter (Kothgassner et al., 2017). Excluded participants were less prosocial when compared to participants who were included, regardless of agent or avatar group (Kothgassner et al., 2017). However, participants excluded by avatars were significantly slower in the pen-retrieval task than those in the agent group (Kothgassner et al., 2017). Kothgassner et al. (2017) explains that being excluded by an agent can be reasoned by participants as a result of a computer error, whereas being excluded by an avatar cannot be. Thus, despite immediate effects

of reluctance to help the experimenter, after using some time to reason, the participant would choose to help the researcher, whereas no time delay used to reason is needed by those who were included. There was no difference between the groups included by the avatar or agent (Kothgassner et al., 2017).

The findings of Kothgassner et al. (2017) contradict a meta-analysis on perceived avatar agency on persuading social interaction by Fox et al. in 2015, which determined that agents, were less persuasive than avatars when it comes to social influence (Fox et al., 2015). Fox et al. (2015) explains that avatars are more inviting to the player to interact with due to the perceived agency of the entity.

Designing for avatar agency is implicative in healthcare designs, specifically in depression diagnosis applications and Fox et al. (2015) suggest that "designs may focus on humanizing virtual agents in persuasive contexts to maximize the potential for influence." While computer agents are becoming more sophisticated, design choices to preserve humanness such as introducing "disfluencies such as interruptions" and avoiding perfectly scripted responses would be beneficial in the design of healthcare applications (Fox et al., 2015). Hybridization where humans and computer algorithms are combined to improve social influence while minimizing costs in areas where computer algorithms are enough may be effective and is presented as an area of future study (Fox et al., 2015; Morris et al., 2018).

Although both avatars and agents may elicit similar emotional responses (Kothgassner et al., 2017), agents may not directly persuade prosocial behaviours as strongly as avatars due to their lower perceived agencies (Fox et al., 2015). Players may reason that interactions with a human have more meaning and impact than interactions with a computer (Kothgassner et al., 2017).

However, the under-reporting of aesthetics is recognized as a limitation of avatar studies by Fox et al. (2015). This includes factors like art style, screen resolution, and avatar movement (Fox et al., 2015), but given the near infinite possibilities of design, it is a complex issue, which we explain in Chapter 4: Research through design. Serious game designers may use avatars to visually identify players with arbitrary creative freedom, but research has shown that perceived meaning through avatars can influence attitudes and behaviours of a player (Yee & Bailenson, 2007), thus thoughtful avatar choices can enhance desired behaviours in a serious game.

2.7 The Proteus Effect

In studies of self-representation, players have taken on stereotyped traits of avatars they use in virtual spaces, even if the traits are not true to their offline selves due to the *Proteus Effect* (Lin & Wang, 2014; Kasunic & Kaufman, 2017). This phenomenon has been named the Proteus Effect, by Yee & Bailenson (2007) alluding to the shape-changing abilities of the Greek god Proteus in mythology, following his studies in Massive Multiplayer Online Role-Playing Games (MMORPGs). Studies regarding the Proteus Effect

have been explored in areas ranging from games (Yee & Bailenson, 2007) and social media (Vatamanescu & Cicei, 2014), to mental health programs (Wrzesien et al., 2015).

Yee & Bailenson (2007) first supported the Proteus Effect by showing that players using more attractive avatars would socialize more intimately with confederates post play, and then demonstrated that persons playing taller avatars —as greater height is a stereotyped physical trait of confident persons— negotiated more aggressively in a post-play offline task.

Despite numerous studies documenting the Proteus Effect, there is no one agreed upon mechanism and studies have all proposed their own theoretical explanations (Peña, 2011). Sherrick et al. (2014) explains that Self Perception Theory (SPT) explains that for a player's avatar appearance to influence the player's behaviour, the player must believe in stereotypes associated with the avatar (Sherrick et al., 2014). However, if the Proteus Effect occurs without the player's belief in a stereotype, it may be due to priming effects and not self-perception, as the player would be automatically acting on media trends based in memory, and not the beliefs and meanings behind their actions (Peña, 2011; Sherrick et al., 2014).

This Proteus Effect was also studied in Facebook communities with survey-based results showing that choice of profile pictures shaped online behaviours and then offline behaviour (Vatamanescu & Cicei, 2014). In alignment with observational learning, observing others' Facebook profile picture choices also influences one's future profile picture choice to replicate observed positive impressions (Wu, Chang, & Yuan, 2015). Therefore, through collaborative learning of online communities and the Proteus Effect of self-representation, positive behaviour could also be persuaded by others' self-representations.

2.7.1 Player characteristics

Bian et al. (2015) further found individual factors such as shyness and perceived avatar attractiveness to mediate avatar identification for the Proteus Effect. High-shy groups were less receptive to stereotype cues than low-shy groups, and attractive avatars used by persons with high shyness can motivate higher identification and higher engagement (Bian et al., 2015). The latter finding is consistent with a games study by Andrew Przybylski which found that when a player's game self (their avatar) is close to their ideal self (an attractive representation), there is higher motivation for play, especially when their game self is unlike how they see themselves offline (Prybylski et al., 2011). However, gender was not controlled for in Bian et al.'s study (Bian et al., 2015).

Gender stereotypes have been evidenced to carry through in the Proteus Effect, where female players using male avatars score better on post-play math tests (Yee & Bailenson, 2007), and a later study has shown that males who play female avatars assist their teammates more in the computer games *EverQuest ,* and *World of Warcraft (WoW)* (Yee, Ducheneaut, Yao, & Nelson, 2011). Created contexts such as in-game

narratives are important to establish understanding of the world, and stereotypes need to remain contextually relevant for the Proteus Effect to occur.

2.7.2 Avatar characteristics

Avatars which resemble their players in mental health applications were shown to form greater avatar identification (Wrzesien et al., 2015), which correlates with a stronger Proteus Effect (Yee & Bailenson, 2007). A study by Soutter and Hitchens (2016) also shows that higher similarity predicted higher identification, yet the evidence of similarity promoting identification goes against the idea by Yee et al. (2011) that acknowledging the stereotypes of a character will change behaviour. In Yee et al.'s (2011) study, males with little physical similarity to their female avatars still exhibited behaviours stereotyped to women; one of supportive and healing roles in a fantasy genre. It could be that helping or prosocial behaviours were changed with the Proteus Effect without mediation by avatar identification.

Perceived trustworthiness can be based on traits such as face shape and eye size know as physiognomy but expected stereotypes do not always carry over into the virtual space (Wang, Geigel, & Herbert, 2013). A study by Wang et al. (2013) showed that not all physiognomy from reality carried over to the virtual space. For example, while wider faces were more trustworthy for photographed human faces, it was more hostile in *Second Life* (Wang et al., 2013).

2.7.3 The helpful stereotype

In an experiment by Yoon and Vargas (2014), participants who were playing as either a hero avatar (Superman from *DC Comics*) or a villain avatar (Voldemort from *Harry Potter*) showed altruistic behaviours stereotyped of their avatars. Those playing as Superman added more chocolate than hot peppered to other participants' ice cream than those playing as Voldemort (Yoon & Vargas, 2014). Yoon and Vargas (2014) suggest that the degree of immersion a game provides predicts observed behaviour, concluding that "everyday gaming, players choose their own avatars, but creating games with more heroic avatars could encourage more prosocial behaviour."

What constitutes as helping behaviour, however, varies between avatar studies. In MMORPGs where a "party" system encourages teamwork among players to defeat enemies, helping behaviour could be providing skill-based support to teammates, such as restoring others' health when they suffer damage in combat. It is also important to consider possible asymmetries between players. For example, in *World of Warcraft (WoW)* 2005, a player who is playing as a hunter cannot restore others' health whereas as player who is playing a priest, can (WOWpedia, 2019). In other studies, helping behaviour could be providing gameplay advice to other players in the form of information, introductions to others, or even providing

emotional consolidations to stressful events. Although Yoon and Vargas (2014) points to value of heroic stereotypes for helping, it is unclear if it is appropriate for all forms of helping.

Familiarity of a stereotype must exist for the Proteus Effect to occur. Previous studies have focused on heroic stereotypes (Yoon & Vargas, 2014; Yee et al., 2011), such as height and attractiveness to improve performance on activities which require self-confidence, such as negotiation or test writing (Yee & Bailenson, 2007). However, there is minimal research on the Proteus Effect for helpfulness, partly because of different definitions of what is considered a helpful stereotype. For example, a doctor would not be stereotypically helpful for providing basketball advice, as a sports coach would not be helpful for giving medical advice.

Currently no study investigates whether avatars influence providing information, advice, or emotional support to others in a setting where that is the game objective. There is no definitive stereotype for emotional P2P support, but there are visual attributes which imply an avatar is more likely to provide help than others.

2.7.3.1 A helpful avatar

Visual and contextual factors can affect a player's desirability to socially interact with an avatar such as the avatar's anthropomorphism (Banks & Bowman, 2016), realism (Fox et al., 2015), similarity to self (Van der Land, Schouten, Feldberg, Huysman, van den Hooff & Bartet, 2014), similarity to others (Peña, Hancock, & Merola, 2009), and gender and role stereotypes (Yee et al., 2011), explained in this section. These factors are found for both the avatar controlled by the player as well as avatars of NPCs or other players.

2.7.3.2 Anthropomorphism

Anthropomorphism is when human traits are given to non-human entities and the more anthropomorphic an avatar is, the more social influence it holds (Fox et al., 2015). For example, when animals are given human-like behaviours such as speech, personality, or gait. Anthropomorphic avatars are also more credible and competent (Banks & Bowman, 2016), appearing more helpful and useful to others.

2.7.3.3 Realism

Realism is different from anthropomorphism as it refers to the fidelity of the avatar, and not necessarily human like qualities. If an avatar was a detailed render of a fir tree, it would be high in realism but not high in anthropomorphism. Although avatar realism increases avatar identification when similar to the player (Van Der Land, 2014), leading to higher social interaction with others in-game, a mismatch of realism and anthropomorphism can be creepy and unsettling (Fox et al., 2015). When a visual representation is too human but is not human it can end up in the "uncanny valley."

2.7.3.4 Similarity

Avatar similarity influences avatar interaction, with studies showing that a player is more likely to be prosocial towards entities physically like the avatar they are using. In a 2014 study by Van der Land et al. (2014), teams with similar avatars collaborated more efficiently in a chatroom-based murder mystery game to determine the culprit and win the game. This phenomenon was seen in an earlier study by Peña et al. (2009) with the Proteus Effect. Players with avatars in black cloaks would collaborate more with others in black cloaks to sentence a criminal in a *Star Wars* (1977) game with less merciful sentences than players using avatars cloaked in white. Not only were participants collaborative with others whom shared physical similarities, but they also exhibited traits stereotyped of their physical form (black being evil, white being good in the Star Wars universe) (van der Land et al., 2014). Avatars allow individuals to visually convey social identities and identify with others seen with similar social identities.

Although it is more likely for a player to socially interact with other physically similar avatars, it is not always the case for all attributes and interactions. Avatars of the same gender were not more likely to help the same gender in MMORPGs, with men more likely to help women, and women significantly more likely to help men (Lehdonvirta et al., 2011). It is suggested that men subscribe to the heroic stereotype of giving help to women seen as inferior, while women feel the need to overcompensate by helping men to obtain respect in male-dominated game environments (Lehdonvirta et al., 2011).

2.7.3.5 Gender

A well-researched topic is the impact of avatar gender in games, especially when it concerns interacting with other avatars. However, there are limited studies which specifically consider the avatar gender's influence on prosocial behaviours and only two which report on in-game emotional support in the context of the Proteus Effect. There are contradicting findings recognizing needs for further research in the area.

Yee et al. (2011) found that the expectation of women being more helpful than men existed in gameplay. When men used female avatars, they showed more assistance to their teammates in the WoW. Assistance however was measured by the frequency of performing a "healing" skill to others during combat, not the frequency of providing advice, information, or emotional support to other players. At the time of the study, only four of the nine classes in WoW could perform the healing skill. Priests, a class centered around healing, is the only class with a female avatar majority (55.7%) in WoW (Realm Pop, 2015). It is unclear whether this is due to female stereotypes for roleplaying, or player preference of the female priest avatar's artwork over the male priest's when players with to play a priest (*Figure 5*). When considering single-factor avatar studies, it is important to recognize other aspects of the game world, as gender choice would not be the sole contributor in Yee et al.'s (2011) findings that higher healing frequency is correlated with female avatars, it could also be artwork or animation preference.

Figure 5. Male and female priests in WoW (2008) wearing the same garment item yield artistic differences. (Blizzard Entertainment, 2008).

Another study was conducted by Sherrick et al. in 2014 to determine mechanisms behind the Proteus Effect by comparing SPT with priming effects using avatar gender as a one-factor control (Sherrick et al., 2014), introduced in 2.7 The Proteus Effect. Participants used either a male or female avatar in an interactive narrative game as a detective interrogating a suspect (Sherrick et al., 2014). Stereotypically masculine and feminine choices were presented for actions in the narrative, with friendly or merciful choices coded as feminine by Sherrick et al. (2014) based on the stereotype that "Women are more sympathetic and eager to soothe feelings."

Going against the expected outcomes, players using female avatars and individuals with higher stereotypical gender beliefs selected less feminine behaviours (Sherrick et al., 2014). Sherrick et al. (2014) explains that this may be due to players consciously rejecting stereotypically feminine traits and overcompensating by choosing masculine options. There was no response time reported for players to select their options in Sherrick's study which could allow time for cognitive appraisal as suggested by Kothgassner et al. (2017) of players rethinking their decisions beyond immediate influences by avatar appearances (Kothgassner et al., 2017).

In criticism of Sherrick et al.'s (2014) study based on Fox et al.'s (2015) concern of unreported aesthetic traits of avatars between studies, there were differences between the male and female avatars Sherrick et al. (2014) used beyond gender (*Figure 6*). In-house lab members pointed out that the female avatar in comparison to the male has disheveled hair, duller skin colour, and arched eyebrows for example, which

may infer stereotypes of an aggressive individual (Wang et al., 2013). Although there is a similar facial width to height ratio and features of same size between the male and female avatars, face ratios can influence trustworthiness or aggressiveness differently based on gender and should have been reported (Wang et al., 2013). Thus, gender may not be interpreted as the only instrumental variable (IV) in this study.

Figure 6. Avatars from Sherrick et al.'s study on the effect of avatar gender on decision making in an interactive narrative. (Sherrick et al., 2014)

A 2011 study by Lehdonvirta et al. (2011) involved more aesthetically diverse male and female avatars in a commercial Japanese MMORPG (*Figure 7*) outside of the lab setting. Sherrick et al.'s (2014) results both contradicted and supported Lehdonvirta et al.'s (2011) findings, which found female avatars provided more help, but the help they provided was coded as masculine, such as providing help in the form of materials, labour, and information, instead of emotional support. Emotional or psychological support was a feminine form of helping determined by authors through gender role theory and was equally given by both male and female avatars in their study (Lehdonvirta et al., 2011).

Figure 7. Male and female avatars in similar dress from *Uncharted Waters Online (UWO),* a Japanese massively multiplayer online game launched in 2005 and published by *Tecmo Koei Games.*

Lehdonvirta et al. (2011) was also unable to match player gender to player avatar gender as they used amalgamated third-party data supplied by *Uncharted Waters Online* (UWO), a Japanese massively multiplayer online game launched in 2005 and published by *Tecmo Koei Games*. Roughly half the avatars used in UWO were female, yet only 13% of players reported to be women (Lehdonvirta et al., 2011). Considering that some women may choose male avatars, most female avatars were determined to be controlled by men. Thus Lehdonvirta et al.'s (2011) findings are in line with Yee et al.'s (2011) findings that males using female avatar offer more help to teammates, beyond in-game healing abilities but with interpersonal interactions between players as well.

Female avatars were reasoned as not more likely to provide more emotional support as observed because men playing these avatars may subscribe to the masculine stereotypes of helping through "heroic" means of material and labour to compensate for their masculinity while using a female avatar (Lehdonvirta et al., 2011). This compensation goes against the player-avatar identification correlated with The Proteus Effect, but is explained through "strategic gender-swapping" in MMORPGs, where men playing with female avatars may obtain certain advantageous social treatment given to women in a male-dominated space (Hussain & Griffiths, 2008). This explanation is in line with Kothgassner et al. (2017) who explains cognitive reasoning can overcome avatar-influence with time.

Both Sherrick et al.'s (2014) and Lehdonvirta et al.'s (2011) studies differ in setting (lab setting versus in a field setting), in the way helping is measured (self-reported multiple choice versus observed helping action), and in camera perspectives of the avatars (animated head icons versus full body over the shoulder view). Lehdonvirta et al. (2011) also does not report on the aid players give NPCs, while Sherrick et al. (2014) only measures help given to NPCs.

Although gender roles were found to yield differences through the Proteus Effect, such as male avatars improving math skills (Yee & Bailenson, 2007), and female avatars improving assistance given to teammates (Yee et al., 2011), the strength of gender stereotypes on influencing behaviours varies on the type of behaviours influenced and the state of the world at the time of study. In the case of providing emotional support, both Sherrick et al. (2014) and Lehdonvirta et al. (2011) ran studies which showed that the gender role of females being more caring than males did not translate to female avatars being more emotionally supportive in games.

Given inconsistencies of aesthetics, interfaces, and what is constituted as prosocial helping behaviour in studies, there is no generalizable conclusion on whether the factor of gender stereotypes influence prosocial player behaviour in all virtual spaces. However, both Sherrick et al. (2014), Lehdonvirta et al. (2011), and

Yee et al. (2011) recognized the value of exploring avatar designs, including gender, in health or P2P applications where the goal of the application is prosocial interaction, as future areas of research.

2.8 Summary and implications

   Research into serious games, iCBT, and crowdsourcing techniques is needed to improve cost-effective mental health treatments. Although promising, there is uncertainty on what elements of gameful design are appropriate to facilitate engagement in mental health P2P networks. Narratives and avatars have been supported to provide the experiences to motivate attitude and behaviour changes in serious games. Specifically, the Proteus Effect has been documented to persuade changes in players reflective of stereotypical traits of avatars based on experience. Understanding whether strategic avatar design can persuade emotional support in players can provide design guidelines for mental health applications.

   Current P2P support groups have also been criticized for excluding NSUs, leading to non-transferrable skills for daily life, and forming cultures of bias. This study narrows that gap in knowledge in evaluating whether avatar based serious game techniques can improve engagement and motivate NSUs to participate in P2P networks traditionally targeted to SUs. Specifically, we will assess the Proteus Effect's strength in increasing the prosocial behaviour of giving emotional support others when players use a premade avatar bearing stereotyped helpful qualities against a control with stereotypically unhelpful qualities. We focus on gendered stereotypes, given controversial information from limited studies on whether avatar gender influences likeliness to provide emotional support when framed in a serious game for mental health, but recognize gender cannot be isolated as a single factor in avatar studies.

Chapter 3: Rationale

In this chapter, the motivations and potential contributions behind this research study is described, for academia, industry, and public health.

3.1 Scholarly implications

In designing, developing, and evaluating a serious game using elements of narratives and avatars within the ELM, and a research through design approach, we extended Morris's (2015) work of merging CBT with P2P support and further Yee and Bailenson's (2007) work on the Proteus Effect. Our study evaluates opportunities for avatar designs to foster prosocial engagement and attitude change for emotional peer support. Also, results could further support using serious games as peripheral cues in the ELM to predict attitude change through observation in the space of mental health technologies.

There are studies exploring the benefits of using avatars in mental health applications to teach emotional management for those receiving help (Wrzesien et al., 2015), but there are limited studies looking at the effects of avatars in mental health applications for persuading emotional support from others (Lehdonvirta et al., 2011). Other existing Proteus Effect studies linking avatar factors and other forms of prosocial support measured participant's self-reported choices in games or were observational studies in MMORPGs where helping others is not required for gameplay. There is no study directly measuring the Proteus Effect for peer emotional support in mental health applications.

3.2 Applied implications

Results from our study can guide the development of mental health services for greater reach, more cost-effectively. Identifying novel ways to involve NSUs in mental health communities can also improve efforts for mental health awareness and prevention by normalizing the behaviour of P2P support in organic settings. Using serious games to add diverse people to mental health communities can also improve transferability of ideas shared to day to day life, avoiding the bubble culture formed by communities solely made of SUs.

Our study can also offer insights for solutions to improve iCBT uptake by consumers, facilitating attitude change through gameful design. Although clinicians and mental health professionals recognize the potential of gamified mental health applications, there are concerns on the specifics and requirements to successfully apply it in practice (Hopia & Raitio, 2016). Findings could guide existing cCBT platforms or bring novel industry solutions to market. Game developers with a social agenda could use our design recommendations to improve prosocial player interaction within their products to form strong likeable communities. As suggested by Yoon and Vagras (2014), understanding behaviours inspired by avatars in games could also

persuade designers to use characters of a more thoughtful stereotype in games to persuade desired player behaviour.

Design recommendations could also be scaled to other public health initiatives to change the perception of and attitude towards effective treatments and behaviours viewed to be inferior to costly counterparts beyond cCBT or P2P support, such as prescribed exercise for pain relief instead of drug solutions. The effective P2P design elements could be applied to other health problems which benefit from open social support beyond mental health issues such as physical health problems like chronic fatigue or pain management, and other prosocial behaviour like forming environmentally conscious habits and refugee support. Due to our focus on gendered stereotypes and helping behaviour, findings may also inspire questions in design on whether the stereotype should be accepted as relevant or be reconsidered due to gender equity concerns.

3.3 Research questions

My research questions are:

RQ1: Would avatars which appear helpful motivate higher engagement in helping?

RQ2: Would avatars which appear helpful improve attitudes towards helping?

We are also interested in determining mediators and confounders to observed differences between avatar groups, in understanding the Proteus Effect.

3.4 Summary

We approach the problem through research through design to determine the feasibility of using games to motivate P2P support for mental health, with a focus on avatar design and their ability to persuade more helpful behaviours through the Proteus Effect. Expected contributions in this thesis is to produce an exemplar artifact and from its evaluation, identify challenges and develop considerations translatable to real world design practices for persuasive avatar design and the user of serious games in mental health applications and beyond.

Chapter 4: Research through Design

Research through design involves designing and developing an artifact to fulfil research objectives, especially when deriving knowledge from under-constrained problems in complex systems (Zimmerman et al., 2007). Developing an artifact by bridging art, design, science, and engineering for a specific use case, time, and audience can give insights into problems in a constantly changing landscape where repeatability or falsifiability of traditional research cannot be met. This is effective in the field of HCI and gaming, as

technology trends to constantly evolve, but also in public health where needs and conditions fluctuate. When unknown variables outnumber the controllable in "wicked" problems, focusing on the particular is more valuable than prioritizing the universal and generalizable (Stolterman, 2008).

Recent pushes in public health to switch from a disease-centric approach to a holistic one by the WHO (Pourbohloul & Kieny, 2011), are in line with the principles of research through design. Groenefeld et al. (2018) notes value in considering all possibilities and angles as "health is increasingly no longer conceived merely as the absence of disease, but as the ability of patients to adapt and self-manage." There are problems in healthcare termed as "wicked" due to contradicting, abstract, incomplete and ever-changing needs, and it is important for researchers to accept design complexity as a practical problem faced by industry designers (Stolterman, 2008), and public health professionals. This is especially true in the context of mental health, as explained by Mead et al. (2001) where it should not be defined by disease, but it is an ongoing experience for all people, regardless of mental illness status.

The drawbacks of traditional research are echoed by Fox et al. (2015) on avatar studies, as "Given the nearly infinite possibilities in creating avatars across platforms, it is difficult to accurately replicate a study that only offers vague descriptions such as 'a male avatar.'" Incorporating visual rhetoric as a variable in studies can be a wicked problem in its own, due to the infinite changing meanings and trends behind design and variations in art styles (color, shape, line, etc.). Although a problem, Fox et al. (2015) proposes that "Within publications, richer descriptions, figures, or links to online content can help resolve this issue." Detail in design is documented in this paper to satisfy research needs, thus our iterative design notes are documented in *Appendix A*.

For this study, we designed a computer game for male-identifying individuals frequenting campuses of post-secondary institutions, either as students or employees, to encourage peer support behaviour to problems of their student peers. Groenefeld et al. (2018) identified seeking collaboration with end-users to be an area of difficulty in research through design in healthcare, especially in pursuit of iterative design. Due to the demographics of our in-house lab members being like our target demographic, iterative design was involved in the development of our game, which is named *Merlynne*, a feminized reference to the assistive wizard Merlin in the *Legend of King Arthur*.

Techniques applied were chosen specifically to motivate or improve the ability of the player to process the P2P CBT messaging within the ELM. *Figure 8* shows gamification techniques used as peripheral cues in the ELM grouped into motivation categories identified by Yee, Ducheneaut & Nelson (2006), and techniques for ability were grouped as categories 1) Facilitate Mastery, to give access to learning CBT, and 2) Protection, to reduce barriers from potential embarrassment or loss.
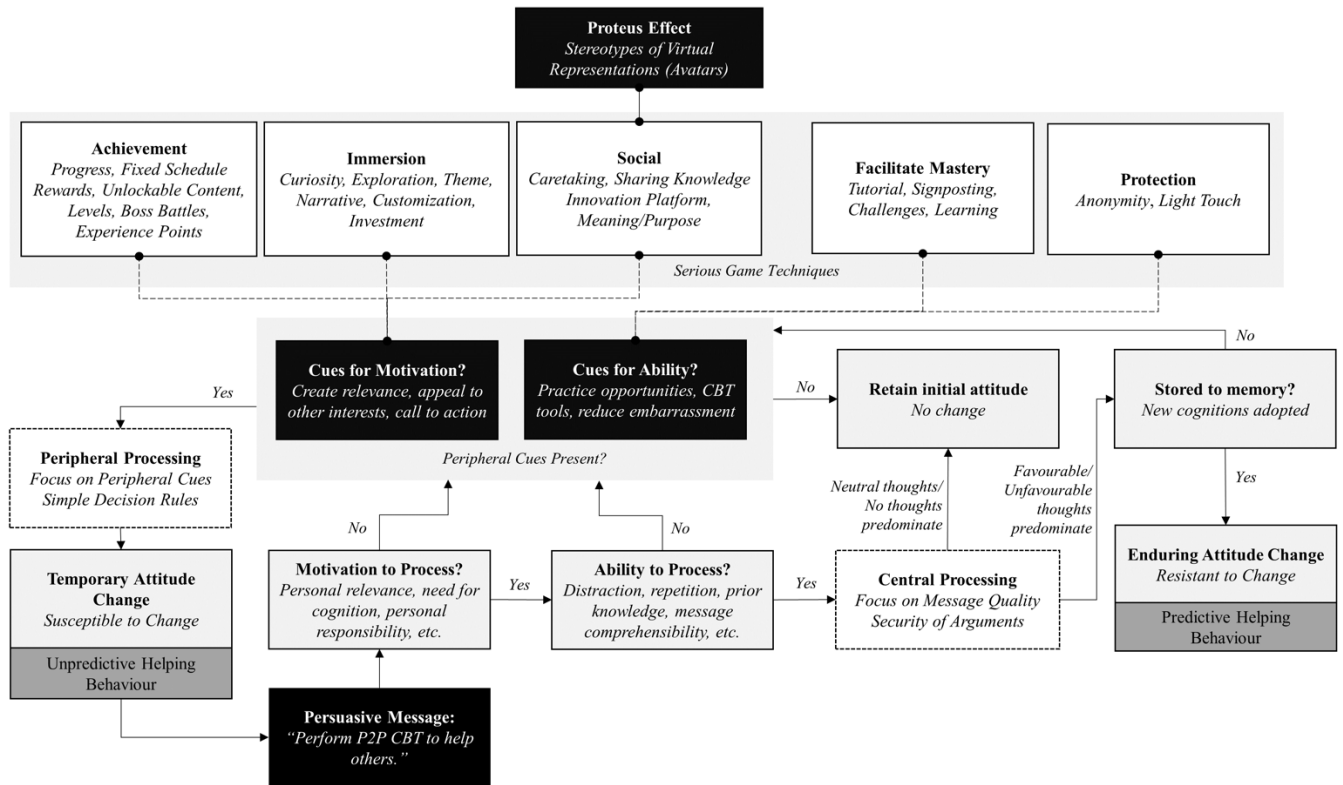
Figure 8. Game mechanics for game goals integrated as peripheral cues into the ELM. The Proteus Effect influences social game goals as self-representation relative to others could guide social behaviour (Glanz et al., 2015).

Consequential elements such as branching plots and strategy were considered, but any game change based on the performance of the players would require true P2P interaction to validate whether player responses were of merit or quality. There was an ethical concern expressed by the Office of Research Ethics (ORE) at the University of Waterloo of misleading participants into believing their efforts were of low quality. This approach could be considered in future studies with mental health professional cooperation, like in Panoply (Morris, 2015).

4.1 Ethical considerations

Merlynne was developed using existing guidelines for ethical considerations for mental health applications. It was important to recognize real-world constraints for ethical design in this research through design approach.

Taken from the Universal Declaration of Ethical Principles for Psychologists, there are four main points Andersson et al. (2014) in <u>iCBT: Clinical Guidelines</u> had pointed out concerns when designing unguided iCBT in compliance for these guidelines:

1) Respect for Dignity. This includes, informed consent, as well as respect for individuals who drop out. It is difficult to gauge "informed consent" in cCBT, individuals may disregard disclaimers in electronic mediums (Andersson, 2014). Poor comprehension of disclaimers may cause persons who require professional help to neglect seeking it in lieu of unsuitable unguided help, especially if there is a negative experience with the cCBT. *Merlynne* opens with clear statements that it is not a substitute for peer support training or needed therapeutic support in concise language which the individual must read to advance.

2) Competent caring of well-being of persons. Open, unguided iCBT cannot urgently handle crisis situations, thus access to crisis services is necessary in the design. Merlynne lists regional and Canada-wide hotlines on every screen of the game.

3) Integrity and 4) Professional and scientific responsibilities to society. The program should be presented as a complement and not a replacement to F2F guided methods at the current time. As our study concerns peer support giving and not receiving, we offer no therapeutic claims for participants.

There are additional ethical considerations brought up by the academic community (Andersson, 2014) regarding visual display and wording used in health applications, as inappropriate push notifications, app icons, and app names which show personal health data or suggest stigmatized health content. It may be a breach of privacy if an unintended individual sees the unopened app on the individual's device and perceives that the user is struggling with mental health illness when they were unaware. It is important for the individual's privacy for the game to not 'look' like a game for CBT. Even though the study ran in a closed room with no spectators, our game avoided any icons or titles suggesting it was a health-related application to reflect design constraints outside the lab.

4.2 Narrative construction

Narratives are also vehicles to attitude change depending on player's receptivity to the story (Thompson & Haddock, 2012). In previous research by Kaltenthaler et al. (2007), a theme or story is a commonly used game feature in unguided iCBT. However, there is a concern of using inappropriate theme elements which may trivialize the player's mental health issues (Lau, Smit, Fleming, & Riper, 2017). We chose to use the common medieval fantasy theme used in gamified mental health applications (i.e., SPARX, SuperBetter), yet we steer clear of violence, death, or religious imagery in compliance with the ORE at the University of Waterloo where the study was running.

Merlynne follows a "hero's journey" narrative, a tool commonly used in popular fiction such as *Lord of the Rings*, *Star Wars*, and *Don Quixote* featuring a central character called to a challenge, overcoming obstacles, then bringing back knowledge to help others. *Appendix B* presents the way our narrative matches with the hero's narrative formula. The familiarity of the story formula further supports identification for the

Proteus Effect through strengthening familiar stereotypes. In our narrative, the player helps NPCs afflicted with thoughts from "another world" which references the Reddit post content from the non-game world, by "taming" the thoughts using the CBT format. The act of taming instead of killing, which is common in most role-playing games, was chosen to be in line with the CBT principles that thoughts are to be accepted and reframed rather than rejected or suppressed.

4.3 Designing the avatar

To test the Proteus Effect, we designed two player avatars to represent two conditions: 1) the helpful condition, and 2) the unhelpful condition. NPCs were also designed to contrast the player avatars to either encourage or discourage prosocial interaction. It is important for us to design a "helpful" avatar consistent with existing literature and an "unhelpful" avatar which discourages social interaction, while designing NPC avatars which invite social interaction for both groups. This section describes the aesthetic decisions made for the avatar designs.

Player avatars resemble familiar stereotypes to allow for identification (Duchenaut, Yee, & Wadley, 2009), thus in line with the hero's journey narrative context, fantasy imagery was used well. Expectations of attractiveness predicted higher Proteus Effect strength in Yee & Bailenson's (2007) study, thus our design did not stray from conventional ideas of beauty even in the fantasy context, such as retaining a humanoid figure, free of deformities (Yee & Bailenson, 2007). Although high-fidelity renders of avatars with high physical similarity to players yield greater player-avatar identification, due to current resource constraints we opted for relatedness through reduction instead of similarity. As explained by comic artist and theorist Scott McCloud in his book Understanding Comics (*Figure 9*), using images with reduced features can invoke relatedness among more viewers than detailed faces (McCloud, 1993).
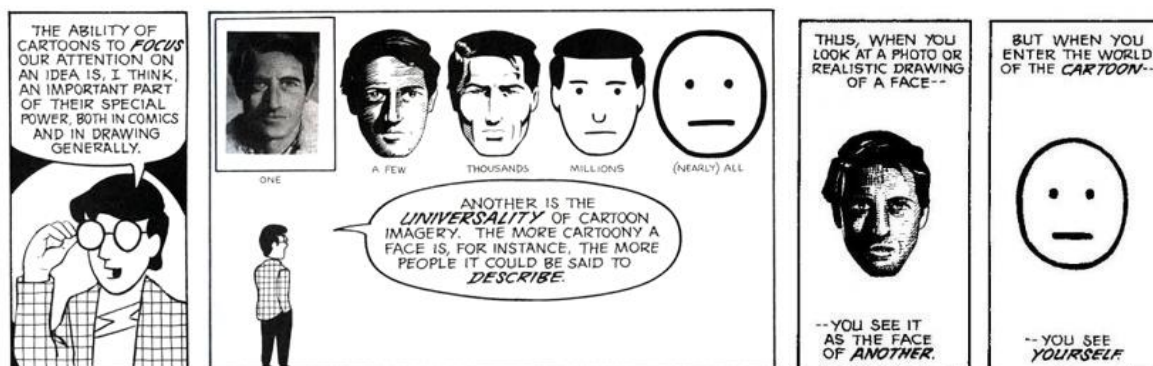
Figure 9. From *Understanding Comics* by Scott McCloud. Cartoon imagery allows for universality of representation.

A second reason we chose to avoid highly realistic avatars is to avoid the "uncanny valley," where realistic computer-generated humans give unsettling feelings (Fox et al., 2015). We used a 32-bit style pixel art from the 80s, which continue to be seen in modern games, especially in independent or "indie" games such as the Canadian game *Celeste* (2018) , or tactical RPGs of Japan, such as the *Fire Emblem: Awakening* series (*Figure10*).

Figure 10. Celeste, a Canadian indie game, and *Fire Emblem: Awakening*, a commercial Japanese RPG share similar dialogue layouts.

4.3.1 The helpful avatar

We drew on the stereotype of the "woman cleric" which is in line with current literature suggesting male players offer and request assistance more frequently when playing with a female avatar (Yee & Nelson, 2011). Emotional or psychological support was a feminine form of helping through gender role theory (Lehdonvirta et al., 2011). Consistent with fantasy genres, she was depicted as a magic user, which are commonly shown as wise, calm, and intelligent, while also traditionally placed in a supportive role in fantasy role-playing games like in *Dungeons & Dragons* by Wizards of the Coast, a long-time publisher of roleplaying games in the table-top gaming industry (Gillespie & Crouse, 2012).

Through feedback from our iterative design phase by in-house experts, wizards were a term not understood to be supportive but rather "damage dealing" in games such as WoW. We instead used the term "cleric" to describe the character, to make direct reference to supportive roles. The avatar was also originally given red hair due to artistic preferences, but during iterative design, red hair was mentioned to convey a rebellious and aggressive stereotype, which did not fit the supportive archetype we were aiming for. The avatar's hair was lightened to a blonde in line with stereotypes of angelic archetypes of healers seen in recent games such as *Overwatch* and *Final Fantasy XV*. Despite supportive imagery, the avatar was described as a hero in the narrative context to further encourage prosocial behaviour as suggested by Yoon and Vargas (2014). We refer to the avatar as CLERIC in this thesis due to its design intentions, but participants as a "healer," to remove religious associations after discussion with in-house HCI researchers.

4.3.2 The unhelpful avatar

For our control, we will use the "enemy monster" stereotype in the form of a minotaur, which is in line with villains not being helpful. A minotaur is a creature from Greek mythology with body of a man and the head and tail of a bull, and its likeness of large horns, great stature, and physically aggressive behaviour has been used in modern videogames for villain characters, such as in *God of War* and *Dark Souls*. Monsters with devil-like features (horns, large build, and dark colours) are commonly expected to be aggressive and hostile while depicted as foes which the protagonist must overcome instead of work alongside (Gillespie & Crouse, 2012). The avatar also held weapons to suggest aggression and violence instead of giving the image of a peaceful negotiator (*Figure 12*).

Although the minotaur character is not the least anthropomorphic representation that we could have used to deter prosocial activity, such as a tree or rock described earlier, we wished to maintain a sense of familiarity and sensibility where the playable avatar was believable to exist in a commercialized game. It is more likely for someone to identify with an anthropomorphic creature, than with an inanimate object to allow for avatar identification for the Proteus Effect to occur (Banks & Bowman, 2016). We refer to the avatar as **MONSTER** in this paper

Table 2 summarizes the differences between the helpful and unhelpful avatar designs.

	Helpful (CLERIC)	**Unhelpful (MONSTER)**
Gender	Female	Male
Anthropomorphism	Human (high)	Minotaur (low)
Realism	32-bit pixel art	32-bit pixel art
Similarity	Same size and race (high)	Different size and race (low)
Role	Healer	Monster
Colors	Light tones	Dark tones

Table 1. Avatar stereotypes.

*Figure 11. Helpful avatars, **Cleric**.*
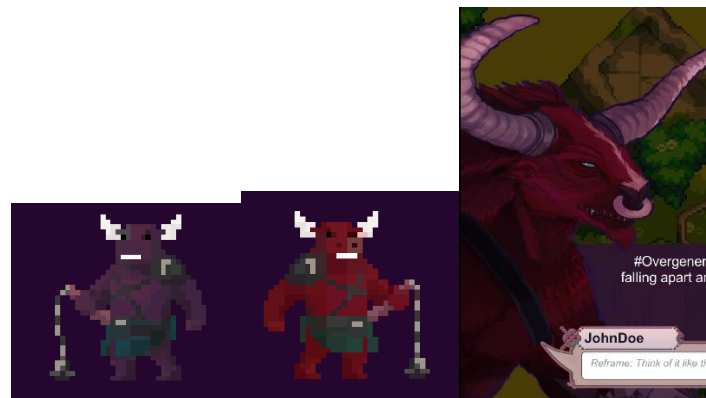
*Figure 12. Unhelpful avatars, **Monster**.*

4.4 Customization

The player could choose from two premade versions of the avatars to increase the potential for avatar identification (Ratan & Shah, 2015). Despite differences between choices, same stereotypes were preserved across both helpful (**Cleric)** and non-helpful avatar (**Monster)** variations. The only change was in colour as clothing and hair were identified as the parts of an avatar most important for physical self-expression by players (Duchenaut et al., 2009). colours were within the same colour palettes as well with the helpful avatar staying to lighter cool colours of blue and green (*Figure 11*), and the unhelpful keeping to darker colours of red and purple (*Figure 12*).

4.5 The NPCs

Physical differences between the player avatar and the NPCs in addition to the player avatar's aesthetics was considered in Merlynne's design. For stereotypes to enact the Proteus Effect, they must exist in a contextually relevant space. As the **Cleric** we chose to use was female, human, with clothing from the high fantasy genre, the NPCs which the player was asked to help were humanoid with high fantasy style clothing, and similar in height and stature.

In comparison, the **MONSTER** being a minotaur of larger stature in comparison to the NPCs would create more visual difference between the player's avatar and the NPCs to discourage social interaction due to less similarities. However, not all NPCs are humans, with 9 avatars within the first 30 avatars encountered being orcs, humanoid creatures of comparatively smaller or larger stature and coloured skin (blue, red, and green) traditionally depicted as villainous, such as in J.R.R. Tolkien's *Lord of the Rings*. This change from human NPCs may cause differences such as lowered response rate from either avatar groups.

Unlike Van der Land et al.'s study (2014) however, we decided to keep the art style consistent across all avatars, player and NPC, in order to retain the believability of a gaming experience. Most NPCs were gendered according to the artists' labelling yet appeared gender-neutral to pilot testers with only height and shoulder broadness in differentiators. However, it is noted that female avatars are less likely to socially interact with other female avatars in Lehdonvirta et al.'s (2011) study.

4.5.1 NPC content

In the design of our study, participants are aware that they are submitting reappraisals to avatars with pre-scripted programmed dialogues controlled by the computer.

Given the influence of perceived agency of human-controlled avatars for social interaction (Fox et al., 2015), we minimized the social differences between human and computer avatars by explaining to the participant that the negative thoughts they are addressing in the game tool are based off the submissions of real people on Reddit. We aimed to preserve emotional reactions and social influence of the NPCs carrying the negative thought queries to represent influence in the real world. This is an attempt at the hybridization suggested by Fox et al. (2015), where use of computer-controlled avatars fulfils a real-world issue, such as cost or maintenance, and human produced content can add to the realism of human engagement. The content is further explained in the section 4.8 Query Types, and details about each NPC's content and visual appearance is in *Appendix C*.

4.6 User interface design

Merlynne's interface is based off RPGs where characters are viewed in overhead third person view and dialogue with NPCs is key to game progression. Dialogue boxes would be activated when players interacted with the NPCs with their player avatar. The negative thoughts which the players were asked to submit cognitive reappraisals to appear in the dialogue boxes below the avatar, along with a text input field where the reappraisals can be typed. The submission UI design is further explained in the section Query Types.

Given that most of the time a dialogue box would be open, and the player's focus would be on the text, feedback during our iterative design phases showed that less attention was given to the avatar than the text,

which made evaluating the Proteus Effect difficult. Thus, we included character artwork close to the text box, common in Japanese style tactical RPGs (*Figure 10*) which provided a solution.

We chose to source our artwork from opengameart.com, a site which offers artwork to independent game developers. Artwork by artist Calciumtrice was used, and their artwork has been used in released games such as *CBUD* by Al Arz. With permissions under creative commons, we recolored his artwork to fit into our game.

4.7 Game design

Merlynne is a single player game, intended to be played by an NSU. The participant is told queries are collected from public internet forums, and their submissions will be collected in a bank to be available in aggregate by request by mental health groups for service improvement at the University of Waterloo. This design choice protects harm to any persons from poor advice and strengthen study controls where all participants will view the same content.

The goal for the players was to advance the narrative (*Figure* 13) which draws on concepts from the traditional fantasy narrative. Players answered queries with as much or as little detail as they wanted, including gibberish answers to advance narratives (*Figure* 14). Two submissions per level would be enough used to unlock narratives, but players were able to submit more if they wish, including re-submitting answers to queries. The entire game was guided by narrative, excluding avatar selection and tutorial level. Headwear of the characters differed based on their progress in the game: new cosmetics were earned as they progress in the game. Full gameplay descriptions and screens provided in *Appendix D*.
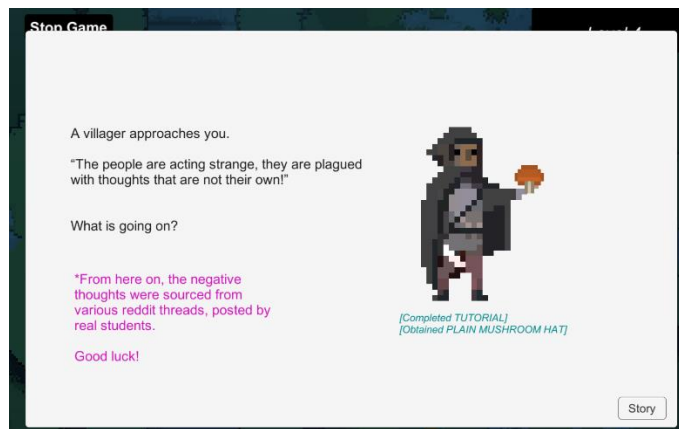
Figure 13. Narrative provided in Merlynne.
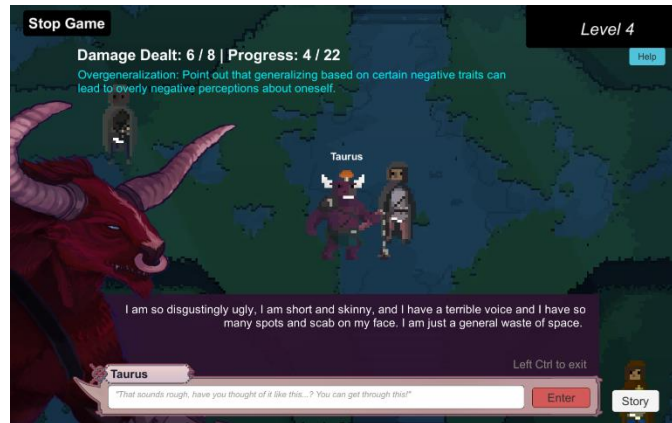
Figure 14. Dialogue with text-input box in Merlynne.

4.7.1 Serious Game Elements applied to the ELM

The focus of this study is on avatars' effects in a serious game for mental health, specifically through the Proteus Effect, but other gameful elements were considered in the creation of the serious game. *Appendix E* lists gamification techniques used and described in *Figure 8*, with the wording and explanation from Gamified UK guidelines (Marczewski, 2015), which was presented in the Conference on Human Factors in Computing Systems (CHI) 2018 conference course on gamification (Tondello & Nacke, 2018). Serious games for mental health termed "tested applied games for mental health" by Fleming et al. (2016) in their meta-analyses are also included as examples of where achievement, immersion, and social factors (Fleming, 2016; Yee, 2006) were used for player motivation. Our list excludes commercial games identified by Fleming et al. (2016) appropriated for mental health purposes (i.e., Wii sports and Tetris).

Putz and Treiblmaier (2015) included ELM as a model of persuasion using gamification and Brown et al. (2016) in a meta-analysis on which gamification techniques in web-based mental health support program adherence concluded that more research was needed to identify the individual gamification features which support adherence in the mental health context. However, re-iterating the research through design perspective, one game feature cannot be isolated to be measured for effectiveness and generalized to other cases, and must exist in conjunction with other elements, especially in serious games where a gameful context is built.

In pursuit of understanding the Proteus Effect, non-avatar gameful elements are also considered. Fleming et al. (2017) explains the potential of serious games to appeal, engage, and be effective for mental health programs. As we conducted an in-lab study where potential players were advertised a research study with renumeration, we cannot measure for the appeal of serious games. Measuring for effectiveness in terms of mental health treatment was also not within the scope of our study, as we focus on the perspective of peer

supporters. Although we examined the quality of submissions, we cannot measure for effectiveness without feedback from the help seeker. Therefore, choice elements for engagement potential were used. In a case study of *Reach Out Central*, a serious game which encouraged male participation in P2P CBT, although uptake went up showing effective appeal, it failed to engage men to prolonged participation (Burns et al., 2010). This resonances with Seidler et al 's. (2018) stance that focus should not be to encourage male participation but to create tools appropriate for the male-identifying individuals who are ready to participate.

4.8 Query types

There are 10 categories of cognitive distortions included in our platform which will be used as query categories, defined by William Irwin and Gregory Bassham (2003), of which five were used in Merlynne: Overgeneralizing, Should Statements, Emotional Reasoning, Personalization, and Mind-Reading.

The queries were chosen from a part of Reddit, called a subreddit, specific to the university of which our participants were recruited from (r/uWaterloo) to increase the personal relevance of the activity to the players to persuade prosocial behaviour through higher perceived agency in the avatar entities (Fox et al., 2015). However, the collected posts were paraphrased to not let the posts be traceable through online search engines. Participants will further be asked to not search for the queries online under the guise that there is a possibility a submission may be posted elsewhere with identifying information.

Interactions with NPCs were grounded in real-world issues from two local university subreddits, which were paraphrased to remove identifying factors or searchability. We manually searched the subreddits for applicable content, collected examples in a local database, and paraphrased each entry before incorporating it into the game. Situations include stress associated with academic performance, conflicts with friends and family, and other examples of anxiety. Mentions of substance and self-harm were omitted, in the interest of participant safety. Our final database included 48 entries, all of which were used for game content.

Despite criticisms of its lack of engagement, Panoply and Kokobot ask individuals to use a structured dialogue based on CBT when creating responses. For example, Kokobot will ask the individual to 1) relate to the query's submitter to show empathy, 2) reframe the query from a positive perspective, and 3) offer words of encouragement. Kokobot's predecessor Panoply also used a similar structure, and when resulting responses were compared with the responses of trained volunteers hired for the study, participants preferred the guided responses from untrained strangers, over the volunteers' responses (Yee at al., 2011). A later study by O'Leary , Schueller, and& Wobbrock (2018) examining the benefits of using a structured format in a P2P online therapy chat showed different benefits for both structured and unstructured chats. Structured chat provided "solutions to problems and new perspectives" but unstructured chats provided "personal connection on shared experiences" (O'Leary, Schueller, & Wobbrock, 2018).

Originally, the layout of the response for forced into a structure adapted from Panoply, like below:

>*Empathize:* "It is ok that you are not quiet."
>
>*Reframe:* "Maybe your customers appreciate your outgoing demeanor."
>
>*Encourage:* "Continue to act in a way you feel is right for your job."

Through our iterative design, feedback showed that the layout was too restrictive and needed "too many clicks" impacting the usability of the interface. It also drew attention away from the avatar. The layout was updated to what is seen in *Figure 14* with one text input field but bearing prompts as a suggestion. Structured templates would yield more informative answers, but freeform fields invited more empathetic responses (O'Leary, Schueller & Wobbrock, 2018).

4.9 Technical requirements

Merlynne was created using *Unity 5 and* written in C#. Submissions with time stamps were recorded on a *Google Forms* file linked to the game. Game art was taken from open source libraries (OpenGameArts.com). Merlynne ran on a desktop computer with a 17" *LD* monitor with a 1680 × 1030 display resolution, with a *Razer* keyboard, and mouse.

Chapter 5: Methods

In our mixed methods approach, both quantitative and qualitative methods were used to compensate for other methods' drawbacks of validity and relatability respectively (Britten & Fisher, 1995; Mays & Pope, 1995). This approach also compliments the research through design approach to explore novel trends in a complex system.

This section describes the participants, research procedures used with the serious game *Merlynne*, operational measurements, and data analysis to answer our research questions.

5.1 Participant characteristics

Exclusion criteria included persons who were non male-identifying, had involvement with the platform prior to the study, persons working in a mental health care provider role, being under 18 years old, as subject matter may be inappropriate for minors, and those who do not read English. Although the ideal participants were NSUs, being an SU was not an exclusionary factor. Intake questions concerning one's relationship with health services were used as controls.

5.2 Sampling procedures

Convenience sampling was used to recruit voluntary participants using posters in strategic and approved places at the University of Waterloo. The poster was also shared with the University of Waterloo's graduate student mailing list. The poster advertised the study as an opportunity to playtest a novel game used in mental health support.

5.3 Sample size, power, and precision

A power analysis before a study can be uncommon in HCI research, since it is difficult to predict the variance in a sample and the difference in the means on the dependent variable before the data are collected (MacKenzie, 2013). We chose to instead examine current peer-reviewed literature in avatar identification and mental health which yielded significant findings when determining sample size (MacKenzie, 2013).

Lopez et al.'s 2019 study titled Investigating Implicit Gender Bias and Embodiment of White Males in Virtual Reality with Full Body Visuomotor Synchrony used 11 participants to study the effect of race (black and white) and gender (male and female) avatars used by players in a VR setting. They produced significant findings agreed through peer-review at Computer-Human Interaction Conference (Lopez et al., 2019). Thus, we aimed for a sample size of 11 for each group this study, totaling at least 22 participants. This thesis study is exploratory; thus less weight is put on statistical significance compared to the depth of qualitative findings.

5.4 Measures and covariates

Both automatic (i.e., logged by computers) and deliberate (i.e., self-reported) measurements gave insights into the how players are consciously and subconsciously making decisions influenced by avatars (Fox et al., 2015). A mixed methods quantitative and qualitative study design provided comprehensive understanding from both facets of participant experiences. Merlynne automatically logged participant activity, and surveys and interviews asked participants of their deliberate experience feedback, to provide insight into differences to how players act and vocalize.

This section describes the mechanics and development of the game tool used for the study and the justifications for its design, and measurement tools to collect metrics of interest. A semi-structured interview (*Appendix F*) was used to supplement quantitative metrics.

5.4.1 Measurements for engagement

Player usage metrics, which include words used, and time spent, number of submissions sent, and number of levels completed were measured from when tutorial ends, to when the player exits the game. The choice to measure usage data as an operational measure for engagement was chosen over measures like adherence (completion of all tasks) and attrition (number of dropouts in the study), because engagement in a short-term platform cannot be adequately measured with adherence (Morris, 2015). Activity level is more predictive of an outcome, as attrition in a research study setting is not be representative of the real world (Morris, 2015).

The content of responses was reviewed by three individuals who first coded a set of responses together to reach consensus on whether each response showed 1) empathy, 2) reframing, and 3) encouragement, befitting the CBT format prompted. Two additional criteria were added based off interviews collected, whether 4) a practical solution was provided, and whether it was 5) perceived as helpful by the raters. Only binaries of Yes and No were recorded. The review was conducted blindly, where it was unknown to the raters whether which submitter belonged to which group.

A second set of responses was then coded separately and then raters reconvened to compare answers. If the answers differed by more than 0.8 on the Kappa test for inter rater reliability on either of the three variables, then they would code together once more to reach consensus and repeat the process. When a 0.8 Kappa score which is high by Landis and Koch's (1977) interpretation was achieved after several iterations, each rater would be assigned a third of participant answers and answers would be recorded.

5.4.2 Measurements for attitude change

In a pre-test, post-test procedure to gauge attitude change, the *Helping Attitudes Scale* (HAS), a 20-item measure of respondents' beliefs, feelings, and behaviours associated with helping (Nickell, 1998) will be used (*Appendix G*). The HAS is psychometrically validated but does not directly ask about helping with emotional support, with a focus on informational and material assistance. There is currently no standardized scale for willingness to provide emotional support. Emotional helping behaviours will be asked of in the unstructured interviews. Differences between emotional and informational support in submissions were to be further analyzed based on Lehdonvirta et al.'s (2011) coding of helping behaviour, through the rater-coded criteria of having practical solutions.

5.4.3 Measurements for the Proteus Effect

Avatar identification was measured with the method by Dunn and Guadagno (2012) who examined the effects of gender on avatar identification and avatar choice, using self-reported discrepancies with 6 items.

1) How connected the player is to their avatar, using a 7-point Likert scale. The categories are represented with a series of two superimposed circles slowing converging into one circle, with 7 representing the converged circles signifying strong connection. This is an adaptation to the "Inclusion of the Other in the Self" scale which measures respondents' interpersonal closeness (Aron et al., 1992) by Dunn and Guadagno (2012) to measure a player's sense of self in their avatar. This method is more appropriate in our short-term study than the Player Identification Scale (PIS) commonly used in player-avatar studies, as the PIS was developed for field studies in MMORPGs (Van Looy et al., 2010), where players would spend weeks using their avatars to develop a relationship. Dunn and Guadagno's (2012) scale was used for an avatar study using 20 minutes of gameplay and is a closer match to our study's procedure.

2) How likely one would be to use the word ''we'' to describe themselves and their avatars on a from a Likert scale of 1, not at all, to 7, extremely likely.

3) Whether the avatar looks like the player on a 7-point Likert (Dunn & Guadagno, 2012).

4) Whether the avatar shares the player's personality on a 7-point Likert (Dunn & Guadagno, 2012).

The *Transportation Scale - Short Form (TS-SF)* (Appel & Richter, 2010) for narratives was used to control for intersubjective differences in preference for the game narrative. The TS-SF is a 6-item questionnaire with a 7-range Likert scale (*Appendix H*) to determine how relatable a narrative is to the reader. The higher the transportability score, the greater persuasive power the narrative has (Appel & Richter, 2010). Transportability will be used to define identification with the narrative, predicting the strength of the stereotypes for the player.

Avatar identification and narrative transportation were compared against engagement and attitude change variables with ANOVA to determine its strength.

5.4.4 Confounding variables

The short form of the Big-Five Inventory (BFI-SF) (Gosling, Renfrow, Swann, 2003) (*Appendix I*) was used to measure for openness, conscientiousness, agreeableness, extraversion, and neuroticism, as these five traits are documented mediators to identification (Bian et al., 2015). Other variables of interest included participant demographics such as gender, ethnicity, age, profession, NSU or SU status, perceived stress, and prior experience with computer games and fantasy media. Whether or not the avatar represented the player's ideal self was also asked, as it was a predictor of higher engagement especially when the avatar did not match how a player saw themselves (Prybylski et al., 2011) by 1) Differences between the avatar and their ideal self, physically, on a 7-point Likert, and 2) Differences between the avatar and their ideal self, based on personality, on a 7-point Likert.

In order to account for all the stereotypes and meanings a visual representation may suggest for an individual person, our study design has a qualitative component to further understand what each participant interprets the given avatar, and whether there was a cognitive appraisal or automatic response between avatar influence and behaviour. For example, our participant may not see our "unhelpful" avatar as unhelpful.

A manipulation check like in Sherrick et al.'s (2014) study to control for whether or not participants were aware of the study's hypotheses was asked during the end of the unstructured interview.

5.4.5 Iterative design

To confirm usability of the tool developed for this study, a series of pilot tests were conducted with in house volunteers (n = 4) within an iterative design process. Volunteers were asked to play the game for 30 minutes, and then the researcher asked for their feedback on usability, design, and learnability. Results integrated in the iterative design process is described in *Appendix A*.

5.5 Research design

The study was between-subjects with a single IV: avatar type. Participants were randomized into either the helpful avatar (**CLERIC)** group or the unhelpful avatar (**MONSTER)** group prior to arriving at their session. The software for each condition was set up ahead of time to prevent participants from knowing there were multiple conditions to the study. Participants were informed that that they were to evaluate a fantasy game from recruitment materials.
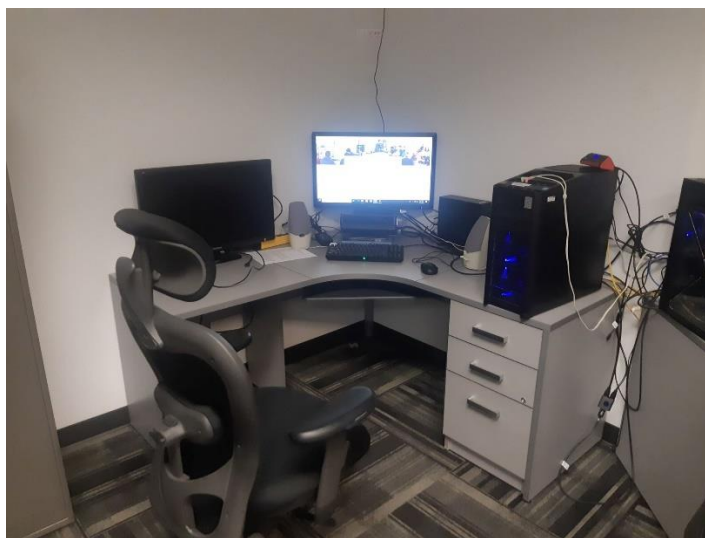
Figure 15 Game area setup.

Consent forms were completed on paper, but the introductory (*Appendix J*) and exit surveys (*Appendix K*) were completed electronically through *Google Forms*. After introductory survey completion, participants were guided by the researcher through the Merlynne game to complete avatar selection, character naming, and three tutorial levels to familiarize with the game before starting the study. Participants played the game for a max of 30 minutes with the option to stop at any time. *Figure 15* shows the computer setup where Merlynne was played within the study.

Post-play, participants were asked to complete the exit survey, and then asked a series of unstructured questions in an interview, which was audio recorded on a *TASCAM DR-05 Linear PCM* recorder. Participants were prompted to elaborate on the questions if their responses could be more detailed. After the interview was concluded, it was revealed to the participants that there was a separate avatar condition, they were thanked, and then reimbursed $15 CDN for their time.

In a pre-test, post-test study, changes in helping attitudes were compared between groups using the two avatar types, and within each avatar-type group, engagement levels, demographics, stress levels, and narrative transportability were compared.

It was hypothesized that there would be the greatest change in helping attitudes in the stereotyped avatars game participant group among persons with higher engagement, low pretest helping attitude scores, and with high identification with their avatars and high transportability with the narrative presented. This hypothesis was based off existing research about the Proteus Effect and results could be used to leverage avatars as tools for motivating helpful behaviour in the P2P mental health support. *Figure 16* shows the flow of the research design.
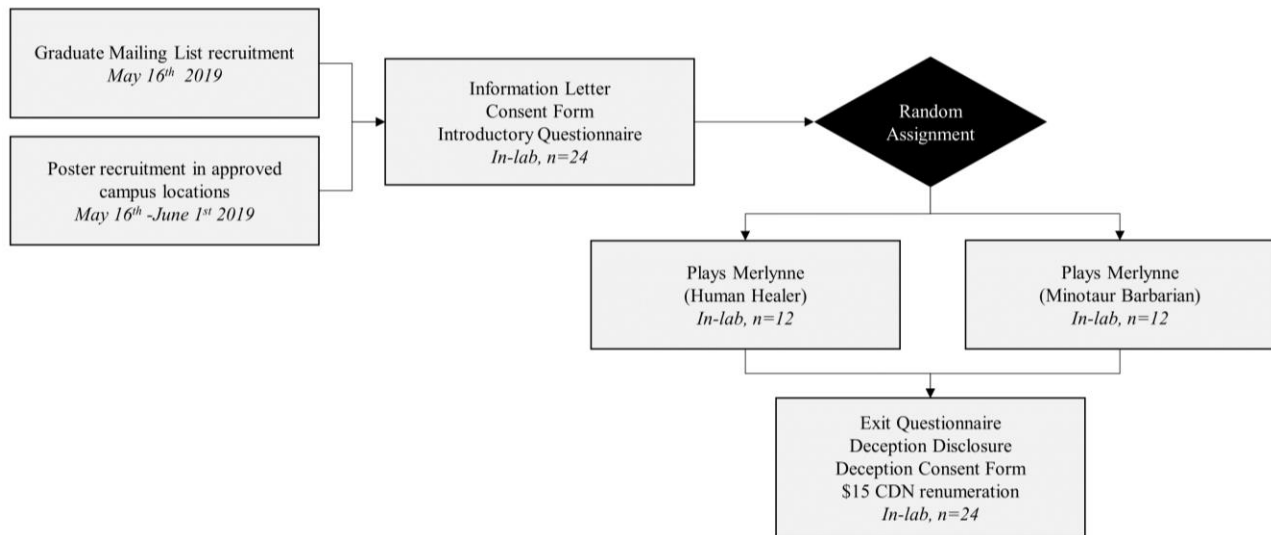
Figure 16. Study design procedure.

5.6 Data analysis

This is a mixed-methods, quantitative and qualitative study. Given our small participant sample, and inability to meet assumptions of normality and symmetry, medians were used for descriptive statistics, and non-parametric tests for statistical comparisons. To compare change in helping attitudes, a Sign test was used for the HAS results in a pre-test, post-test study due to our small sample size (paired t-test requires 50 samples). A Mann Whitney U (MWU) test was used to compare usage data between the two avatar groups, and to identify significant interactions between the potentially moderating variables for the HAS score changes and engagement rates in case of significance. Detailed explanation is outlined in *Table 3.*

5.7 Summary of measurements and statistical tests

RQ1: Do 'helpful' avatars motivate higher engagement in CBT?

Variables	*Measured by*	*Statistical Test*
Study conditions (independent)	Helpful Avatar (**CLERIC)** group Unhelpful Avatar (**MONSTER)** group	Mann Whitney U; Logistic Regressions; Linear Regressions
Engagement levels (dependent)	Word Count, Number of Submissions, Length of Sessions, Number of Levels completed Empathy, Reframing, Encouraging, Practical Solution, Harmless, CBT use	

RQ2: Do 'helpful' avatars improve player attitudes towards CBT?

Variables	Measured by	Statistical Test
Study conditions (independent)	Helpful Avatar (**CLERIC**) group Unhelpful Avatar (**MONSTER**) group	Mann Whitney U
Helping attitudes change (dependent)	Difference in pre-test, post-test HAS scores	

What are the mediators and confounders to the differences in engagement levels and change in attitudes towards helping others due to the Proteus Effect?

Variables	Measured by	Statistical Test
Demographics (confounder)	Age BFI-10 scores Pre-test HAS score	Mann Whitney U
Avatar identification (outcome)	How connected the player is to their avatar How likely player would be to use the word ''we'' to describe themselves and their avatars Whether the avatar looks like the player Whether the avatar shares the player's personality	
Narrative identification (outcome)	NTS score	
Engagement levels differences between avatar groups (dependent)	Differences in: Word Count, Number of Submissions, Length of Sessions, Number of Levels completed Empathy, Reframing, Encouraging, Practical Solution, Harmless	
Helping attitudes change differences between avatar groups (dependent)	Differences in pre-test, post-test HAS scores between Helpful Avatar (**CLERIC**) group and Unhelpful Avatar (**MONSTER**) group	

Table 2. Outline of variables, measurements, and statistical tests.

Non-listed categorical variables such as education and ethnicity are only described with descriptive statistics given its expected low statistical power due to a small sample size, using the chi square test.

Chapter 6: Quantitative results

In our mixed-method approach, we used quantitative results to support findings from qualitative results and triangulate participants' self-reported data better understand their attitudes and motivations. This section describes the quantitative results of the study, gathered from surveys, usage data, and coded submissions by raters. Quantitative results were calculated using IBM SPSS, and scale scores with equal weights per question, were converted into percentages to account for missing answers. Descriptive results, except submissions quality data, reference the median as average, as collected data violates assumptions of normality.

6.1 Participant characteristics

A total of 24 male-identifying participants were recruited between May 21st, 2019 and June 6th, 2019 (n = 24) and no participants revealed transgender status. The median age of participants were 26 years old. The youngest participant was 19, and the oldest participant was 38. Most of the participants were 26 (16.7%) and 27 (12.5%), accounting for almost a third (29.2%) of the sample.

Every participant (n = 24) had at least a highschool diploma, with the median participant obtaining a bachelor degree. Of the sample, 45.8% (n = 11) of the participants had a bachelor's degree as their highest educational attainment.

Participants were predominantly (50.0%, n = 12) of Asian/Pacific Islander descent, but had representation from those who identified as Caucasian (33.3%, n = 8), Middle Eastern (8.3%, n = 2), South American (4.2%, n = 1), and Black or African American (4.2%, n = 1).

Participants on average played games between once a month and once every 4 months, with the median of 1-3 times a month, but most reported playing games daily (25%, n = 6). Only two participants reported to have never played games (8.3%, n = 2).

Most participants did not report being diagnosed with physical or mental health conditions which affected their stress (79.2%, n = 19), did not report accessing mental health professionals in the last 6 months (75.0%, n = 18), and did not report being currently on any mental health treatment plan, including medications used to manage symptoms (83.3%, n = 20). All but one participant reported to have held regular volunteering or work positions in a mental health field (95.8%, n = 23).

All but one participant (4.7%, n = 1) had a score deemed high in the initial HAS scoring. The median initial HAS score of the participants was 83.50% (n = 24), which is scored as high (Nickell, 1998). Those above 88.56% (n = 24) were in the 75th percentile, and those under 78.25% (n = 24) were in the 25th percentile, which is still scored as high.

After BFI-10 scores were adjusted into percentages to account for missing values, median extraversion in groups was 35.71% (n = 24) with those scoring above 50.00% (n = 24) in the 75th percentile, and the median and mode (28.57%, n = 24) at the 25th percentile of 28.57% (n = 24). The median agreeableness was 57.14% (n = 24), and mode (57.14%, n = 24) slightly higher, at the 75th percentile of 57.14% (n = 24). Conscientiousness had a median at 35.71% (n = 24) and mode (21.43%) lower than the 25th percentile of 23.21% (n = 24). Neuroticism had the median of 71.43% (n = 24), with the mode (64.29%, n = 24) also at the 25th percentile (64.29%, n = 24). The median Openness to New Experiences, shortened to Openness in the rest of this thesis, is 35.71% (n = 24), with its mode (28.57%, n = 24) also at the 25th percentile of 28.57% (n = 24).

6.1.1 Group characteristics

This section compares characteristics between groups, such as demographics and potential confounding factors, which yielded no statistical significances overall. Outcome characteristics are described in the next sections.

There were 12 participants in the **CLERIC** group (n = 12), and 12 participants in the **MONSTER** group (n = 12). There were no significant differences between the two groups based on measured characteristics. Given that age was balanced between groups (**CLERIC** M = 26.0, **MONSTER** M = 26.5), we could not use the data to consider its effects on dependent variables of interest in our study. This is the same case for HAS scores, as due to the consistently high scores across initial HAS scores across groups, we cannot consider initial HAS scores as a potential confounder to our study's dependent variables. MWU showed no differences between avatar groups for neither initial HAS scores (n = 24, U = 67.0, p = 0.39), nor exit HAS scores (n = 23, U = 59.5, p = 0.36) at alpha = 0.05.

To compare categorical data, likelihood ratio chi square statistics was used over the chi square statistics, as it has been shown to be more representative of data when categories have less than five samples (n < 5) (Özdemir & Eyduran, 2005). Determined by likelihood ratio chi square test at alpha = 0.05, there is no significant difference in education, X^2 (1, n = 24) = 5.471, p = 0.242, in ethnicity, X^2 (1, N = 24) = 5.88, p = 0.21, in gaming use, X^2 (1, N = 24) = 7.81, p = 0.35) in whether or not they have a diagnosed problem affecting stress, X^2 (1, N = 24) = 0.25, p = 0.614, whether or not they have accessed mental health services in the last 6 months, X^2 (1, N = 24) = 0.90, p = 0.34, whether they are on treatment to manage mental health issues, X^2 (1, N = 24) = 0.00, p = 1.00, and if they volunteered or worked in the mental health field, X^2 (1, N = 24) = 1.43, p = 0.232.

There were no statistically significant differences between BFI-10 scores between avatar groups. MWU tests showed no difference in extraversion between **CLERIC** (Mdn = 35.71%) and **MONSTER** avatar groups

(Mdn = 35.71%), U = 64.5, p = 0.34, agreeableness between **CLERIC** (Mdn = 57.14%) and **MONSTER** avatar groups (Mdn = 46.43%) U = 52.0, p = 0.12, conscientiousness between **CLERIC** (Mdn = 35.71%) and **MONSTER** avatar groups (35.71%) U = 63.5, p = 0.32, neuroticism between **CLERIC** (Mdn = 75.00%) and **MONSTER** avatar groups (Mdn = 71.43%) U = 67.0, p = 0.40, and openness between **CLERIC** (Mdn = 75.00%) and **MONSTER** avatar groups (Mdn = 71.43%) U = 58.5, p = 0.22.

6.2 Engagement

This section describes the engagement results. There were no significant effects found for engagement, thus no confounders were tested.

Session time was capped at 30 minutes after the finish of the tutorials, but participants could finish their last action before stopping the game. All participants finished up until the 30-minute mark (n = 24). One participant paused the game; thus, their session time was adjusted accordingly manually. All the participants completed at least 8 levels (n = 24), with the highest reaching level 19 (n = 1) of 22 possible levels, the median level reached was 12 (n = 24), with the most people stopping at level 12 (n = 6). The highest level possible was 22 levels.
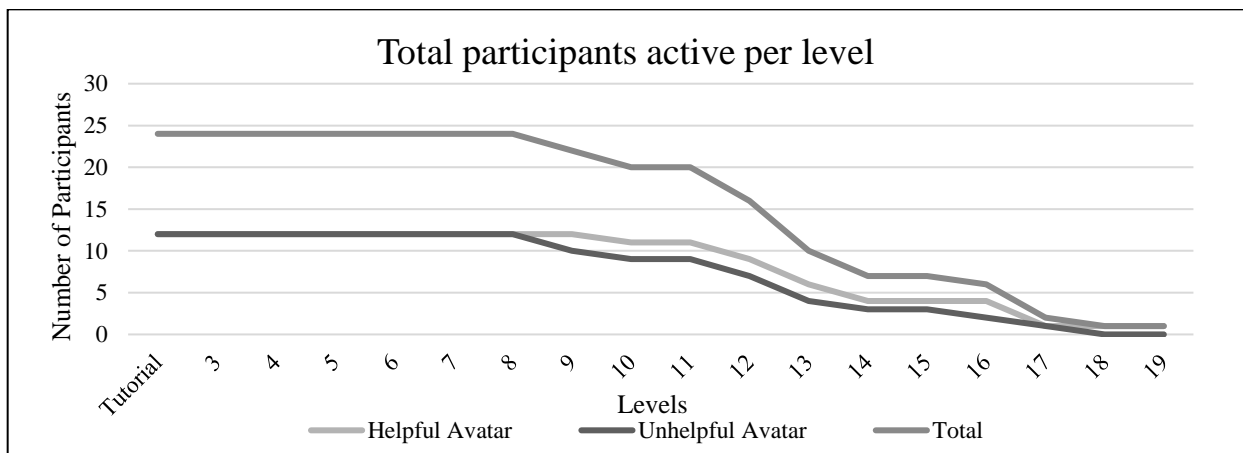
Figure 17. Active participants per level before forced drop-out at the cap of 30 minutes after completion of tutorial levels, divided between avatar groups as well as total groups. Although insignificant, the helpful avatar group were active on more levels than the unhelpful group past level 8.

Figure 17 shows the number of participants active per level between groups, and MWU shows no difference between levels completed for **CLERIC** (Mdn = 12) and the **MONSTER** (Mdn = 12.5) avatar groups U = 53.5, p = 0.15., number of submissions for **CLERIC** (Mdn = 24.5) and the **MONSTER** (Mdn = 24) avatar groups U = 62.0, p = 0.29, number of words in total for **CLERIC** (Mdn = 485.5) and the **MONSTER** (Mdn = 501) avatar groups U = 69.0, p = 0.44, the average number of words per level for **CLERIC** (Mdn = 53.67) and the **MONSTER** (Mdn = 62.70) avatar groups, U = 58.0, p = 0.22, or the average

number of words per submission for **CLERIC** group (Mdn = 23.89) and the **MONSTER** (Mdn = 29.16) avatar groups, U = 57.0, p = 0.20.

6.2.1 Time and words per level

The median session time between all groups was 41 minutes and 6 seconds (n = 24), median time spent per level excluding tutorial by participants was 03:39.3 (n = 24), median number of submissions was 24.5 (n = 24), median total number of words in a session was 624 (n = 24), lowest of 193, highest of 1294, median number of words per level was 56.5 (n = 24).

Table 3 below lists the average time and words per level, based on number of participants on the level, and *Figure 18* illustrates the median time per level decreasing over progressing levels, and *Figure 19* shows consistent words over levels.

Level	n	Time per level (hh:mm:ss)			Words per Level		
		min	max	median	min	max	median
Tutorial	24	0:04:52	0:09:52	0:06:14	0	47	36.5
3	24	0:00:28	0:04:31	0:02:28	3	78	35
4	24	0:02:20	0:08:08	0:04:00	0	103	51.5
5	24	0:02:14	0:07:21	0:03:33	0	158	63
6	24	0:01:26	0:06:29	0:03:30	0	171	65.5
7	24	0:01:14	0:06:58	0:02:20	0	176	36
8	24	0:02:17	0:07:59	0:03:39	0	172	64
9	23	0:01:45	0:07:23	0:03:56	0	166	74
10	20	0:01:29	0:05:47	0:03:26	13	173	66
11	20	0:00:24	0:05:39	0:03:11	0	175	67.5
12	16	0:01:19	0:04:46	0:02:26	0	176	47
13	10	0:00:58	0:05:05	0:02:16	18	105	41.5
14	7	0:00:48	0:02:42	0:01:30	0	72	26
15	7	0:00:57	0:03:17	0:01:57	10	82	55
16	6	0:01:20	0:02:42	0:01:51	0	134	64.5
17	2	0:01:51	0:02:07	0:01:59	51	68	59.5
18	1	0:00:57	0:00:57	0:00:57	31	31	31
19	1	0:01:45	0:01:45	0:01:45	58	58	58

Table 3. Median time and words per level across participants of all groups.
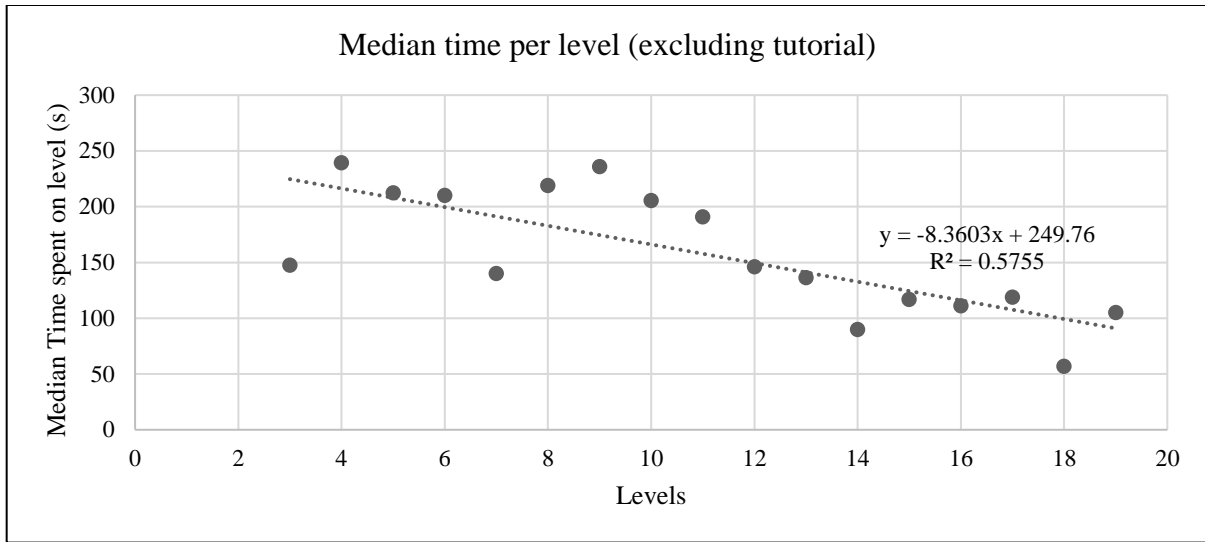
Figure 18. Median time per level compared with sequential levels. A line of best fit shows a negative slope where median time decreases with each level.
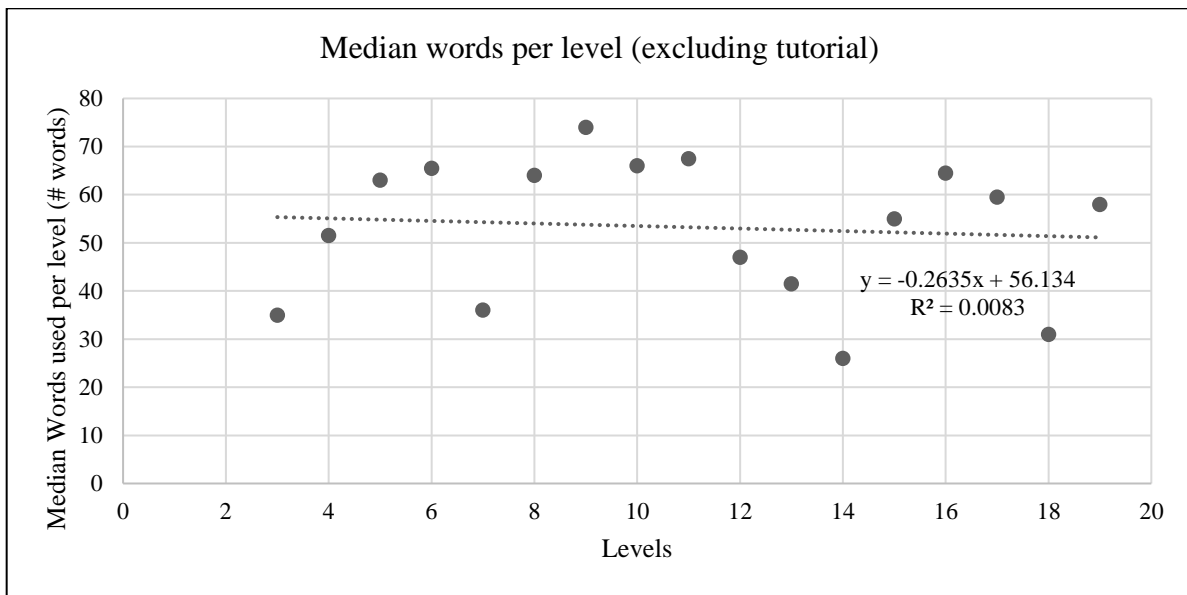
Figure 19. Median words per level compared with sequential levels. A line of best fit shows median words per level is relatively consistent across levels, with a low R2 suggesting low predictability.

When median words were compared against median time, a positive trend is observed suggesting more time is spent on levels with more words (Figure 20).
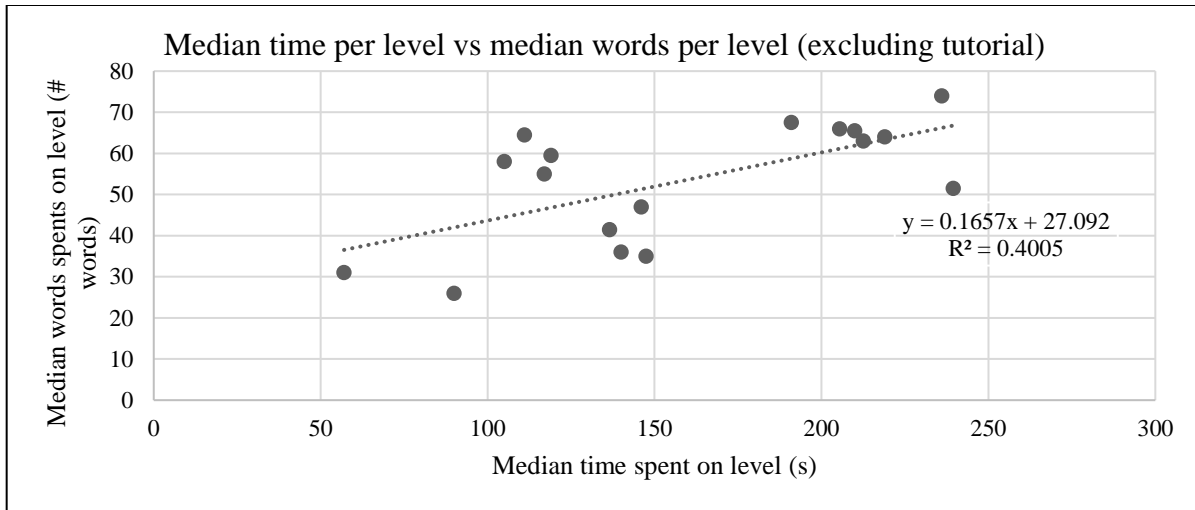
Figure 20. Median time per level compared with median words per level shows that time spent on level is positively correlated with words per level.

6.2.2 Submission structure

The three raters completed one set of participant answers together (Participant 24) in a round table and discussed openly which factors led to their response. Majority rules determined the final decision on the category. Raters were then asked to complete one set of participant answers alone (Participant 23), then reconvene and discuss. There was high discrepancy when reviewing, and majority rules determined final decisions again. Raters completed another set alone (Participant 12) and discussed answers openly and came up with a list of common assumptions (*Appendix L*) to refer to when rating future answer sets. The category of helpfulness was changed to "harmless" where submissions were judged based on its potential to do harm than to add good, since the raters disagreed on what makes a response good from a P2P perspective.

Raters again completed a set (Participant 11) independently while referring to common assumptions agreed upon. A Fleiss Kappa for inter rater reliability was calculated for each category using SPSS, showing there was agreement across categories (*Table 4*). A *Landis and Koch* (1977) interpretation is given.

		Empathy	**Reframing**	**Encouraging**	**Solution**	**Harmless**
P11 (n = 24)	*Fleiss Kappa*	0.529 (p = 0.002)	0.456 (p = 0.009)	0.236 (p = 0.175)	0.864 (p < 0.001)	All ratings the same
	Interpretation	Moderate agreement	Moderate agreement	Fair agreement	Substantial Agreement	Perfect agreement

P4 (*n = 11*)	*Fleiss Kappa*	0.583 (p = 0.001)	0.830 (p < 0.001)	0.524 (p = 0.004)
	Interpretation	Moderate agreement	Substantial Agreement	Moderate agreement
P5 (*n = 11*)	*Fleiss Kappa*	All ratings the same		0.293 (p = 0.093)
	Interpretation	Perfect agreement		Fair agreement
P22 (*n = 17*)	*Fleiss Kappa*			0.700 (p < 0.001)
	Interpretation			Substantial Agreement

Table 4. Inter-rater reliability (IRR) between three raters for coding, using Fleiss Kappa.

Table 5 shows the proportion of participants who fulfilled each measured criterion, between avatar groups and across all groups, with both means and medians as measures of centrality.

		Empathy	**Reframing**	**Encouraging**	**Solution**	**Harmless**
All	*Mean*	57.26%	69.70%	50.77%	37.52%	91.11%
	Std	34.29%	25.13%	23.64%	21.25%	13.64%
	Median	64.35%	73.86%	53.14%	33.33%	95.12%
Helpful (*CLERIC*) (n = 12)	*Mean*	61.47%	70.96%	48.60%	34.74%	88.67%
	Std	31.75%	29.20%	18.64%	25.80%	13.52%
	Median	64.35%	79.18%	47.06%	30.00%	94.56%
Unhelpful (*MONSTER*) (n = 12)	*Mean*	53.04%	68.44%	52.94%	40.29%	93.55%
	std	35.84%	17.91%	25.76%	14.57%	11.42%
	Median	60.99%	65.13%	61.82%	37.72%	97.62%

Table 5. Average proportions of response criteria fulfillment between participants.

MWU showed no differences between empathy scores of the **CLERIC** group (Mdn = 64.35%) and the **MONSTER** group (Mdn = 60.99%) U = 59.5, p = 0.24, no differences between reframing scores of the **CLERIC** (Mdn = 79.18%) group and the **MONSTER** group (Mdn = 70.70%) U = 54.0, p = 0.16, no differences between encouraging scores of the **CLERIC** group (Mdn = 47.06%) and the **MONSTER** group (Mdn = 61.18%) U = 64.0, p = 0.33, no differences between solution scores of the **CLERIC** group(Mdn = 30.00%) and the **MONSTER** group (Mdn = 37.72%) U = 50.0, p = 0.12, and no differences between

harmless scores of the **CLERIC** group (Mdn = 95.12%) and the **MONSTER** group (Mdn = 100.00%), U = 55.0, p = 0.16.

In considering empathy, reframing, encouraging and harmlessness together, satisfying all aspects of CBT format, MWU also showed no significant differences between mean CBT scores of the **CLERIC** group (Mdn = 2.80) and the **MONSTER** group (Mdn = 2.95) U = 71.0, p = 0.49. Scores were totaled out of four, for the four criteria satisfied, and means were used due to assumptions of normality. When comparing mean CBT use against time represented by query order through linear regression modelling, CBT use significantly declines with query order (df = 23, F = 15.85, p < 0.01), although there was insignificance when avatar types were factored in as well (df = 23, F = 0.05, p = 0.82). Although insignificant, plotted graphs show the **MONSTER** group to use less CBT with time in comparison to the **CLERIC** group (Figure 21).
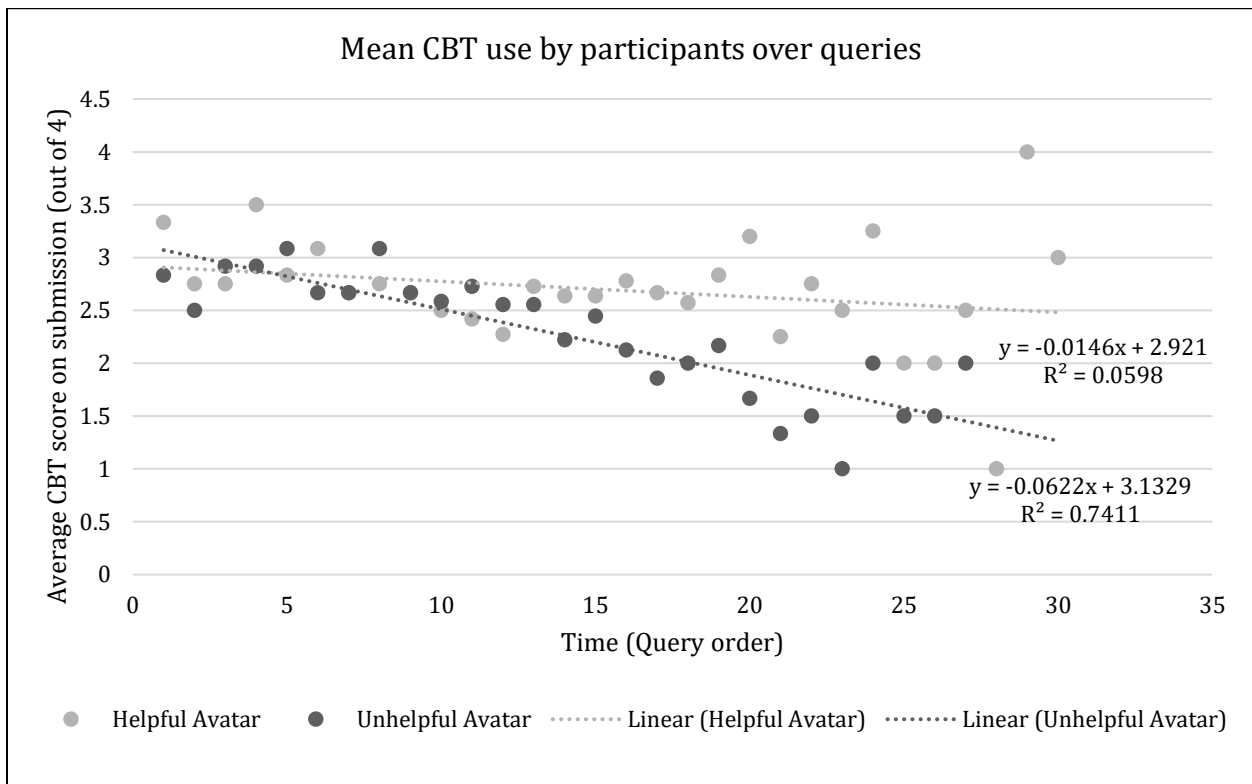
Figure 21. Comparing mean CBT use over time measured by query order. Mean CBT use measured by fulfilling criteria of empathy, reframing, encouragement, and harmless. A score of 4 represents total fulfilment of criteria. Lines of best fit suggest a stronger negative correlation.

A similar trend is seen in empathy alone, where both avatar groups are significantly negatively correlated with query order through logistic regression modelling (df = 432, F = 9.44, p < 0.01) and plotted data show

that the **MONSTER** group provided less submissions with empathy with query order (*Figure* 22), despite insignificance (df = 432, F = 0.80, p = 0.37).
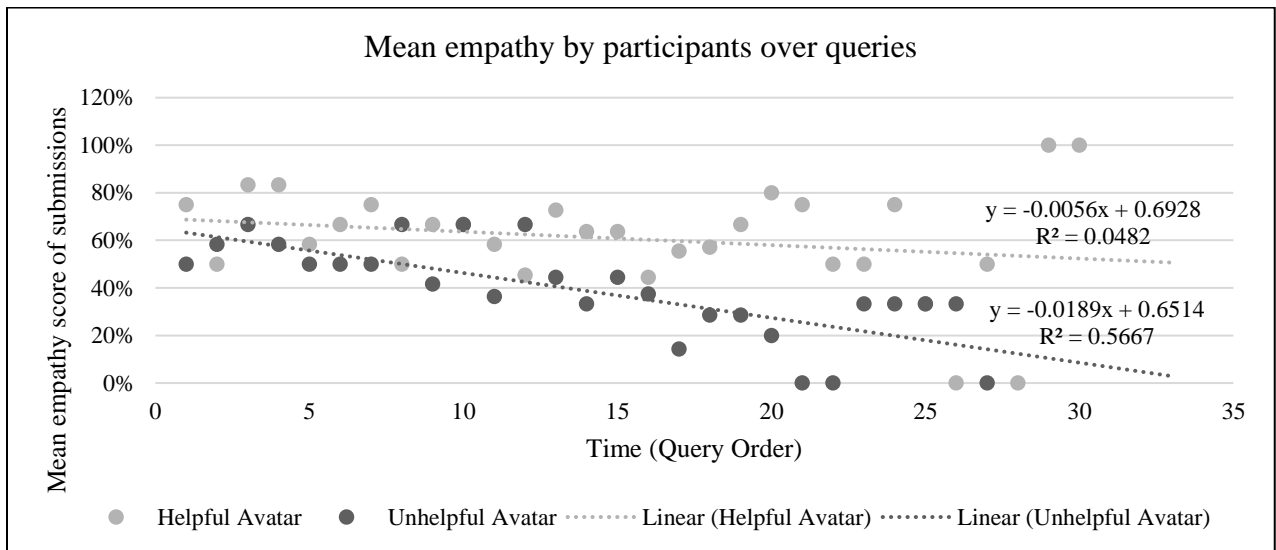
Figure 22. Comparing mean empathy expressed by participants over time measured by query order. Lines of best fit suggest a stronger negative correlation for empathy by queries by the unhelpful avatar group.

No significance for time by query order on reframing (df = 432, F = 0.61, p = 0.4362), but there was significance on query order for encouraging through logistic regression modelling (df = 432, F = 10.29, p < 0.01), with avatar insignificance (df = 432, F = 0.00, p = 0.9481). However, *Figure 23* shows that the **MONSTER** group used less encouragement over time by query over time than the **CLERIC** group.

For solutions given, which is not part of the CBT format and also significantly declines with query order through logistic regression modelling (df = 432, F = 10.29, p < 0.01), graphs show the **CLERIC** avatar group provided less submissions with solutions with query order in comparison to the **MONSTER** group, but it is also insignificant (df = 432, F < 0.01, p = 0.9481) (*Figure 24*).

Mean solutions given by participants by over queries

y = -0.0062x + 0.5478
R² = 0.0711

y = -0.0175x + 0.489
R² = 0.5115

Mean Solution score on submission

Time (Query Order)

● Helpful Avatar   ● Unhelpful Avatar   ·········· Linear (Helpful Avatar)   ·········· Linear (Unhelpful Avatar)
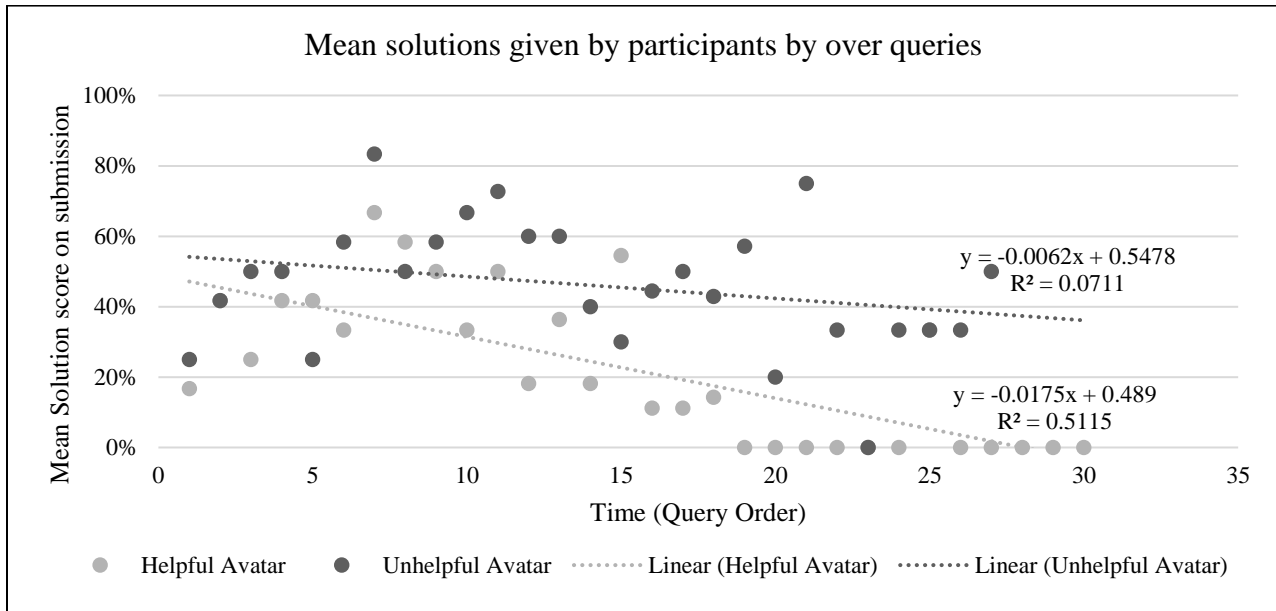
Figure 24. Comparing mean solutions given by participants over time measured by query order. Lines of best fit suggest a stronger negative correlation for solution by queries by the helpful avatar group.

There is significance by query order on harmlessness through logistic regression modelling (df = 432, F = 10.68, p < 0.01), but graphs suggest that there was influence of query content between queries 20-25, and harmlessness stays consistent. There is no significance in harmlessness between avatar groups (df = 432, F = 0.89, p = 0.34).
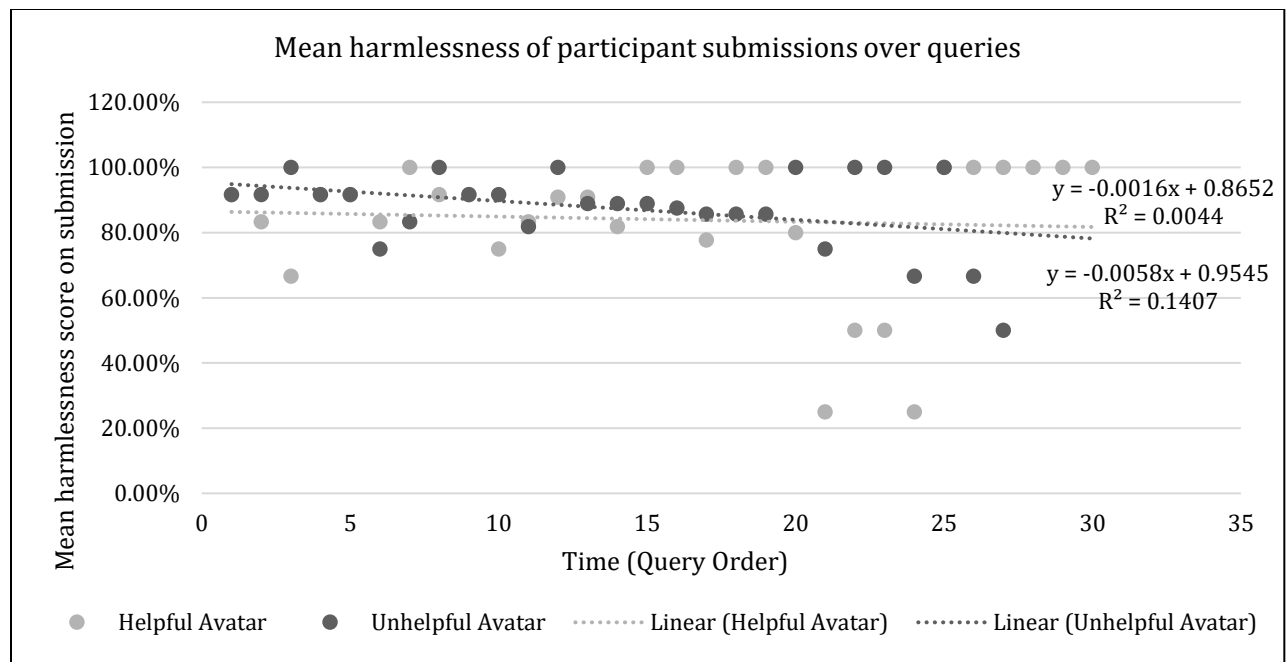
Figure 25. Comparing mean harmlessness of participants' submissions over time measured by query order. Scatterplot suggests no difference neither in difference between groups or over time, with significance potentially due to difficulty in interpreting content in queries 20-25.

6.3 Attitude changes

One participant did not complete an exit HAS survey and was removed from the data. All participants scored high in the exit HAS scoring (Nickell, 1998), with one participant failing to complete the exit HAS survey (4.7%, n = 1). The median exit HAS score was 84.00% (n = 23), with those above 90.82% (n = 23) in the 75th percentile and under 79.00% (n = 23) in the 25th percentile. Median difference between initial and exit HAS scores is an increase by 1.33% (n = 23), with a 3.85% (n = 23) increase in the 75th percentile and a drop of 0.59% (n = 23) in the 25th percentile. MWU showed no significant difference between HAS scores changes for neither the **CLERIC** nor **MONSTER** (n = 23, U = 64.5, p = 0.48).

6.3.1 Avatar groups

MWU showed neither differences between the **CLERIC** avatar group (Mdn = 84.0) and the **MONSTER** avatar group (Mdn = 85.5) for exit HAS scores, U = 59.5, p = 0.36, nor differences between initial HAS scores and exit HAS scores for the **CLERIC** avatar group (Mdn = 84.0) and the **MONSTER** avatar group (Mdn = 83.0) U = 67.0, p = 0.40 (*Figure 26*).
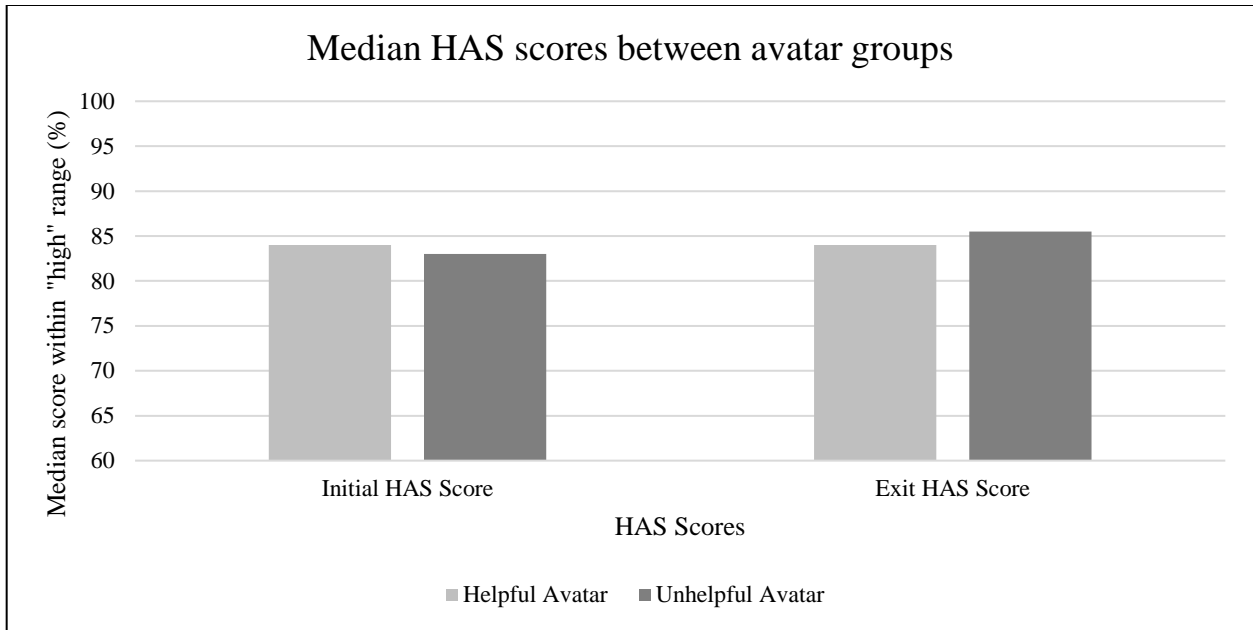
Figure 26. Median intial and exit HAS scores comapred between avatar groups. All medians increased. Although insignificant, the unhelpful avatar group has a lower median initial score and higher median exit HAS score.

6.4 Proteus Effect

This section describes the outcomes which potentially evidence the Proteus Effect to account for differences in engagement or attitude change, measured through their response to narrative (Narrative Transportability) and avatar (avatar identification).

6.4.1 Narrative transportability

There were no differences for the total TF-SF scores between the **CLERIC** avatar group (Mdn = 48.21%) and the **MONSTER** group (Mdn = 46.43%), U = 56.0, p = 0.28, and on all points. There was also no difference in individual TF-SF sections: cognitive scoring between the **CLERIC** avatar group (Mdn = 71.43%) and the **MONSTER** avatar group (Mdn = 64.9%), U = 59.5, p = 0.35, general scoring between the **CLERIC** avatar group (Mdn = 85.71%) and the **MONSTER** avatar group (Mdn = 71.43%) U = 59.5, p = 0.35, emotional scoring between the **CLERIC** avatar group (Mdn = 71.42%) and the **MONSTER** avatar group (Mdn = 50.0%), U = 59.0, p = 0.34, and imaginative scoring between the **CLERIC** avatar group (Mdn = 64.29) and the **MONSTER** avatar group (Mdn = 60.71%), U = 46.5, p = 0.12.

6.4.2 Avatar identification

Player-avatar identification was statistically significantly stronger in the **CLERIC** avatar group than the **MONSTER** avatar group, with no confounding variables of player-avatar similarity or avatar-player ideals' similarity measured and found significant.

MWU showed a significant difference in avatar identification with avatar-player connectedness between the **CLERIC** avatar group (Mdn = 71.43%) and the **MONSTER** avatar group (Mdn = 42.861%), U = 42.0, p = 0.04, and likelihood to use "We" to describe avatar between the **CLERIC** avatar group (Mdn = 64.29%) and the **MONSTER** avatar group (Mdn = 21.43%), U = 38.0, p = 0.04. *Figure 27* compares groups on chosen criteria for avatar-player connectedness.

There was no significant difference found with MWU with player-avatar Physical Similarity between the **CLERIC** avatar group (Mdn = 35.71%) and the **MONSTER** avatar group (Mdn = 21.43%), U = 54.0, p = 0.15, player-avatar Personality Similarity between the **CLERIC** avatar group (Mdn = 78.57%) and the **MONSTER** avatar group (Mdn = 78.57%), U = 72.0, p = 0.49, avatar similarity to player Physical Ideal between the **CLERIC** avatar group (Mdn = 50.0%) and the **MONSTER** avatar group (Mdn = 35.71%), U = 51.0, p = 0.11, and avatar similarity to player's Ideal Personality between the **CLERIC** avatar group (Mdn = 85.71%) and the **MONSTER** avatar group (Mdn = 78.57%), U = 56.0, p = 0.17.
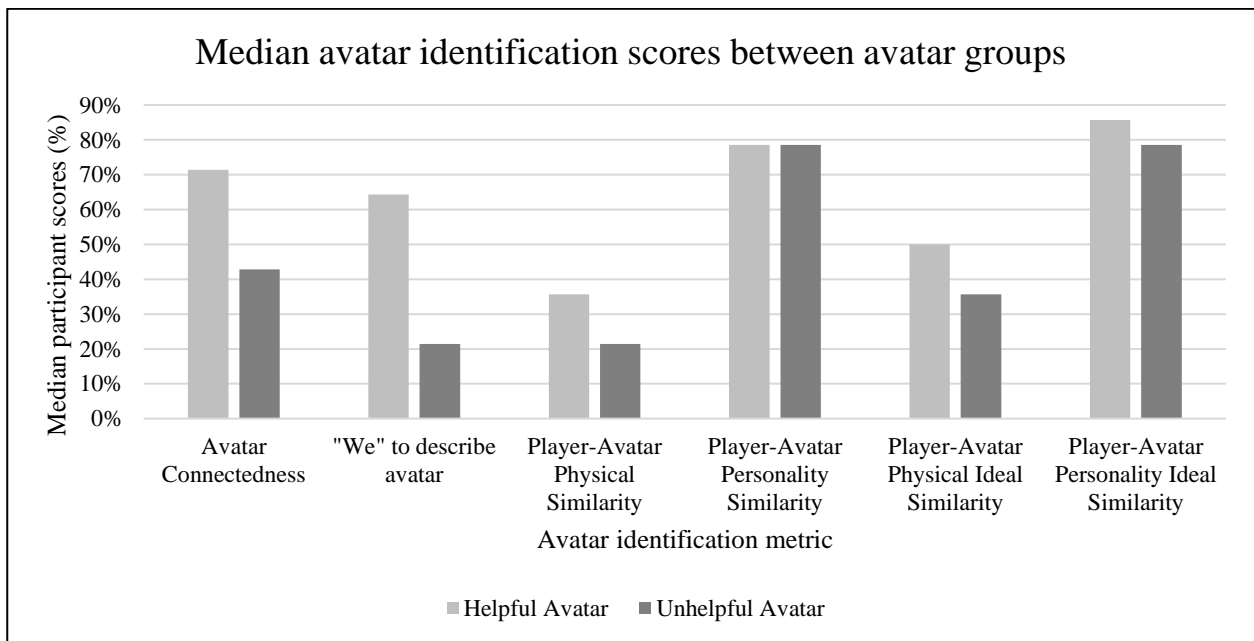
Figure 27. Median player-avatar identification scores based on criteria, with significance in Avatar connectedness and Referring to avatar as "we."

As no statistical significances were found in neither engagement metrics nor attitude change metrics in our study, we did not test the statistical significances of avatar identification metrics for interaction effects.

6.5 Summary

Players had no in-group differences and exhibited high usage with Merlynne, completing the full 30 minutes assigned and words per level submitted were consistent across levels. There were no differences

in neither HAS scores nor usage rates. However, there was statistical significance between time by query order and mean empathy, encouragement, solutions, and harmlessness in player submissions. Although insignificant between avatar groups, a visual inspection of the plotted graphs suggests the **CLERIC** group's submissions decreased slower in empathy and encouragement than the **MONSTER** group over time and the **MONSTER** group's submissions decreased slower in solutions than the **CLERIC** group over time. There was statistical significance between avatar groups for player-avatar identification for avatar connectedness and referring to avatar as "we."

Chapter 7: Qualitative Results

All 24 participants were interviewed after they played Merlynne, after the exit questionnaire was completed. Building rapport was attempted between the interviewer and participant with discussion of games played outside the study, academic endeavors, and day dependent topics such as the weather and whether the participant required the facilities before each part of the study. Since the interview took place one hour into the study, the participant was given adequate time to be accustomed to the researcher. Hypothesis checks returned no positives, no participant was aware of the goal or avatar controls of the study. Fantasy media exposure was not accounted for as all participants had diverse experience with it which could not be categorized meaningfully, but the content was considered when coding.

7.1 Procedure details

Detailed process during the collection and data analysis of qualitative research is documented in this section to add rigor to the findings.

7.1.1 Assumptions

The introductory and exit questionnaire responses were not reviewed by the interviewer and discussed during interviews, giving participants to give contradictory responses for triangulation. It is assumed that each participant was male-identifying, has played games before, speaks English, has experience using computers in their daily life, is not a game developer or design expert, and had no intentions of dishonesty in completing the study.

7.1.2 Interview practices

Semi-structured interviews explored participants' game experiences and opinions towards games and helping others with relevance to theoretical models we wished to investigate such as the ELM, the Proteus Effect, SPT, and SCT. Participants' thoughts and feelings after playing Merlynne, their attitudes towards helping others online and in person, and their attitudes and behaviours on helping in their usual gaming environments were questioned. Participants were also asked what they thought hypothesis of the study was, as an awareness check in case the study's deception elements (hidden avatar groups) were known. The questions differed in order based on participant answers, where the flow would direct the conversation to one topic over the other.

In building rapport with participants while preserving authenticity in answers, techniques from Games User Research (2018) (Drachen et al., 2018) were employed. 1) Answers were repeated if players were ambiguous in their wording for clarification, and a chance for players to confirm the interviewer's interpretation was given. 2) Players' questions were responded with a question about their expectations or

acknowledged but deferred until the end of the study (i.e., When a participant questioned the authenticity of a query from Reddit, the interviewer asked if they felt they were real). 3) When players expressed like or dislike in a feature, they were asked to explain their opinion to reveal usability feedback. Questions on how their opinions affected their gameplay were specifically asked. 4) Questions about game play were asked earlier in the interview to preserve short-term memory and avoid unintentional lies due to forgetfulness of player.

7.1.3 Data

Interviews were recorded on a TASCAM DR-05 Linear PCM Recorder, and then transcribed manually by the researcher and a research assistant. Themes were data-driven, and transcriptions were coded with an inductive approach where themes found were not directly related to the semi-structured questions in interviews, which is ideal for capturing latent themes in underexplored areas of research (Clarke & Braun, 2006).

As recommended by Games User Research 2018, transcripts were flagged for projections where the participants imagine an experience for others (i.e., Mention of a more pleasurable experiences for someone more invested into MMORPGS than themselves), and unintentional lies from false memories due to temporal delay since finishing the game (Drachen et al., 2018). Projections were excluded from the study data (i.e., claiming a feature would be liked by someone else) and claims of behaviours (i.e., remembering submitting short answers) were cross referenced with quantitative data (i.e., word count logs) to assure validity.

7.2 Thematic analysis procedure

Nvivo 12 was used to iteratively code the transcriptions to identify key points. A total of 414 nodes first were identified with open coding, and duplicates were merged. The nodes with the highest number of mentions by different participants and references overall drove the curation of emerging themes with axial coding, but final themes presented were not driven by mention frequency, but determined by the researcher as relevant to the research questions, as suggested by Braun and Clarke (2006), when working with datasets in under-explored areas where nuanced themes and details could be preserved. A reflexive journal (Ortlipp, 2008) documented coder's thoughts when the data was coded (*Appendix M*) and the thematic mapping process was also documented (*Appendix N*).

7.3 Emerging themes

Research questions were considered when deciding themes presented in this thesis. Not all themes pertain to avatar effects, but give insight into engagement, attitudes, and motivation from a data-driven approach.

Four themes were uncovered with thematic analysis; Participants reported 1) feeling dismissive of fatigue, 2) conflicts between self-expression and using the CBT format, 3) feeling more competent post-play, and 4) selectively choosing part of the game to accept for immersion.

7.3.1 Motivated to dismiss fatigue

Players were asked to discuss how they felt after the study and six participants reported feeling negative post-play (n = 6), and there was reported fatigue (n = 4) from repetition, negativity, and uncertainty of impact. Despite these negative feelings, players continued to play and were reportedly motivated to push themselves as much as possible. This finding offers perspective into motivations to engage, as certain demotivators do not hurt engagement but potentially impacts experience.

P15 describes the repeated exposure to negativity as "draining" due to repetition,

> *"On especially when there were negative comments after comments and, and that's really draining because of this doesn't happen, generally, because I meet people with such emotions every now, now, —not every now and then— but not with this frequency." (P15, MONSTER)*

P13 reasons negativity from queries which reminded them of their own stressful situations,

> *"I feel in some scenarios I feel the same thing, so I feel a little bit stressful because I think I am the person who asked for the help." (P13, CLERIC)*

Two participants noted that the lack of response from the seeker added to the stress (n = 2), and P16 thought the game was deliberately designed to induce fatigue for a study objective. Despite fatigue, all 24 participants completed the full 30 minutes, with P15 citing the prospect of progression and helping real students to motivate play,

> *"I wanted to help people, as much as I could. I knew I could not finish all 22 levels, that was there on the game, but I wanted to finish it and help as much as possible, knowing that they went into a bank." (P15, MONSTER)*

The prospect of achieving in Merlynne with level progression, narrative progression, or avatar cosmetic improvements, was mentioned by nearly two thirds of participants (n = 15), and nearly a third addressed it as their main goal (n = 7). The motivation to engage due to level progression was referred to as having a "completionist" personality by two participants (n = 2). P23 enunciates the term by remarking,

> *"Because I'm more of a "completionist," I feel if there's an achievement, I will pour my blood, sweat, and mostly my tears into achieving it." (P23, CLERIC)*

Motivation for progression was given through narrative (n = 3), anticipation of later special levels (P23), and through appreciating cosmetic upgrades of the avatar (n = 9). But most participants also saw "seeing the levels count up." (P24) to be a strong motivator (n = 9). Completion was coupled with a need to achieve

in the game in the way the game intended (n = 2), and participants acknowledged inappropriate means to achievement (n = 14). Inappropriate means include providing submissions which would not serve Merlynne's purpose of helping others, such as giving disingenuous or purposely hurtful advice (n = 14), and "cheating" such as submitting blanks or gibberish for the sole goal of advancing the level (n = 3). Only one participant (P18) admitted in interviews to submitting a blank for level progression.

P23 compared the action of skipping queries to cheating themselves out of an enjoyable experience,

> *"I don't feel rewarded by skipping something, if I don't feel like in call in the context of this game, I don't feel like hitting enter or typing out some random ass so just so I could see what the last level is." (P23, CLERIC)*

Purposely unhelpful submissions were also seen as cheating (n = 3) and P20 explains,

> *"The task was to help these people with their negative thoughts, if I were to submit a blank answer that wouldn't help them improve their day. If I received that, like if I had that problem and I received a blank, I would be frustrated." (P20, MONSTER)*

This emergent theme alludes to game setting and expectations affecting motivations for helping behaviours within a serious game. The temporary environment created with game-specific norms is referred to as "the magic circle" in literature which can present in serious games which "have goals that are connected to the real world" retaining both a serious and playful mindset and motivations (Stenros, 2014). The dominant motivation of playing the game is still the desire to help others (83.33% of participants), but peripheral cues of game achievement within game expectations is an evident motivator.

7.3.2 Self-expression vs. CBT

Merlynne presented players with cognitive reappraisal templates, with prompts to guide submissions at each level. Many participants disliked the CBT-derivative format due to its perceived unnaturalness (n = 9) and preferred using their own way of speaking to represent their thoughts, as well as feeling it forced them to be disingenuous in their feelings about the issue at times. This finding suggests that expressing relatability during helping by players conflicts with subscribing to an instructed method in a serious game.

Participants judged their competence in reappraisals based on whether they personally related to queries. Opportunities to relate were deliberately sought out in the game, and P21 explained they would deliberately view the third query without intentions of answering out of interest, despite unnecessity.

> *"There were always 3 characters in a level, and so I only ever answered 2 questions per level. But I would kinda go and walk over the third one, and just kinda read what their problem was just out of interest." (P21, MONSTER)*

This behaviour likens the "lurker" online, where someone reads posts but does not reply in a community like Reddit. P23 cites lurker motivation in comparing themselves to others online,

> *"...subconsciously it makes me feel like any problem that I have is very minor compared to everybody else…"* (P23, **CLERIC**)

Nineteen participants say they forwent the CBT format (n = 19) in preference of "natural" speech (n = 4) although the CBT format was recognized as more useful than their own format by one participant (P14). P5 explains their attempt to change the CBT format to preserve their personality in their submissions,

> *"I would adapt it in a way that fits in, but I would mostly be almost to try to be myself."* (P5, **MONSTER**)

There was also a desire to incorporate subjective perspectives in submissions, as expressed by thirteen participants (n = 13). Participants' own personal experiences drove replies over given cognitive distortion prompts, and if personal experience was lacking, participants would imagine themselves in the shoes of the query posters. Almost half of participants expressed dislike in the CBT format specifically due to the empathy criteria (n = 11), as they didn't know enough about the person to genuinely empathize, they did not feel empathetic towards specific situations, and did not want to normalize overreactions of what they considered to be inconsequential stress as explained by P21,

> *"...if it was something where I believe they were being like just like unreasonable or just saying something like, just kinda like out there where it's like 'Okay, you're just jumping into a conclusion or you're overreacting,' then I wouldn't empathize with them in that case so much because I wouldn't want that person to feel like that's a normal thing to think. I would rather them, I would rather them, kinda come back to reality and even if they don't believe me, then at least hear me say it, that 'You're being irrational, this is what you should be, this is what your outlook really like should be holistically.'"* (P21, **MONSTER**)

Other participants mentioned they did not wish to be empathetic preferring to provide action-oriented advice and deliver opinions more directly (n = 7). P2 explains it is due to their personality and valuing importance in fixing situational factors before individual feelings,

> *"I am not that's kind of person who'll cheer you or something, I am that kind of person, I force you to face this reality and that then you save the reality and the you see the problem you can, when you calm down and then wipe out all the negative thoughts. You can solve this all right away. So, for me maybe I do a hard away first and then give you some suggestions."* (P2, **CLERIC**)

Conversely, some participants felt uncomfortable with the CBT format as they preferred more emotional support over logical reframing (n = 2). While participants felt the CBT format was not able to communicate their thoughts as effectively as unstructured speech, it was acknowledged for its helpful structure. Sometimes participants wished to submit answers they felt they would normally post on Reddit but refrained from sarcastic or humourous remarks in fear of hurting those who misinterpret (n = 2). Participants were aware that Merlynne used queries sourced from Reddit, with some participants suspecting direct

content from r/uwaterloo (n = 4) yet Merlynne changed the way some players would usually respond (n = 5).

Potential hurtful advice, although tempted, of was not given after rethinking. P21 explains his thinking when responding to a query about someone feeling neglected by their supervisor.

P21, *MONSTER***:**	*"Well your supervisor thinks that you are not worth his time."*
Researcher:	*"Did you submit it though?"*
P21, *MONSTER***:**	*"No."*
Researcher:	*"Why not?"*
P21, *MONSTER:*	*"Well it because it's not necessarily true. I think it's not always the case I mean the guy might be busy."*

A relationship between the helper and the seeker, nonexistent in Merlynne, is also a prerequisite for common acceptance for humour and sarcasm. Contextual understanding can pre-establish common ground, as one participant explained they may refrain from humour on subreddits about r/personalfinance but will be liberal with sarcasm on their university's student subreddit, r/uwaterloo. P23 relates the behaviour to "trash talking" being a positive aspect of some game communities within reason. P21 explains that dishonesty is also expected in other online spaces, and thus sarcasm is often used defensively to avoid embarrassment, and it is unclear if someone bears genuine intentions of seeking help,

> *"...you can't be caught up and like kinda be like gullible for all these things because you're gonna be falling for a lot of things which is like, dude I just said that, right? As joking or something, right? Uhm see I think it's a lot harder on the internet, online to actually help other players and like feel compelled to do that." (P21, MONSTER)*

Participants assumed honesty in Merlynne's queries despite Reddit sources due to presumptions in the game context, including the study context (n = 4). The visualization of avatars interacting with NPCs also simulated the player taking initiatives help others (n = 6), as P5 expresses reluctance to retract help they actionably offered,

> *"...when I would start, I would basically commit myself to it. But no matter how kind of issue it is, I can't just like you know walk away." (P5, MONSTER)*

Only one participant admitted to submitting hurtful advice but justified it as "Generally it is good to give bad advice," (P10) while alluding to sarcasm,

> *"I can remember someone that was a girl who told me that her cat is going to die or something like that okay yeah and I told her that you can kill yourself as well to go with and to stay with her forever, it was a lie, but it just you know it was on purpose, it was to just to say to her that you know the situation can be worse." (P10, CLERIC)*

Query:

"I am really worried that my cat will die within the week, she is my oldest friend, and it is very sad. I cannot sleep."

P10 had submitted:

"that's the world, you can kill yourself to be with her, come on baby"

Others simply said it was not in their nature (n = 5) or it was unethical (n = 7) to hurt others with bad advice, especially since they were instructed to be helpful. This emerging theme suggests that although the "magic circle" put participants into a conscientious mindset within a serious game, there are player needs to personally connect with content with means which conflict with CBT format, including players who give harmful advice despite good intentions.

7.3.3 Increased willingness to help

Intentions to help others were increased during gameplay as well as after gameplay by participants (n = 8), through in-game rewards, and increased competence to help and motivation to perform emotional labour. Some players explained they would not normally seek to help others online yet Merlynne provided an opportunity to help others with gameful motivations for doing so (n = 4). P2 explains committing to playing the game gave them a reason to help others,

"I've seen Reddit threads where people have similar sorts of uh outpourings of feelings that they have and I would just scroll past them all and not, you know, interact with them. So it was good to, and a bit rewarding, to take some time to uh reply to these with some serious intention." (P2, CLERIC)

P3 additionally mentions that Merlynne provided incentives to help overcome hesitations from perceived incompetency.

"Some of them, I felt like I wouldn't have responded if it was online because I don't think I'm the most qualified to be providing help in that situation but as it is a game, I feel like it I have to I get extra incentive to respond." (P23, CLERIC)

P23 completed submissions with 91.67% empathetic, 95.83% with reframing, 62.50% encouragement, and 79.17% of responses were rated harmless. 79.17% however was under the average mean of 88.67% (SD = 13.52%), and median of 94.56% in our sample, which is less than desirable. One of their responses for example was labelled as potentially harmful by raters due to promoting the division of the seeker and the seeker's peers.

P23's response to a query about workplace tensions:

> *"that sucks. if they are not supportive, they are probably threatened by you. you will get past this and reach heights far above them"*

Overestimating competency may be an issue. Half of participants felt positive post-play (n = 12), and "more empathetic having gone through all that" (P17). P21 specifically describes being compelled to help others in real life differently after playing,

> *"I would definitely go into conversations and interactions with people with a different mindset hopefully, and like maybe pick up, if, if they say something like — maybe just like, sarcastically or like self-deprecatingly humorous, like 'Oh I haven't studied for ECON at all this week, I'm probably gonna fail the midterm' or something, maybe not something like that, but something similar where usually I'd just be like 'Yeah, me too,' or something, I might actually wanna be more supportive or helpful and be like 'Hey, like if you want we can meet up and study for it' or like 'I can give you some notes.'" (P21, MONSTER)*

Merlynne was described to offer real examples to practice applying CBT in a short and engaging format to build perceived competence in helping others (n = 3), motivating helping in real life (n = 3). Majority of players also translated the format into strategies for self-help (n = 21). Interestingly, one participant (P15) said the game experience persuaded him to prioritize helping others over his own comfort,

> *"There was a moment where it was too much for me personally to take it, so when I had to choose between being myself or predicting myself, or choosing to be more helpful, I chose to help, be helpful, I wanted to come out of my comfort zone and challenge myself more, I didn't really feel a shift but I wanted to stretch myself more and help a little more. The people yeah." (P15, MONSTER)*

This merging theme suggest that participants who were motivated to help others had hesitations to do so in daily life, but Merlynne provided persuasive incentives to act on motivations in-game either through mechanics or contextual factors. Participants carried this game mindset into their daily life post-play to help themselves and others in future interactions. Gameful design can bridge intentions with actions in serious games and potentially out of game.

7.3.4 Selective rejection of the game world

Most players did not feel that their avatar influenced the way they responded (n = 15), but a third of participants felt their avatar appearance affected their mindset and consequential behaviour (n = 8). Players acknowledged intended helpful and unhelpful stereotypes with the CLERIC (n = 8) and MONSTER (n = 12), but several in the MONSTER group rejected negative stereotypes citing visual conflicts with the positive task of helping others (n = 5), or assigned positive stereotypes to the MONSTER character by re-imagining its stereotypes to be constructive to the game's task (n = 2).

P17 describes the CLERIC to appear wise and caring,

"I don't know if she had this for a look of wisdom about her in some way of like. Like. Yeah I don't know what more to say about it but she, she seemed like confident and caring I guess." (P17, CLERIC)

And, in line with SPT, they explain that since the **CLERIC** avatar's image is seen as capable of good advice, they should also provide good advice,

"I was saying for the avatar that that the drawing of the woman that comes up during the text, it kind of felt like the words were coming out of her mouth so should be appropriate to that, like if it had instead been like a clown or something like that I might have been tempted to say like silly things or be more joking but she seems sort of like, she seems like the kind of person who would give good advice so then I thought I should give good advice." (P17, CLERIC)

Consistent with their avatar interpretation, P17's responses largely followed the format given (Empathy 90.00%, Reframing 75.00%, Encouragement, 85.00%),

Example query:

I bombed my thesis presentation. My supervisor is not replying to my emails. Probably knows I'm not worth their time.

P17's response to query, broken down:

Empathy: *"I know the feeling."*

Reframing: *"But there could be a million reasons for that —supervisors are busy!"*

Encouragement: *"Keep your head up and you can do better next time :0"*

In contrast, some participants (n = 2), although felt represented by the **CLERIC** avatar, saw the **CLERIC** as someone more capable of wording than themselves, and found fault in their own responses,

"I believe the character would have given it a lot more thought, really formulated, really analyzed or situation from a variety of different perspectives." (P23, CLERIC)

Although many players in the **MONSTER** group reported not playing as the character, they claimed the avatar would have negatively influenced their responses if they did (n = 2). P4 expected that they would have changed the way they wrote their replies to align with the expected roughness of the **MONSTER**, but rationalized the behaviour as unconstructive.

"At some point, I was like hey maybe I should play like this minotaur and get more like I don't know roughish and strong and, like uh you know, helpful answers, but I was like oh that's not a —that's not very helpful." (P4, MONSTER)

P15 who chose to use the purple **MONSTER** option instead of the red due to associating red with anger,

"Yeah. I think to choose the red avatar, I would be seeing the avatar on the screen every time so that might or we could have triggered some, some, different kind of emotion, so, so that would not be, I mean, I wouldn't be thinking the same because there would be energy spent, of, on, on analyzing the way the avatar looks." (P15, MONSTER)

Despite the negative connotations acknowledged, the **MONSTER** avatar was also rationalized into a positive stereotype to fit the task. P5, who had reported the highest avatar personality vs. ideal personality score (100%) in the **MONSTER** group, explained,

"I am kind of just imagining him as like a sports coach that is like yelling out, and encouraging people, when people are like working out, or like goading things, like, "yeah you can do it yeah! Keep going! Just a few more to go!" just kind of like that. (laugh) So, it would be like going around seeing people struggling and yelling out like trying to motivate them." (P5, MONSTER)

When looking at P5's submissions, they all ended with an exclamation mark possibly to symbolize yelling, although he said it was unlike him to yell things in real life.

Sample query:

"I did my first phone interview despite hating phone calls, and everything was going well, but couldn't answer even one of the technical questions and I think that bombed my entire job and shows how much of a fraud I am."

P5's response to query:

"That sounds tough, but there are many people who struggle with phone communications. I'm sure your interview performance would be much better in mediums you are more comfortable with!"

Interestingly, to improve the fit of the **MONSTER** in a supportive role, one player reimagined the **MONSTER** in the cleric's role.

"I was trying to play a medieval emotional support worker. I guess, so I guess kind of a cleric but a more emotional one than just physical healing. I was trying to help them with that their mind set." (P21, MONSTER)

The Proteus Effect may not have occurred for all the participants and was not reflected in the usage metrics. However, there are self-reported differences in game behaviour and usual behaviour due to avatar appearances. It is possible the imagery given by the **MONSTER** was too greatly contrasted with the CBT task, leading players to consciously choose to unsubscribe from visual expectations of the avatar. The imagery of the **MONSTER** could also have been too visually different from player, leading to poor avatar identification for the Proteus Effect. Avatar designs can persuade behaviour could be effective but attention to its fit with the task to be acceptable by the player is needed.

There was a difference in avatar identification between the **CLERIC** and the **MONSTER** group expressed in interviews as well as quantitative surveys through likeliness to use "We" to describe avatar (n = 24, p = 0.02) and connectedness (n = 24, p = 0.04). More **CLERIC** players saw the avatar as a representation of themselves (n = 7/12) than the **MONSTER** group (n = 3/12). Gender mismatch between player and **CLERIC** avatar was mentioned as a barrier to identification by three players (n = 3). Disconnect between the game theme and queries was repeatedly mentioned to break immersion (n = 9), as the players' in-game activity was not in alignment with the game's narrative — termed "ludonarrative dissonance" (Toh, 2018).

While P23 describes imagining themselves as the **CLERIC**, adopting their perspective in the game,

> *"I put myself in the character shoes and I see that everything else from what do I see with characters, sees from my own point of view. I don't put on a persona when I play, I am the character okay." (P23, **CLERIC**)*

P21 described the **MONSTER** avatar as only projection of themselves,

> *"I'm not sure if I can identify with like the peer-support barbarian minotaur but uh, basically it was just like an avatar projecting myself, essentially." (P21, **MONSTER**)*

The **MONSTER** on the other hand was described mostly used to interact in Merylnne and players did not see themselves as the avatars. One reason was the misfit between the **MONSTER**'s appearance and animations of implying aggression and violence, and the supportive task the player was asked to perform, invoking some ludonarrative dissonance.

There was conscious separation from the **MONSTER** avatar to fulfil two goals by P20,

> *"When I played the game, I kind of separated it. I want to beat the game so the minotaur will get me there, then as myself I want to help these people so it felt like me talking a real people person to person, not a minotaur talking to a villager." (P20, **MONSTER**)*

Players also mentioned a separation between queries and the game's theme and story (n = 9). There was a break in immersion when the avatar was exploring a fantasy setting, and yet when they interacted with a villager, they would be faced with a modern-day problem. P5 illustrates this further ludonarrative dissonance by saying,

> *"The fantasy world was nice for the immersion but many of the issues that were presented kind of broke the immersion, like they were talking about like phone interviews and orientation week and things like which is, which is disconnected from the fantasy world. So when I was playing that, I basically kind of like disconnected the actual story from the issues." (P5, **MONSTER**)*

Relatedness was not reported through the avatar and narrative, but through the queries that they were viewing outside of the game's context. P17 describes this to be in line with helping in commercial games as well, where assisting other players with real life problems was separate from the game,

> *"Like if it confined to the game world then I'd go with whatever makes sense for the game world, but if I get more information and some real-world thing happening, then I would shift my perspective." (P17, CLERIC)*

This emerging theme suggests that if the game's theme is not compelling to players, such as the disconnect between avatars and task and queries and narrative in Merlynne, immersion can break and lessen motivating effects of narrative within a serious game. The design of serious games features in-game decisions with consequences contained within the game world and those which effect the real world. Although ultimately distinct from one another, the two together should be accepted by the player for immersion.

Chapter 8: Discussion

Previous studies in P2P or P2P CBT focused on the perspective of the help seeker, and efforts to persuade seeking help or therapeutic successes of receiving help. Our study instead focusses on the perspective of the helper, and methods to persuade emotional helping behaviour by those who do not usually engage in P2P groups. In this section, we reflect on Merlynne's design and connect findings to our initial research questions which explore whether stereotypes associated with avatars used in a CBT P2P game influence engagement and attitudes towards helping.

8.1 Design and the Elaboration Likelihood Model (ELM)

Merlynne's design enabled high usage rate and quality of replies from participants. All participants completed the full 30 minutes of Merlynne, and the CBT format was used for more than half of queries. P2P engagement was high, as participants in interviews say they used personal experiences or envisioning themselves in the situation the seeker was in to form replies. Overall, participants engaged in P2P CBT through the Merlynne game interface, and nearly all the responses were rated as harmless.

Due to high initial helping attitudes of our participants pool evidenced by HAS scores and reported personal relevance and responsibility in helping peers, we believe most participants processed the messages of helping others using CBT in the central route of the ELM. However, the peripheral cues of game elements such as narrative, cosmetic items, and progression also provided motivation to participants to engage through facilitating motivation and ability to help others. Interview data evidences potential for serious games to affect motivations and abilities for engagement in P2P CBT.

Although unprompted and not included in the CBT format, a third of submissions included a practical solution, showing participants not only followed the simple rules given in Merlynne, but engaged in a creative manner. This phenomenon further suggests deep processing in the central route of the ELM took place, as participants thought deeply about the objective of the game and decided it would be constructive to help others by including more than needed, and at times even forgoing the CBT format when they saw it unfit for their submission's message.

8.1.1 Design assessment

We included game mechanics for different player types (Marczewski, 2015) to set achievement, immersion, and social game goals (Yee, 2015) and to facilitate mastery for continual engagement. These gameful design elements also served as cues for motivation and ability to process messaging in the ELM (Petty & Cacioppo, 1986), respectively.

Achievement goals were motivated through progression, feedback, and fixed reward schedules (Marczewski, 2015). Level progression, and new narrative and avatar accessories were cited as motivators for engagement by players but was acknowledged it would have been more motivational with professional writing and artwork seen in commercial games. *Immersion goals* were enabled with mystery and emotional investment (Marczewski, 2015) and *Social goals* were set up with opportunities for sharing knowledge and purpose (Marczewski, 2015). Social goals were achieved through relatedness to real-world queries but not through NPC interactions, but immersion goals were not as players felt there was insufficient details for NPCs beyond non-descript images to foster attachment. Finally, *ability cues* (Petty & Cacioppo, 1986), for CBT mastery were given with learning supports and anonymity (Marczewski, 2015). Ability cues were successful as participants said the game experience increased their peer support competency in interviews.

In reflection of game goals with design, motivational and ability cues for P2P CBT were successfully given through serious game techniques. However, more gameplay unrelated to P2P CBT. to foster attachment to narrative, NPCs, and avatars themselves would improve the game experience.

8.2 RQ1: Do 'helpful' avatars motivate higher engagement in CBT?

We hypothesized that using a stereotypically helpful avatar would lead to higher engagement levels than players using a stereotypically unhelpful avatar. While our quantitative analysis revealed no statistically significant differences in usage levels or submission content between avatar groups, visual inspection of collected data points to a potential Proteus Effect. Those in the helpful avatar group adhered more to the CBT format and provided empathy in their submissions over time, whereas those in the unhelpful avatar group provided more practical solutions over time. Our qualitative results also show how avatars influenced participants' motivation to engage in CBT.

8.2.1 Proteus Effect in submission structure

Although both groups decreased in empathy over time likely due to fatigue described in interviews, the helpful avatar group (female human **CLERIC**) submitted more empathetic responses over time than those in the unhelpful avatar (male minotaur **MONSTER**) group. The influence from avatar gender through the Proteus Effect explains the observation, as women are expected to be more emotionally oriented in high stress workplaces (Ronen & Pines, 2008), and expected to provide emotional labour in service-based jobs (Gray, 2010). Thus, male-identifying players may have felt expected to be more emotionally supportive in Merlynne. This explanation is supported by Yee et al. (2011), who predict men offer more support to teammates when playing with a female avatar.

Higher avatar-player identification suggests a greater need to play within game expectations as the **CLERIC** group continued to write submissions using the CBT format more consistently over time. The

MONSTER group with lower player-avatar identification could have been responding without the influence of their avatars, and thus submitting more practical solutions over time. The stereotype of the stoic male is expected to offer informational or manual support over emotional support in Lehdonvirta et al.'s (2012) work, and this perspective is supported by literature in the public health space, where men are shown to prefer action-oriented P2P support in Australia (Robinson et al., 2015; Ray et al., 2017). The Proteus Effect may not have occurred for the **MONSTER** group, and the male-identifying players were responding as themselves. *Figure 28* illustrates the observation.
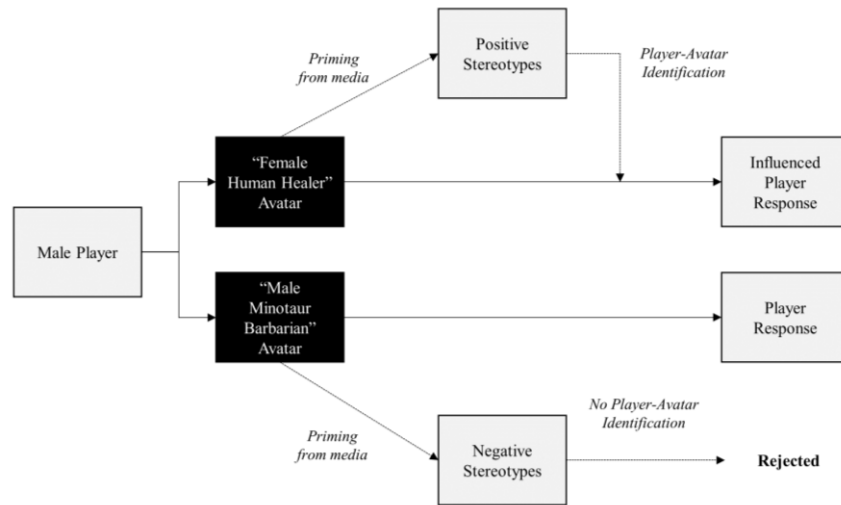
Figure 28. Proteus Effect as observed in our study, where no player-avatar identification lead to purposeful rejection of stereotypes in the **MONSTER** group.

8.2.2 Designing for empathy

Thematic analysis from interviews showed participants felt "drained" post-play, largely due to repeated exposure of negativity yet they felt motivated to continue to help others. Participants felt responsible to help others and to complete the game within the study time. All measured response criteria besides reframing (empathy, encouragement, solutions, and harmlessness) significantly decreased in participant responses over time, supporting reports of fatigue. However, harmlessness maybe not be truly affected by time as graphs suggest consistently high harmlessness scores, and raters addressed as difficulty harmfulness of one query which appeared in later levels (Level 9, Query 2 in *Appendix C*) .

Interview data showed that participants felt providing empathy as unnecessary or disingenuous and they were hesitant to provide it as the game progressed and participants preferred authenticity over the suggested CBT format, by giving advice in ways they felt representative of themselves in seek of relatedness in queries. This is in line with O'Leary et. Al's (2018) findings that unstructured responses provided more

relatable content. It was also important the responses were genuine and drew on their personal beliefs or experiences to be considered as adequate responses by the participants.

Justifying emotional labour for the helper needs to be considered in the design of P2P tools, especially when asking helpers to subscribe to unfamiliar frameworks such as CBT. This can be achieved through providing a rewarding play experience where the helper feels compensated for their efforts in gameplay, or by including other play experiences between emotionally labourious tasks which offers time to recover and prevent draining. The latter in Merlynne's context could be more map areas for exploration, as suggested by participants to reduce repetition and allow for rest.

Avatars with helpful stereotypes could encourage empathy, but it is important to consider current trends and priming of the intended player. For example, one participant with greater experience playing RPGs had suggested using familiars (with reference to Navi, a fairy companion who would direct you through levels in the *Legend of Zelda* series) or animal companions (i.e., Morgana, a talking cat who would navigate you in *Persona 5*) to infer helpfulness. This relation may not appeal to those with less experience with RPGs like Zelda, as assistant characters could also take the form of humanoid characters like Cortana from *Halo*, or robot characters like Wheatley from *Portal 2*. Although non-human characters fit the stereotype, they can make player-avatar identification difficult since player-avatar physical similarity contributes to identification. This was reflected in the unhelpful group (**MONSTER**) of our study. There could be merits in low deindividuation in players, as they would respond with more personal experiences such as offering more informational advice provided in the **MONSTER** group.

Overall, game design choices also need to be driven by designer's purposes, whether CBT adherence or representation of the helper's experience is prioritized in the P2P product.

8.3 RQ2: Do 'helpful' avatars improve player attitudes towards CBT?

We hypothesized that using a stereotypically helpful avatar would lead to higher attitude change in helping others. While our quantitative analysis of HAS scores did not reveal significant differences between avatar groups, our qualitative analysis of interview data revealed that a third of participants reported different changes in helping attitudes post-play, such as perceiving to have improved competency or motivation to invest emotional labour in others.. We now interpret these mixed-methods results and discuss what they reveal about participants' attitudes. We discuss attitudes towards "de-lurking," using theoretical models and previous work, as well as the magic circle's role in establishing expectations for behaviour in Merlynne.

8.3.1 Increased helping intentions

Although both increased motivation and ability can lead to attitude and behaviour change predicted in the ELM, and persuade greater P2P engagement using CBT by disinterested persons as desired, they also present potential risks to the seeker and the helper. That is, the perception of improved competency without actual competency can welcome harmful advice. In our study, although nearly all the responses were rated as harmless, there were some responses noted by raters as especially harmful, despite justified by participant as humourous. Specifically, one of the responses promoted self-harm behaviour and suicide as a means of comparison between what a seeker was experiencing and a 'worst case scenario.' We have no design suggestions at this time beyond human moderation (Dosono & Semaan, 2019), given it is a complex and serious issue requiring further research and professional consultation, but overconfidence in competency it is an important element of consideration in the design of P2P mental health systems.

Some participants felt motivated to help others despite discomfort post-play, putting themselves at the risk of burnout, seen in online forum moderators (Putz & Treiblmaier, 2015). Breaks could be incorporated into the design for the helper's well-being. Interestingly, despite reported discomfort, HAS scores did not decrease post-play, meaning emotional labour did not negatively change the way players felt about helping others in our study. This observation could suggest central processing occurred for enduring attitude change in our study. However, it is possible that longer exposure (i.e., beyond 30 minutes) to unworthwhile stressful experiences can deter persons from desired tasks and should be considered in the design of a study.

8.3.2 Self-help attitudes

Participants reported they would adopt the CBT format for self-help in the exit survey, but when asked again in the interview, some brought up the difficulty of being aware of one's own negative thoughts, or that they already use some form of the CBT format prior to the study —factors independent of Merlynne. We initially expected to use SCT to explain social learning, but since Merlynne was unable to convey the positive impact of the seeker to the helper in real-world applicability beyond in-game cosmetic feedback, we cannot use observation to justify learning behaviour.

For example, there was no way to know if the original poster would have benefited from their advice. Even outside of Merlynne, it is difficult to assess the value of online P2P support if the help seeker fails to follow-up. However, one participant raised that they would have appreciated a reward of seeing villagers happy or celebrating after they submitted a submission or completed a level. Although in the game design process we were discouraged from doing so in case of creating unrealistic rewards from unhelpful advice, or creating false expectations of needing rewards for helping others out of game, it is worth reconsidering in the future if it communicates the value of helping others to players.

Participants however, related to queries in Merlynne, reminding some of problems they faced in the past. Others' value gained from their responses could have been imagined, leading to the belief that the CBT format has value for self-help. Merlynne's fantasy RPG interface indirectly influences adoption of CBT for individuals, through opportunities for individuals to reflect on CBT's perceived value.

8.3.3 De-lurking

Despite participants having high HAS scores, few reported helping others whom they have no relationship with outside of subject-specific fields such as topics related to their academic study. Several participants however enjoyed reading about others' emotional issues for relatability without engaging, citing interest in knowing they are not alone, or comfort in knowing their own issues were comparably lesser to others. Participants called this behaviour called "lurking," which is also a well-documented term in P2P literature (Sun, Rau, & Ma, 2014). One participant reported that while they only responded to two of the three queries per level in Merlynne to qualify for level progression, they also opened the third query out of curiosity.

Lurkers are described as a "silent majority" who participate in a community by reading posts by others without posting themselves (Sun et al., 2014), yet they still derive value form the community (van Uden-Kraan et al., 2008). Persuading lurkers to engage, termed "de-lurking" (Edelmann, 2012), benefits newly formed groups to create content (Schneider et al., 2013; van Uden-Kraan et al., 2008), but can also add diversity to existing P2P groups to strengthen transferability of skills learned to daily life in the interest of our research direction.

Edelmann (2012) presented a literature review on de-lurking methods such as rewarding posters, improving the usability of tools, and motivating commitment. Merlynne has successfully encouraged de-lurking through using peripheral cues of gameful design to motivate and support P2P CBT through in-game rewards, interesting interactions, and progression feedback. Game design elements could also be applied to target members who become lurkers after being "bored" due to no novel content or failed stimuli (Schneider et al., 2013).

However, there are reasons for lurking besides lack of interest, such as employer restrictions for browsing the internet, or being only motivated by short-term situational needs (Schneider et al., 2013). Although Merlynne presents game elements which could motivate de-lurking, systematic concerns should be considered when focusing on efforts for engaging lurkers wither serious game designs and is encouraged as an area of research. Implementing a P2P system interesting and accessible to helpers within a greater system is crucial to design.

8.3.4 Magic circle for mental health

Although Merlynne introduces the player to a game world and rules, Merlynne was also presented within a lab-setting, where participants may behave in a way different from their daily life. The formality of the study setting may have created a different magic circle than if Merlynne was to be played in more personal settings without dedicated time to play. For example, it is unsure if participants would have played for 30 minutes if they were accessing the game on their own time. In design considerations of mental health systems, especially for mobile devices, play environment and game introduction to lead into the magic circle is important to establish attitudes towards play in game.

An emerging theme from thematic analysis was the willingness to engage Merlynne differently than if on forums including the r/uwaterloo subreddit. The difference in attitude could be formed by games creating unique contexts where norms of the real world do not necessarily apply. While sarcasm and humour were culturally expected on some subreddits, it was not seen as permissible in Merlynne even though it shared the same content source. Participants mentioned they were tempted to be humourous, sarcastic, and "blunt" like they would be out of game, yet they reworked their answer to be safer as they did not have a relationship with the person, and the cultural expectations were unknown.

While replies given by untrained persons in P2P could harm others, professional moderation is not available in unguided supports (Mehrotra et al., 2017), and enforced strict restrictions on replies can limit creative strengths of a P2P system (Mead et al., 2001; O'Leary et. Al, 2018). For example, humour has been shown to be a positive aspect to P2P supports, facilitating community building, and encouraging discourse in cancer peer support forums (Demjén, 2018), something not usually found in formal mental health systems. Therefore, while it is important to design and convey a game culture where boundaries are emphasized, opportunities to deviate from expectations should exist to allow for self-expression (Marczewski, 2015).

Chapter 9: Limitations & future work

Mental health studies have limitations, due to lab setting, ethical restrictions, and recruitment, while the research through design approach cannot be generalizable universally. This section describes the limits of our research and points of consideration when applying our insights into future designs in mental health and P2P support, as our study is neither truly unguided, nor P2P due to research constraints. Lastly, we reflect on the design of serious games for mental health by considering other models of games for good.

9.1 Serious game techniques and the Elaboration Likelihood Model (ELM)

Although participants pointed out game elements such as anticipation of narrative and level progression as motivators for engagement, we cannot conclude at which point in the ELM these peripheral cues lead to central message processing. It is also possible central processing was inconsequential to peripheral cues and participants chose to centrally process messaging immediately due to personal relevance of the messaging due to their initial high helping attitudes. Reiterating Gotlieb and Swan (1990)'s standpoint, knowing effective cues for motivation is necessary but does not guaranteed to predict behaviour.

Future work on serious games using the ELM is encouraged to follow-up after temporal delay to measure if attitudes were stored to memory, to predict if games can lead to temporary or lasting change, and could also include participants with low affinity for helping and specifically measure for a point in attitude change and include post-study follow-ups. Future research on games and the ELM could also extend beyond its interaction design to explore how a serious game is communicated to the public influences its usage. Attractive advertising of games may lead to high uptake but poor engagement if it is unsuitable for its intended audience (Durkin & Hickie, 2010).

9.1.1 Sample limitations

Only male-identifying individuals frequenting the University of Waterloo campus were recruited for this study, thus results may not scale to all genders. Yee et al. (2006) has found female players to less likely to value achievement goals over social goals, thus progression may not be that effective as a peripheral cue for engagement. It is also likely those with interest in mental health were predominantly recruited, given the high HAS scores of participants. As we used a sample of convenience, we did not account for participant diversity, but it is encouraged for future studies. Non-probabilistic sampling for participants similar gaming experience may have greater effects, as the Proteus Effect has limited itself to WoW players originally (Yee & Bailenson, 2007). Whether or not the effect works for non-gamers invites further research. An increased sample size for higher statistical power to detect meaningful differences is also recommended.

9.2 Design Considerations

While the results of our study are largely positive, it also revealed several potential pitfalls that warrant consideration. In particular, the higher motivation to contribute peer support without adequate ability presents risks for both helper and seeker, such as potential burnout and harmful advice.

9.2.1 Avatar design

Although observed trends between helpful avatar stereotypes and empathetic behaviours are promising, our study cannot conclude whether certain gendered stereotypes or just our specific choice in avatar artwork (Fox et al., 2015) was found to influence empathetic or action-oriented behaviour. One limitation for our study design for studying the Proteus Effect was that the **MONSTER** group had low player-avatar identification, and we cannot determine if an unhelpful stereotype deters helpful player behaviour. More work could identify game features (Brown et al., 2016), and deliberate artwork in HCI research for greater player-avatar identification to measure the Proteus Effect. Due to different interpretations of artwork, one stereotype may be conveyed in different ways, such as with non-anthropomorphic virtual representations, such as in games like *EVE online*, where players only use spaceships, or even with different camera angles and display methods (Gorisse, Christmann, Houzangbe, & Richir, 2019).

Other game techniques are also encouraged in serious games research (Brown et al., 2016), as certain presentations may be receptive to some but not other player types (Tondello & Nacke., 2018). The interface of our 32-bit fantasy RPG may not appeal to those who dislike fantasy RPGs as a genre for example, and other game formats such as puzzle games, care-taking games, or strategy games could appeal to others.

9.2.2 Fatigue

Our results suggest that the effectiveness of participants' responses declined over time, even though their attitudes towards helping did not. That is, scores for empathy, proposed solutions, and encouragement — which play an important role in therapeutic outcomes (Beck et al., 1979)— decreased over time, and participants reported that the emotional labour of CBT felt 'draining' in post-study interviews. But, participants' attitudes towards helping (HAS scores) did not decrease. Together, these findings suggest that designers need to consider a player's ability to engage with CBT content over extended periods of time. Potential solutions include designing for shorter sessions (Morris, 2015) or including more varied gameplay such as map exploration or more avatar customization opportunities.

9.2.3 Need for self-expression

Peer supporters' willingness to conform to the CBT format is also an important consideration. 19/24 of our participants resisted using the CBT format, despite acknowledging its merit for mental health support,

and reported feeling that helping others is 'intuitive' and that they could provide effective support without the need for guided responses. 7/24 also felt that action-oriented and direct advice was more helpful than elements of the CBT format like empathy. While most responses were overwhelmingly positive, and more than 95% (n=426) were rated harmless, we did see potential for harm. For instance, one response from P10 sarcastically promoted suicide as an attempt at humour, which propositions harm in practice. Given the potential for harm, human moderation could remain necessary in P2P support systems (Dosono & Semann, 2019; Morris, 2015). However, this moderation needs to be considered within the context of trade-offs; research has found that limiting player expression and over-structured formats can limit relatability (Mead et al., 2001, O'Leary et al., 2018), and that humour can facilitate patient community building (Demjén, 2018).

9.2.4 Need for Relatedness

Related to the need for self-expression was a need for participants to relate to those they were supporting, and to help them through shared experiences. Participants reported going out of their way to find NPCs that they could relate to, and difficulty responding to those with whom they shared little common ground. 20/24 of our participants included their own personal anecdotes in their responses, and a third of responses contained unprompted practical solutions based on their personal experience (n=149, Mdn=33.33%). These results suggest that matching players with peers with similar experiences will improve engagement and provide opportunities for genuine empathy. However, care needs to be taken in such a matchmaking process, since segregation based on mental health experience is discouraged and a diversity is considered a strength of peer support communities (Dosono & Semann, 2019).

9.2.5 Ludonarrative dissonance

Unlike previous Proteus Effect studies (Sherick et al., 2014; Yee, 2007; Lehdonvirta et al., 2012), we asked participants to interpret information and make decisions in an open-ended and personally meaningful ways within a fictional game world. Given the critical thinking needed for cognitive reappraisals, there may have been additional awareness of the ludonarrative dissonance by those in the **MONSTER** group. Kothgassner et al. (2017) explains cognitive reasoning can overcome avatar-influence with time. Priming Effects are likely reasons for the Proteus Effect observed, as participants acknowledged the stereotypes of both the **CLERIC** and the **MONSTER**. One participant in the **MONSTER** group vocalized that appearances do not matter in deciding who can be helpful. Participants did not relate to the idea of a monster giving humans advice and rejected the persona, accepting the **MONSTER** avatar as only a means to give responses.

A drawback of Merlynne is that its fantasy theme and narrative was too far removed from the task of responding to modern-day problems from Reddit, which broke immersion for the players. Some participants

suggested a more modern-day theme, such as a simulation of a university setting to reduce ludonarrative dissonance. Contrastingly, *Habitica*, a gamified time management platform employed the same mechanism of rewarding players in-game within a fantasy narrative for real-world tasks exhibited high adherence rates (Kalde, 2015). The expectations for immersion of a serious game versus a gamified application could be different and is worth considering in the design process. Reducing ludonarrative dissonance is important to enable the Proteus Effect in serious games to create harmonized experience within a magic circle.

9.3 Study setting

Since a researcher was present and play was contextualized within a research study, Merlynne could be regarded as a closed, guided CBT instead of a truly open, unguided CBT tool. *Appendix O* contains all recruitment and consent materials for participants. Assumptions within a study context which would be nonexistent in an unsupervised environment, may have influenced players' behaviour. Thus, usage may not be predictive of real-world engagement, and this thesis's results remain exploratory. Notably, in later studies on Habitica, the gamified app incited little real-world behavioural change (Diefenbach & Müssig, 2019) despite high usage in studies (Kalde, 2014), bringing into question whether the proper way to determine effectiveness of prosocial gameful design is through usage.

Future research in the field is encouraged if resources permit, like Morris's (2015) study where hired professionals moderated messages while participants access the platform independently, to yield results which can be more accurately transferrable to real world product designs.

9.4 Peer to Peer (P2P) support

In the context of the Proteus Effect, viewing one's avatar help NPCs in games could persuade helping behaviour offline (Kothgassner et al., 2015). However, using NPCs instead of human players does not perfectly capture P2P attitudes as NPCs are not reciprocating peers, and help remains one-directional. This limitation is acceptable for this thesis's purpose of exploring avatar appearances and the Proteus Effect as the limitation exists in both avatar groups, but future studies which choose to focus on avatars in a dynamic social setting —perhaps using SCT— should consider the influence of how a player assumes others perceive their avatar on their behaviour.

It is also worth noting that Kothgassner et al. (2017) states online exclusion by humans and computers can both lead to anti-social behaviours through aggression, and this phenomenon needs further research in games meant for social good. In considering social risks of our findings, if results indicate that female avatar designs increase helping behaviour, designers may choose to further the stereotype that empathy is specific to females of a certain appearance. Such design choices may be undesirable for gender equity initiatives.

A second limitation of representing P2P support in our study is that we cannot measure the helpfulness of the responses given, only whether they subscribe to an instructed format and whether they pose a risk to participants. After discussion with co-authors on papers on this research, the only accurate measure of helpfulness would require a response from the original query poster, which is difficult to acquire without involving the original posters in the study. In public forums where advice is sought, such as Reddit, or Stack Overflow, it is not uncommon for original posters to fail to reply to responders and verify helpfulness of peer advice. Encouraging follow-up responses from help-seekers could also be a worthwhile area of research.

9.5 Reflecting on serious games for mental health

In interpreting our results, participants felt a need to engage in a conversation in their own manner of speech. The need to connect, and have control, can potentially be provided if Merlynne followed an *Emergent Dialogue* model rather than a *Procedural Rhetoric* model.

As described by Antle et al. (2014) in their paper comparing game goals in persuading changes in players, "The Emergent Dialogue model holds that behaviour change occurs when participants become engaged stakeholders in the process of co-constructing their own narrative about a desired future" and defines Procedural Rhetoric as where "The game designer(s) create the rules of interaction in the game mechanics that are in line with their argument for attitude or behaviour change." Antle et al. (2014) describes the rigidity of Procedural Rhetoric, as it "supports pre-set judgements and values about what is right and wrong" whereas The Emergent Dialogue model "provides opportunities to reflect and discuss personal meanings and values outside of the mechanics of the game." Merlynne was designed as a simulation of a world where only contributing energy in cognitive reappraisal grants rewards and progress, an idealized demonstration of how peer support helps others and the self.

As Merlynne is strict in mechanics, it has decided for the player that providing P2P CBT to others is "right" and doing nothing is "wrong," as per the Procedural Rhetoric model. Blanks and gibberish answers although introduced as permissible in the tutorial, were not seen as valid options for some players perceived it as cheating. If these options were presented as lawful choices in gameplay (i.e., offering a "skip" button) instead of an improper method of advancing, it could convey greater player autonomy.

The viewpoint comes into question of whether a P2P CBT serious game should heavily nudge the player into the role of a mental health community member or be designed to allow the player to explore and reflect on the value of P2P CBT and participate on their own accord. From the results of our study, the latter could be the better option to allow players to determine their own framework and meanings for their P2P engagement due to dislike of CBT and displeasure from lack of exploration and continual repetition.

Re-designing Merlynne with the Emergent Dialogue model could go beyond giving one-directional, one-time advice to an individual, but continuous advice and interactions until the player feels like a stakeholder in the help seeker's experiences and the greater mental health community. A design supportive of self-expression and reflection while attentive to sensitivity and fatigue, can potentially motivate and provide opportunities individuals to process persuasive mental health messaging. However, for lasting attitude change, it is important that individuals come to their own conclusions through central processing on whether to participate in ways they see appropriate.

9.6 Summary

In reflection of this thesis's research, limitations in game presentation, study design, and participant pool were identified. Future work should consider creating a true two-way P2P experience with help-seeking participants as a field study and fostering higher avatar-player identification to measure the Proteus Effect through different presentations of a serious game through both mechanics and artwork. A more diverse participant pool could also improve transferability of finding to greater demographics and considering self-discovery opportunities for participants through gameplay is encouraged.

Chapter 10: Conclusion

We created Merlynne, a serious game simulating P2P support, where players perform the CBT technique of cognitive reappraisal on Reddit queries within a fantasy RPG interface to study the Proteus Effect on helping behaviours and attitudes. Merlynne exhibited high engagement reflected in high usage metrics and meaningful reappraisals submitted by participants. Game mechanics and design choices used in Merlynne motivated both peripheral and central processing of mental health messaging through the ELM, suggesting serious games can persuade participation in P2P supports for mental health, by individuals with no evident mental health interest.

Our mixed-methods exploratory study with 24 male-identifying participants supported that stereotypically helpful avatars (a female **CLERIC** as opposed to a male **MONSTER**) can influence players' engagement levels and helping attitudes in recruited.

The Proteus Effect was observed as the **CLERIC** group contributed more reappraisals with empathy and more frequently used the CBT format over time compared to the **MONSTER** group, while having significantly higher player-avatar identification. The **MONSTER** group provided more solutions in reappraisals over time, expected of male-identifying individuals —possibly playing as themselves due to their significantly lower player-avatar identification. Using helpful stereotypes may persuade helpfulness, but player-avatar identification is needed.

While quantitative results returned no further significant differences between avatar groups, thematic analysis from interview data uncovered themes from game experiences which translate into design considerations and areas of further research:

- Although Merlynne motivated engagement and increased willingness to offer help, designing to prevent players' emotional fatigue and overconfidence leading to harmful replies is suggested to protect both helpers and help seekers.
- Designers are also suggested to prevent ludonarrative dissonance by using narratives and themes closer to the real-world task of helping than fantasy RPGs and the game-world for better immersion.
- Game design for promoting long term helping behaviour based on CBT could consider allowing players to discover the benefits of helping others through gameplay instead of dictating its value.

10.1 Impact

This thesis's findings may guide designs for motivating participation in mental health support and for the use of serious games to encourage participation in health interventions. Possible applications include:

- De-lurking efforts to promote participation in new peer-to-peer support communities
- Retaining interest for participation in existing peer support systems
- Drive avatar designs in non-serious games to encourage desired types of helpful behaviour

Academic contributions of this thesis include the design and evaluation of a serious game used to motivate CBT, an exploration for the Proteus Effect in persuading helping behaviour through serious games, and successfully interpreting specific game elements as effective peripheral cues in the ELM.

Our long-term goal is to understand how gameful design, such as avatars, can improve peer support for mental health. Researchers are encouraged to explore different approaches to the solution using research through design and extend our exploratory findings with the Proteus Effect.

References

Ali, K., Farrer, L., Gulliver, A., & Griffiths, K. M. (2015). Online Peer-to-Peer Support for Young People with Mental Health Problems: A Systematic Review. *JMIR Mental Health*, 2(2), e19. https://doi.org/10.2196/mental.4418

Andersson, G. (2014). *The internet and CBT: a clinical guide.* Linkoping, Sweden: CRC Press.

Andrews, G., & Williams, A. D. (2015). Up-scaling clinician assisted internet cognitive behavioural therapy (iCBT) for depression: A model for dissemination into primary care. *Clinical Psychology Review*, Vol. 41, pp. 40–48. https://doi.org/10.1016/j.cpr.2014.05.006

Antle, A. N., Tanenbaum, J., Macaranas, A., & Robinson, J. (2014). *Games for Change: Looking at Models of Persuasion Through the Lens of Design.* https://doi.org/10.1007/978-981-4560-96-2_8

Appel, M., & Richter, T. (2010). Transportation and Need for Affect in Narrative Persuasion: A Mediated Moderation Model. *Media Psychology, 13*(2), 101-135.

Aron, A., Aron, E. N., & Smollan, D. (1992). Inclusion of Other in the Self Scale and the structure of interpersonal closeness. *Journal of Personality and Social Psychology*, 63(4), 596-612. http://dx.doi.org/10.1037/0022-3514.63.4.596

Ayres, A. (2014, May 23). Elaboration Likelihood Model (ELM). (Graphic). Retrieved August 10, 2017 from https://crew.co/blog/the-science-behind-persuasion/

Banks, J., & Bowman, N. D. (2016). Emotion, anthropomorphism, realism, control: Validation of a merged metric for player–avatar interaction (PAX). *Computers in Human behaviour*, 54, 215-223. doi:10.1016/j.chb.2015.07.030

Barik, E. Murphy-Hill, T. & Zimmermann, T. "A perspective on blending programming environments and games: Beyond points, badges, and leaderboards." *2016 IEEE Symposium on Visual Languages and Human-Centric Computing (VL/HCC)*, Cambridge, 2016, pp. 134-142. doi: 10.1109/VLHCC.2016.7739676

Bateman, D. R., Brady, E., Wilkerson, D., Yi, E.-H., Karanam, Y., & Callahan, C. M. (2017). Comparing Crowdsourcing and Friendsourcing: A Social Media-Based Feasibility Study to Support Alzheimer Disease Caregivers. *JMIR Research Protocols*, 6(4), e56. http://doi.org/10.2196/resprot.6904

Beck, A. T., Rush, A. J., Shaw, B. F., & Emery, G. (1979). Cognitive Theory of Depression. In *The Guilford Press.*

Bian, Y., Han, L., Zhou, C., Chen, Y., & Gao, F. (2015). The Proteus Effect in virtual reality social environments: Influence of situation and shyness. Acta Psychologica Sinica, 47(3), 363. https://doi.org/10.3724/SP.J.1041.2015.00363

Birk, M., & Mandryk, R. (2018). Combating Attrition in Digital Self-Improvement Programs using Avatar Customization. *CHI '18 Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems.* Montreal, 2018. Retrieved from https://dl.acm.org/citation.cfm?doid = 3173574.3174234

Bot-Hub. (2016, July 27). v KokoBot: comfort and help chatbot review. Retrieved from https://bot-hub.com/reviews/comfort-and-help-chatbot-review

Brown, M., O'Neill, N., van Woerden, H., Eslambolchilar, P., Jones, M., & John, A. (2016). Gamification and Adherence to Web-Based Mental Health Interventions: A Systematic Review. *JMIR Mental Health*, 3(3), e39. https://doi.org/10.2196/mental.5710

Burns, J. M., Webb, M., Durkin, L. A., & Hickie, I. B. (2010). Reach out central: A serious game designed to engage young men to improve mental health and wellbeing. *Medical Journal of Australia,* 192(SUPPL. 11).

Centre for Addiction and Mental Health. (2010). Stress. *Centre for Addiction and Mental Health.* Retrieved Feb 2, 2017 from http://www.camh.ca/en/hospital/health_information/a_z_mental_health_and_addiction_information/stress/Pages/info_stress.aspx

Centre for Addiction and Mental Health. (2012). Cognitive-behavioral therapy (CBT). *Centre for Addiction and Mental Health.* Retrieved Feb 2, 2017 from https://www.camh.ca/en/hospital/health_information/a_z_mental_health_and_addiction_information/CBT/Pages/default.aspx

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social behaviour*, 24(4), 385–396. https://doi.org/10.2307/2136404

Davison, K. P., Pennebaker, J. W., & Dickerson, S. S. (2000). Who talks? The social psychology of illness support groups. *American Psychologist*, 55(2), 205–217. https://doi.org/10.1037/0003-066X.55.2.205Deloatch, R., Bailey, B., Kirlik, A., & Zilles, C. (2017). I Need Your

Encouragement! Requesting Supportive Comments on Social Media Reduces Test Anxiety. *CHI 2017 : ACM CHI Conference on Human Factors in Computing Systems.*

Diefenbach, S., & Müssig, A. (2019). Counterproductive effects of gamification: An analysis on the example of the gamified task manager Habitica. *International Journal of Human Computer Studies*, 127, 190–210. https://doi.org/10.1016/j.ijhcs.2018.09.004

Dosono, B., & Semaan, B. (2019). Moderation Practices as Emotional labour in Sustaining Online Communities: The Case of AAPI Identity Work on Reddit. *Proceedings of the SIGCHI Conference on Human Factors in Computing System*. https://doi.org/10.1145/3290605.3300372

Ducheneaut, N., Wen, M., Yee, N., & Wadley, G. (2009). Body and Mind: A Study of Avatar Personalization in Three Virtual Worlds. *Proceedings of the 27th International Conference on Human Factors in Computing Systems - CHI 09*. doi:10.1145/1518701.1518877

Dunn, R. A., & Guadagno, R. E. (2012). My avatar and me - Gender and personality predictors of avatar-self discrepancy. Computers in Human behaviour, 28(1), 97–106. https://doi.org/10.1016/j.chb.2011.08.015

Edelmann, N. (2012). Lurking and De-lurking in e-participation. *Proceedings of the IADIS International Conference ICT, Society and Human Beings 2012, Proceedings of the IADIS International Conference E-Commerce* 2012, 151–155.

Findlay, L. C., & Sunderland, A. (2014). Professional and informal mental health support reported by canadians aged 15 to 24. *Statistics Canada Health Reports*, 25(12), 3–11.

Fleming, T. M., Bavin, L., Stasiak, K., Hermansson-Webb, E., Merry, S. N., Cheek, C., & Hetrick, S. (2017). Serious games and gamification for mental health: Current status and promising directions. *Frontiers in Psychiatry*, 7(JAN). https://doi.org/10.3389/fpsyt.2016.00215

Forsell, E., Bendix, M., Holländare, F., Szymanska von Schultz, B., Nasiell, J., Blomdahl-Wetterholm, M., & Kaldo, V. (2017). Internet delivered cognitive behaviour therapy for antenatal depression: A randomised controlled trial. *Journal of Affective Disorders, 221*, 56-64. https://doi.org/10.1016/j.jad.2017.06.013

Fox, J. Ahn, S. J., Janssen, J., Yeykelis, L., Segovia, K. Y., & Bailenson, J. (2015) Avatars Versus Agents: A Meta-Analysis Quantifying the Effect of Agency on Social Influence, *Human–Computer Interaction*, 30:5, 401-432, DOI: 10.1080/07370024.2014.921494

Gilbody, S., Littlewood, E., Hewitt, C., Brierley, G., Tharmanathan, P., Araya, R., White, D. (2015). Computerised cognitive behaviour therapy (cCBT) as treatment for depression in primary care (REEACT trial): large scale pragmatic randomised controlled trial. *BMJ, 351*.

Gillespie, G., & Crouse, D. (2012). There and back again: Nostalgia, art, and ideology in old-school dungeons and dragons. *Games and Culture,* 7(6), 441–470. https://doi.org/10.1177/1555412012465004

Glanz, K., Rimer, B., & Viswanath, K. (2015). *Health behaviour: Theory, research, and practice* (5 ed.). Jossey-Bass.

Groeneveld, B., Dekkers, T., Boon, B. & D'Olivo, P. (2018) Challenges for design researchers in healthcare. *Design for Health*, 2:2, 305-326, DOI: 10.1080/24735132.2018.1541699

Gorisse, G., Christmann, O., Houzangbe, S., & Richir, S. (2019). From Robot to Virtual Doppelganger: Impact of Visual Fidelity of Avatars Controlled in Third-Person Perspective on Embodiment and behaviour in Immersive Virtual Environments. *Frontiers in Robotics and AI*, 6, 8. https://doi.org/10.3389/frobt.2019.00008

Gosling, S. D., Rentfrow, P. J., & Swann, W. B. (2003). A very brief measure of the Big-Five personality domains. *Journal of Research in Personality*, 37(6), 504–528. https://doi.org/10.1016/S0092-6566(03)00046-1

Gotlieb, J. B., & Swan, J. E. (1990). An application of the elaboration likelihood model. *Journal of the Academy of Marketing Science*, 18(3), 221–228. https://doi.org/10.1007/BF02726473

Hedman, E., El Alaoui, S., Lindefors, N., Andersson, E., Ruck, C., Ghaderi, A., Kaldo, V., Lekander, M., Andersson, G., & Ljotsson, B. (2014). Clinical effectiveness and cost-effectiveness of Internet- vs. group-based cognitive behaviour therapy for social anxiety disorder: 4-Year follow-up of a randomized trial. behaviour *Research and Therapy, 59*.

Hofmann, S. G., Asnaani, A., Vonk, I. J. J., Sawyer, A. T., & Fang, A. (2012). The efficacy of cognitive behavioural therapy: A review of meta-analyses. *Cognitive Therapy and Research*, Vol. 36, pp. 427–440. https://doi.org/10.1007/s10608-012-9476-1

Hopia, H., & Raitio, K. (2016). Gamification in Healthcare: Perspectives of Mental Health Service Users and Health Professionals. *Issues in Mental Health Nursing*, 37(12), 894–902. https://doi.org/10.1080/01612840.2016.1233595

Hussain, Z., & Griffiths, M. D. (2008). Gender Swapping and Socializing in Cyberspace: An Exploratory Study. *CyberPsychology & behaviour*, 11(1), 47-53. doi:10.1089/cpb.2007.0020

Irwin, W., & Bassham, G. (2003). Depression, Informal Distortions, and Cognitive Therapy. Inquiry: *Critical Thinking Across the Disciplines,* 21(3), 15–21. https://doi.org/10.5840/inquiryctnews200321335

Ivanova, E., Lindner, P., Ly, K., Dahlin, M., Vernmark, K., Andersson, G., & Carlbring, P. (2016). Guided and unguided Acceptance and Commitment Therapy for social anxiety disorder and/or panic disorder provided via the Internet and a smartphone application: A randomized controlled trial. *Journal of Anxiety Disorders, 44*. 27–35. https://doi.org/10.1016/j.janxdis.2016.09.012

Kalde, M. A. (2015). behavioural changes through serious health games : a viable alternative to traditional treatments / techniques ? *6th IBA Bachelor Thesis Conference*, November 5th, 2015, 12.

Kaltenthaler, E., Parry, G., Beverley, C., & Ferriter, M. (2008). Computerised cognitive-behavioural therapy for depression: Systematic review. *British Journal of Psychiatry*, Vol. 193, pp. 181–184. https://doi.org/10.1192/bjp.bp.106.025981

Kasunic, A., & Kaufman, G. (2017). Be me, or be mii?: A study of self-presentation and interaction in the miitomo mobile application. *Conference on Human Factors in Computing Systems - Proceedings,* 2017–May, 1973–1977. https://doi.org/10.1145/3025453.3025934

Kliewer, W., Lepore, S. J., Broquet, A., & Zuba, L. (1990). Developmental and gender differences in anonymous support-seeking: Analysis of data from a community help line for children. *American Journal of Community Psychology*, 18(2), 333-339. doi:10.1007/bf00931308

Kothgassner, O. D., Griesinger, M., Kettner, K., Wayan, K., Völkl-Kernstock, S., Hlavacs, H., Felnhofer, A. (2017). Real-life prosocial behaviour decreases after being socially excluded by avatars, not agents. *Computers in Human behaviour*, 70, 261-269. doi:10.1016/j.chb.2016.12.059

Lappalainen, P., Granlund, A., Siltanen, S., Ahonen, S., Vitikainen, M., Tolvanen, A., & Lappalainen, R. (2014). ACT Internet-based vs face-to-face? A randomized controlled trial of two ways to deliver Acceptance and Commitment Therapy for depressive symptoms: An 18-month follow-up. *Behaviour Research and Therapy*, 61, 43–54. https://doi.org/10.1016/j.brat.2014.07.006

Landis, J. R., & Koch, G. G. (1977). Landis amd Koch1977_agreement of categorical data. *Biometrics,* 33(1), 159–174. https://doi.org/10.2307/2529310

Lau, H. M., Smit, J. H., Fleming, T. M., & Riper, H. (2017). Serious games for mental health: Are they accessible, feasible, and effective? A systematic review and meta-analysis. *Frontiers in Psychiatry,* Vol. 7. https://doi.org/10.3389/fpsyt.2016.00209

Lehdonvirta, M., Lehdonvirta, V., & Baba, A. (2011). Prosocial behaviour in avatar-mediated interaction: The influence of character gender on material versus emotional help-giving. *On the Horizon,* 19(3), 165-173. doi:10.1108/10748121111163878

Lehdonvirta, M., Nagashima, Y., Lehdonvirta, V., & Baba, A. (2012). The Stoic Male: How Avatar Gender Affects Help-Seeking behaviour in an Online Game. *Games and Culture*, 7(1), 29-47. doi:10.1177/1555412012440307

Lin, H., & Wang, H. (2014). Avatar creation in virtual worlds: behaviours and motivations. *Computers in Human behaviour*. 34. 213–218. 10.1016/j.chb.2013.10.005.

Lindner, P., Ivanova, E., Ly, K., Andersson, G., & Carlbring, P. (2013). Guided and unguided CBT for social anxiety disorder and/or panic disorder via the Internet and a smartphone application: study protocol for a randomised controlled trial. *Trials*, 14(1), 1–7. doi.org/10.1186/1745-6215-14-437

LiWc. (2015). Discover LIWC 2015. *Pennebaker Conglomerates, Inc*. Retrieved from http://liwc.wpengine.com/

Lofgren, K. (2016, Feb 8). 2016 Video Game Statistics & Trends Who's Playing What & Why. *Big Fish Games, Inc*. Retrieved August 10, 2017 from https://www.bigfishgames.com/blog/2016-video-game-statistics-and-trends/

Lopez, S., Yang, Y., Beltran, K., Kim, S. J., Hernandez, J.C. Simran, C., Yang, B., Yuksel, B. F. (2019). Investigating Implicit Gender Bias and Embodiment of White Males in Virtual Reality with Full Body Visuomotor Synchrony. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems - CHI 19*. doi: 10.1145/3290605.3300787

MacKenzie, I. S. (2013). Designing HCI Experiments. In *Human-computer Interaction* (pp. 157–189). https://doi.org/10.1016/b978-0-12-405865-1.00005-4

Marczewski, A. (2015). 52 Gamification mechanics and elements - Gamified UK Blog. Retrieved from Gamified UK website: https://www.gamified.uk/user-types/gamification-mechanics-elements/

Mays, N., & Pope, C. (1995). Qualitative Research: Rigour and qualitative research. *Bmj*, 311(6997), 109-112. doi:10.1136/bmj.311.6997.109

McCloud, S. (1993). Understanding comics: The invisible art. New York, NY: HarperPerennial.

Mead, S., Hilton, D., Director, M., & Curtis, L. (2001). Peer Support: A Theoretical Perspective. *Psychiatric rehabilitation journal.* 25. 134-41. 10.1037/h0095032.

Melling Richmond VIC, B., Terry Houguet-Pincham depressioNet, A., & Vic, R. (2011.). Online Peer Support for Individuals with Depression: A Summary of Current Research and Future Considerations. *Psychiatric Rehabilitation Journal.* 2011. 34(3):252-4. doi: 10.2975/34.3.2011.252.254

Merry, S., Stasiak, K., Shepherd, M., Frampton, C., Fleming, T., & Lucassen, M. (2012). The effectiveness of SPARX, a computerised self help intervention for adolescents seeking help for depression: randomised controlled non-inferiority trial. *BMJ, 344*. Retrieved from http://www.bmj.com/highwire/filestream/579896/field_highwire_article_pdf/0.pdf%5Cnhttp://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=emed10&NEWS=N&AN=2012292499

Mental Health Commission of Canada. (2017).Workplace: What is the issue? *Mental Health Commission of Canada.* Retrieved Feb 2, 2017 from http://www.mentalhealthcommission.ca/English/focusareas/workplace

Miloff, A., Marklund, A., & Carlbring, P. (2015). The challenger app for social anxiety disorder: New advances in mobile psychological treatment. *Internet Interventions*, Vol. 2, pp. 382–391. https://doi.org/10.1016/j.invent.2015.08.001

Morris, R. (2015). *Crowdsourcing Mental Health and Emotional Well-Being.* Dissertation. Massachusetts Institute of Technology.

Morris, R., Kouddous, K., Kshirsagar, R., & Schueller, S. M. (2018). Towards an Artificially Empathic Conversational Agent for Mental Health Applications: System Design and User Perceptions. Journal of Medical Internet Research, 20(6), e10148. https://doi.org/10.2196/10148

Murray, K., Pombo-Carril, M. G., Bara-Carril, N., Grover, M., Reid, Y., Langham, C., Birchall, H., Williams, C., Treasure, J. and Schmidt, U. (2003), Factors determining uptake of a CD-ROM-based CBT self-help treatment for bulimia: patient characteristics and subjective appraisals of self-help treatment. Eur. Eat. Disorders Rev., 11: 243–260. doi:10.1002/erv.519

Naslund, J. A., Aschbrenner, K. A., Marsch, L. A., & Bartels, S. J. (2016). The future of mental health care: Peer-To-peer support and social media. *Epidemiology and Psychiatric Sciences*, 25(2), 113–122. https://doi.org/10.1017/S2045796015001067

Nicholson, S. (2015). A RECIPE for Meaningful Gamification. In S. Nicholson, *Gamification in Education and Business* (pp. 1-20). Cham: Springer International Publishing.

Nickell, G. (1998). The Helping Attitude Scale. *106th Annual Convention of the American Psychological Association at San Francisco.* Retrieved August 10, 2017 from http://web.mnstate.edu/nickell/APA%201998%20paper.pdf

Ortlipp, M. (2008). Keeping and Using Reflective Journals in the Qualitative Research Process. *Qualitative Report*, 13(4), 695–705. Retrieved from http://csaweb110v.csa.com/ids70/view_record.php?id = 3&recnum = 83&log = from_res&SID = 7ndsl0lqpq9t0qbm6m905dier3&mark_id = search%3A3%3A83%2C80%2C90

Özdemir, T., & Eyduran, E. (2005). Comparison of Chi-Square and Likelihood Ratio Chi-Square Tests: Power of Test 1. *Journal of Applied Sciences Research*, 1(2), 242–244.

Peña, J., Hancock, J. T., & Merola, N. A. (2009). The Priming Effects of Avatars in Virtual Settings. *Communication Research,* 36(6), 838-856. doi:10.1177/0093650209346802

Petty, R. E., & Cacioppo, J. T. (1986). The elaboration likelihood model of persuasion. *Advances in Experimental Social Psychology*, 19(C), 123–205. https://doi.org/10.1016/S0065-2601(08)60214-2

Pourbohloul, B., & Kieny, M. (2011, April 01). Complex systems analysis: Towards holistic approaches to health systems planning and policy. Retrieved April 17, 2019, from https://www.who.int/bulletin/volumes/89/4/11-087544/en/

Przybylski, A. K., Weinstein, N., Murayama, K., Lynch, M. F., & Ryan, R. M. (2011). The ideal self at play the appeal of video games that let you be all you can be. Psychological science. http://dx.doi.org/10.1177/0956797611418676

Public Health Agency of Canada. (2014). *Mood and anxiety disorders in Canada: Fast facts from the 2014 survey on living with diseases in Canada.* Retrieved March 26th, 2017 from https://www.canada.ca/content/dam/canada/healthcanada/migration/healthycanadians/publications/diseases-conditions-maladiesaffections/mental-mood-anxiety-anxieuxhumeur/alt/mental-mood-anxiety-anxieux-humeureng.pdf

Putz, L.-M., & Treiblmaier, H. (2015). Creating a theory-based research agenda for gamification. 2015 *Americas Conference on Information Systems, AMCIS 2015.*

Ramos, J. (2017, October 23). Stardew Valley on the Switch proves the importance of "the magic circle". Retrieved from https://www.polygon.com/2017/10/23/16504684/stardew-valley-nintendo-switch-magic-circle

Realm Pop. (2015). Population statistics on the players' characters in World of Warcraft. Retrieved April 16, 2019, from https://realmpop.com/us.html

Ducheneaut, N., Don Wen, M. H., Yee, N., & Wadley, G. (2009). Body and mind: A study of avatar personalization in three virtual worlds. *Conference on Human Factors in Computing Systems - Proceedings*, 1151–1160. https://doi.org/10.1145/1518701.1518877

Ray, J. M., Kemp, L. L., Hubbard, A., & Cucciare, M. A. (2017). Developing a Peer Support Protocol for Improving Veterans' Engagement to Computer-Delivered Cognitive behavioural Therapy. behaviour*al and Cognitive Psychotherapy*. https://doi.org/10.1017/S1352465816000539

Robinson, M., Raine, G., Robertson, S., Steen, M., & Day, R. (2015). Peer support as a resilience building practice with men. *Journal of Public Mental Health*, 14(4), 196–204. https://doi.org/10.1108/JPMH-04-2015-0015

Schneider, A., Von Krogh, G., & Jäger, P. (2013). What's coming next? Epistemic curiosity and lurking behaviour in online communities. *Computers in Human behaviour*, 29(1), 293–303. https://doi.org/10.1016/j.chb.2012.09.008

Sherrick, B., Hoewe, J., & Waddell, T. F. (2014). The role of stereotypical beliefs in gender-based activation of the Proteus Effect. *Computers in Human behaviour*, 38, 17-24. doi:10.1016/j.chb.2014.05.010

Stenros, J. (2014). In Defence of a Magic Circle: The Social, Mental and Cultural Boundaries of Play. *Transactions of the Digital Games Research Association*, 1(2). https://doi.org/10.26503/todigra.v1i2.10

Erik Stolterman. (2008). The Nature of Design Practice and Implications for Interaction Design Research. International Journal of Design, 2(1), 55–65. Retrieved from https://www.mendeley.com/catalogue/nature-design-practice-implications-interaction-design-research-1/

Sun, N., Rau, P. P. L., & Ma, L. (2014). Understanding lurkers in online communities: A literature review. *Computers in Human behaviour*, 38, 110–117. https://doi.org/10.1016/j.chb.2014.05.022

Soutter, A. & Hitchens, M. (2016). The relationship between character identification and flow state within video games. *Computers in Human behaviour.* 55(B), 1030-1038. https://doi.org/10.1016/j.chb.2015.11.012

Tallner, A., Pfeifer, K., & Mäurer, M. (2016). Web-based interventions in multiple sclerosis: the potential of tele-rehabilitation. *Therapeutic Advances in Neurological Disorders*, 327–335. https://doi.org/10.1177/1756285616640684

Thompson, R., & Haddock, G. (2012, 2 1). Sometimes stories sell: When are narrative appeals most likely to work? *European Journal of Social Psychology, 42*(1), 92-102.

Toh, W. (2018). Ludonarrative Dissonance. In *A Multimodal Approach to Video Games and the Player Experience* (pp. 49–74). https://doi.org/10.4324/9781351184779-4

Tondello, G. F., & Nacke, L. E. (2018). Gamification: Tools and techniques for motivating users. *Conference on Human Factors in Computing Systems - Proceedings, 2018–April.* https://doi.org/10.1145/3170427.3170662

Ullrich, P. M., & Lutgendorf, S. K. (2002). Journaling about stressful events: Effects of cognitive processing and emotional expression. *Annals of behavioural Medicine*, 24(3), 244–250. https://doi.org/10.1207/S15324796ABM2403_10

Van Der Land, S. F., Schouten, A. P., Feldberg, F., Huysman, M., & Van Den Hooff, B. (2014). Does Avatar Appearance Matter? How Team Visual Similarity and Member-Avatar Similarity Influence Virtual Team Performance. *Human Communication Research*, 41(1), 128-153. doi:10.1111/hcre.12044

Van Looy, J., Courtois, C., & De Vocht, M. (2010). Player identification in online games. *Proceedings of the 3rd International Conference on Fun and Games - Fun and Games* 10. doi:10.1145/1823818.1823832

van Uden-Kraan, C. F., Drossaert, C. H. C., Taal, E., Seydel, E. R., & van de Laar, M. A. F. J. (2008). Self-reported differences in empowerment between lurkers and posters in online patient support groups. *Journal of Medical Internet Research,* 10(2). https://doi.org/10.2196/jmir.992

Vatamanescu, E., & Cicei, C. (2014). The Proteus Effect in the Context of Facebook Virtual Communities. In E. Vatamanescu, & C. Cicei, *Strategica: Strategic Thinking in a Changing World.*

Wang, Y., Geigel, J., & Herbert, A. (2013). Reading personality: Avatar vs. human faces. *Proceedings - 2013 Humaine Association Conference on Affective Computing and Intelligent Interaction, ACII 2013.*

Woodford, J., Farrand, P., Bessant, M., & Williams, C. (2011). Recruitment into a guided internet-based CBT (iCBT) intervention for depression: Lesson learnt from the failure of a prevalence recruitment strategy. *Contemporary Clinical Trials.*

WOWpedia. (2019). Timeline (World of Warcraft). *Gamepedia.* Retrieved from https://wow.gamepedia.com/Timeline_(World_of_Warcraft)

Wrzesien, M., Rodríguez, A., Rey, B., Alcañiz, M., Baños, R., & Vara, M. (2015). How the physical similarity of avatars can influence the learning of emotion regulation strategies in teenagers. *Computers in Human behaviour.*

Wu, Y., Chang, W., & Yuan, C. (2015). Do Facebook profile pictures reflect user's personality? *Computers in Human behaviour.*

Yee, N., Ducheneaut, N., & Nelson, L. (2006). Online Gaming Motivations Scale: Development and Validation. Retrieved from http://www.nickyee.com/pubs/2012 CHI - Motivations Scale.pdf

Yee, N., & Bailenson, J. (2007). The Proteus Effect: The effect of transformed self-representation on behaviour. *Human Communication Research.*

Yee, N., Ducheneaut, N., Yao, M., & Nelson, L. (2011). Do Men Heal More When in Drag? Conflicting Identity Cues Between User and Avatar. *CHI.*

Yoon, G., & Vargas, P. T. (2014). Know Thy Avatar: The Unintended Effect of Virtual-Self Representation on behaviour. *Psychological Science*, 25(4), 1043-1045. DOI: 10.1177/0956797613519271

Zimmerman, J., Forlizzi, J., & Evenson, S. (2007). Research through design as a method for interaction design research in HCI. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems - CHI 07.* doi:10.1145/1240624.1240704

Appendix A: Playtesting and iterative design notes

Iterative design as part of the research through design process was conducted with 4 volunteers using the unhelpful version of the avatar, but avatars were shown for both characters to volunteers at the end. The game was presented as part of the study and the researcher's script was followed throughout the process.

Category	Suggestion	Change
Visuals	The cosmetics earned do not match the minotaur character. (P1)	No differences were made between the healer and minotaur avatars for cosmetics, but the placement of the cosmetics were changed to better align with the head and body of the minotaur avatar than before.
	More visual focus is placed on the text box and not the avatar at times. (P1)	An illustration of the avatar was placed beside the dialogue box. To be in the visual space as the user types. The layout is based off dialogue layouts of commercialized games.
	Immersion is broken when the avatar snaps back to a default left-facing direction after walking right. (P2)	Avatar would freeze facing left if the last movement was movement towards the left.
	Difficult to read text in transparent text boxes over the game. (P3)	The boxes are not opaque.
	It is difficult to tell which level you are on, it should be more clearly indicated. (P3)	Levels labelled in top left corner.
	Red hair of helpful character suggests aggression. (P3)	Helpful avatar's hair was lighted to light blonde.
	The queries do not match the NPC sometimes, such as the small orc matched to a query saying that they are a mature student. (P3)	This was not changed. The queries all were not intended to belong to the NPC, to match the narrative of the negative thoughts being from another world.
	A cape would be cool. (P4)	This was not changed. Garments required additional animation changes that was not within the scope of the project.
	I don't like the glow on the avatars. (P4)	The glow was lessened in intensity, but needed to be kept to suggest an area of effect for interactions.

Interface	Needs an indication that a response has been submitted. (P1) There's no visual feedback to let me know an answer was submitted (P3)	An audio feedback was added after submission was sent. NPCs would also turn into a flame animation only after the submission was recorded.
	The ESC key closes the game, but it was assumed that it would close the dialogue box. (P2)	ESC key was disabled.
	The SPACEBAR is usually the key used to interact with NPCs in other commercial games, not Right CTRL. (P2)	Right CTRL and Left CTRL would open and close dialogue boxes, this was not changed. Using the SPACEBAR would risk closing dialogue boxes if the play were to move to another NPC when typing on another NPC's query.
	There is no way to wear hats of previous levels. (P2)	This was not changed. Changing cosmetic features required additional changes that was not within the scope of the project.
	The progress bar should cap at the number of submissions needed to advance the level. It is confusing when the additional submissions submitted per level exceeds the number of submissions needed to advance the level. i.e., It jumps from 21/22 to 22/24, and it is confusing. (P3)	Progress was capped at 2 submissions per level. The NEXT button would appear when two submissions have been submitted. Any additional submissions would not be counted. i.e., 21/22 would turn into 22/22, then to 22/24 only when the next level is loaded.
	I am not sure what the Damage Dealt means. Maybe name it something else (P3).	Added explanation to the researcher's script during tutorials.
	I should be able to use the ENTER key to submit my responses. (P3, P4)	You can use the ENTER key to submit responses.
	The hotlines do not open. (P4)	This was a misunderstanding, the hotlines now start off as open, and participants are asked to close it in the tutorials to assure they understand its functionality.
	The game crashes a lot. (P4)	This was tested on a browser, it is now on a desktop in a native file. It no longer crashes when tested on the computers the study would be run on.
	There should be a visual cue by the NPC that they are engaged with me. (P4)	This was not changed. Changing NPC animations required additional animation changes that was not within the scope of the project. There is an audio cue now.
	TAB doesn't work (P4)	The text input boxes were reduced form 3 to 1, and no longer requires a TAB key.

	There should be a way to save progress or return to previous levels. (P4)	This was not changed. Saved progress and switching levels required additional changes that was not within the scope of the project.
	WASD should be disabled if the dialogue box is active as it moves the character around when I am typing. (P4)	WASD is disabled.
	I should not be able to move when I am in the middle of helping someone. (P4)	This was not changed. If text input is selected, the character would not move.
	CTRL may not be the best for browser-based games. (P4)	It is now on a desktop in a native file. It no longer crashes when tested on the computers the study would be run on.
	It's weird that you enter your name and select your character on two separate screens. (P4)	Due to technical debt, this error could not be fixed. However, the screens were simplified to appear like the same screen.
Content	The text on the screen repeats what the researcher is telling the participant. (P1) It is confusing to follow what the researcher is saying while reading the screen at the same time. (P3)	The amount of onscreen text has been reduced to information specific to the gameplay, such as game controls. All information pertaining to the study will only be in the researcher's script.
	Sometimes they don't feel like irrational negative thoughts, maybe they are just wrong. (P1, P3)	No content changes were made, but some were re-worded to better fit the obvious format of a cognitive distortion.
	It is difficult to write a response to some queries, some examples should be provided. There is not enough explanation in the "Spellbook" to follow and write the responses. (P1)	The "Spellbook" once held all the descriptions of cognitive distortions and took up space on the screens. The game was restructured to feature only one distortion type per level. Direct instructions were provided on each screen based on the cognitive distortion of the given level.
	There is a lot of Overgeneralization queries. (P2)	This content was not changed, but overgeneralization queries were now grouped in the beginning to allow players to foster a sense of mastery before attempting other cognitive distortion types.
	It is not evident that the content is from Reddit. (P2)	The opening page and the level right after the tutorials of the game tell the player the queries are from Reddit.
	The "boss level" did not feel like a boss level because it was not harder in difficulty. It also only took one submission to get through, it	The level was renamed special levels instead of boss levels and given additional artwork and different audio to separate it from the rest of the levels.

was a reduced challenge more than a challenge. (P2)	
The ending reward, which is the congratulations scene should be more "congratulatory." Perhaps the NPCs at the final scene should reward the player with positive thoughts. (P2)	The NPCs at the end now give positive statements.
The negative queries at times felt too "close to home" and difficult to process. (P2)	There were no changes made.
Not sure if you are asked to give advice or to reframe their thoughts in a different way. More inclined to give advice. (P3)	A more direct prompt of the expected submissions are given as placeholder text in the text input box.
Not sure if I am supposed to give advice as myself, or as my character as if I am roleplaying them. (P3)	There were no changes made. It can be acceptable either way, it is up to the participant.

Appendix B: Game narrative

Level No.	Location	Game Narrative	Hero's Journey Comparison
1 (tutorial)	A crypt	The player familiarizes with controls and is fighting strange monsters.	Reluctancy
2 (tutorial)			
3 (tutorial)			
4	Your Village	A villager approaches you. "The people are acting strange, they are plagued with thoughts that are not their own!" What is going on?	Call to Help
5		"We are unable to hunt to provide food for our families, can you help us?" The hunters are infected with foreign negativity as well. You suspect there is greater danger.	
6		The villagers and hunters you have helped seem to be regaining motivation to resume their duties. You discover more heros in need of support as you investigate the plague of negativity.	
7	Village Gates	You encounter a villager that has been hit very hard with worry. More than the others.	Acceptance of Quest
8	Dangerous Forest	You encounter the defenders of the central kingdom. "We must address the threat to the kingdom, but today we struggle to find bravery." You cannot fight the fights of the knights, but you can support them.	Obstacles
9		You decide to enter orc territory to use a shortcut to the central kingdom. to help. Orcs are different from you, but are affected by a similar curse of negativity.	
10		"We appreciate you for helping us. Our elder has been studying the cause of the curse for days." You seek answers.	
11	Magical Village	The Ord Elder claims human mages have been conducting strange magic experiments and they must have attracted negativity from other worlds. He directs you to the central kingdom.	Learning

12		You encounter the human mages, also cursed with foreign negativity. Strong people also have their moments of weakness. You offer your help.	
13		"Can you please help the others put an end to the curse?" The other mages seem to be trying to close some sort of a breach. You are not trained with their magic, but you can support them by strengthening their mindsets.	
14	Treasure Room	A woman appears from the breach. "That's Merlynne! The high wizard of Khamelot!" The other mages explain that while trying to help others with her magic words, she ended up overexerting herself and attracting negativity from another world to the kingdom. You try to speak to Merlynne.	Obtain knowledge
15	Venture through monsters' territory	Merlynne overcomes the worry plaguing her and advises you: "Do not set yourself on fire just to keep other people warm." With the knowledge and practice from your journey, you return home through the kingdom while helping others on the way.	Wish to bring back knowledge
16		The mages, wizards, and local hunters have showed up in the civilian areas to aid panic in the streets. You offer ways they can overcome their own worries, fearing they may overexert themselves, like Merlynne.	
17		A messenger from an enemy town arrives. The minotaurs, are violent rivals to Khamelot. They may have also been afflicted by Merlynne's curse, just not to their knowing. You attempt to reason with the messenger.	
18	Your Village	"Thank you for the insight. I will tell my people." The minotaur messenger leaves after commenting on the community strength in the Khamelot. An orc ambassador offer escorts you back to your village in appreciation on your previous help.	Use knowledge to help others
19		Word has spread about your special magic in alleviating negativity. Visitors from remote kingdoms come to your village to seek your help.	
20		More and more people show up asking for your magic. You suspect that you may not be able to help them all...	

		Was this what Merlynne felt like? But, you still try to help...	
21	Crypt	You feel like you don't have enough energy to fuel your efforts towards helping others. Were you not affected by Merlynne's curse? You must address your own worries before you can continue to help others.	Self-growth
22	Village	With your own worries addressed, you return to the others with a healthy mindset. You tell them you will help them, but only when you have sufficient magic power, and they understand. But your villagers seem to have adopted the healthy mindset among themselves!	

Hero's journey:

Christopher Vogler. (2003). The Stages of the Hero's Journey. *Excepts from Myth and the Movies.*

Retrieved from http://www.tlu.ee/~rajaleid/montaazh/Hero%27s%20Journey%20Arch.pdf

Appendix C: Non-player characters (NPC) and queries

NPC Image	Level	Query	Cognitive Distortion Type	Intended Gender	Role
	4	I feel like such a narcissist, but I miss my old friends not because I liked them, but because they gave me the attention I needed.	Overgeneralization	M	Peasant
	4	I am so disgustingly ugly, I am short and skinny, and I have a terrible voice and I have so many spots and scab on my face. I am just a general waste of space.	Overgeneralization	M	Peasant
	4	I don't think I am mentally ill, but just lazy and that alone makes me feel depressed, but I don't have depression. I am just melodramatic, and immature.	Overgeneralization	F	Peasant
	5	In 1a and already messing up my future. I missed my first 120L pre-lab quiz, I did bad in my phys lab, and to top it all off I just got caught smoking by my don.	Overgeneralization	M	Archer
	5	My teacher told me to re-write the functions exam because I did so poorly on it. It was my dream to get into UW cs with co-op but how on earth can I get in when I can't even pass a highschool test?	Overgeneralization	F	Archer

	5	I did my first phone interview despite hating phone calls, and everything was going well, but couldn't answer even one of the technical questions and I think that bombed my entire job and shows how much of a fraud I am.	Overgeneralization	M	Archer
	6	I lost 60 pounds last summer and gained 20 back in a month lol. I think I am meant to be impulsive and obese.	Overgeneralization	M	Peasant
	6	I am not good enough for my friends, I don't vocalize this, and I try not to make it obvious, but it tears me up inside.	Overgeneralization	M	Archer
	6	I didn't make a single friend in o-week and that's when you pay $100 to make friends. I can't make friends even when people are paid to make friends.	Overgeneralization	F	Archer
	7	My bike was stolen and I lost my main mode of transport to work, I have no idea what to do, and I am worried about getting fired.	Rational	M	Peasant
	8	Feels bad that I'm such an awkward loser at work. I just can't help it...I don't feel like talking randomly during the	Emotional Reasoning	M	Warrior

day unless it's lunch time.

	8	I just cannot write properly anymore, the flow is gone, I feel like I was way smarter in highschool. I am afraid I peaked, and this is all I am.	Emotional Reasoning	M	Archer
	8	I feel like the reason I can't maintain a friendship is me, not them.	Emotional Reasoning	F	Archer
	9	I am 30, a mature student. I should be working already and with a family, but I am in group projects with people half my age and annoying the fuck out of my professors. I have 3 more years to go.	Should Statements	Neutral	Orc henchman
	9	She's my mom and I should be taking care of her and be there for her, but I'll go crazy myself when I must spend too much time with her. She clearly doesn't listen to anyone and when we try to tell her to stop, she would either make excuses or snap at us.	Should Statements	Neutral	Orc leader
	9	I should relax, but for me relaxing is just a slightly less stressed version of me. It's got to a point now where I don't take days off because I can't just sit around and do nothing.	Should Statements	Neutral	Orc henchman
	10	Thanksgiving should be for spending time with friends and family, but I just did nothing but play games.	Should Statements	Neutral	Orc leader

	10	I should be doing my readings for my courses, but I just skim the conclusion and get by on all the tests. I feel like I am cheating the system and just not a good student at all.	Should Statements	Neutral	Orc henchman
	10	I spend most of my time studying and don't procrastinate or party (or go to social events), but I still can't get decent marks. I don't understand how people survive university.	Should Statements	Neutral	Orc henchman
	11	My partner and I are on opposite co-op streams. I just wish we talked more at night. I get that they have work in the mornings…but I don't want to have to be clingy to ask for some attention.		Neutral	Orc leader
	11	Every time I see a pretty girl, I immediately think "wow that girl is so much skinnier than me" and I think about how my boyfriend should probably attracted to them and it makes me hate them.		Neutral	Orc leader
	11	My parents paid so much money for me to be in university, yes, but they shouldn't put so much pressure on me. I should be able to enjoy my early twenties without having to call them every night.		Neutral	Orc henchman

	12	If I don't get ranked this term, I have no chance at co-op next term.	Mind-Reading	M	Priest
	12	Spent $30k on a useless degree, I could have bought a house by now.	Mind-Reading	M	Priest
	12	If I hadn't went abroad to study, I think my grandma wouldn't have forgot me after Alzheimer's. It sucks that she remembers all my siblings but not me.	Mind-Reading	F	Priest
	13	I am in engineering and got a Google interview, most of the other applicants are Computer Science. I don't have a good coding background and this interview is going to be a car crash.	Fortune Telling	M	Magician
	13	I am fearful of interacting more with my girlfriend because I am afraid of getting hurt. I like spending time with her, but I just know she'll grow to dislike me.	Fortune Telling	F	Priest
	13	I bombed my thesis presentation. My supervisor is not replying to my emails. Probably knows I'm not worth their time.	Fortune Telling	F	Priest
	14	I am really worried that my cat will die within the week, she is my oldest friend, and it is very sad. I cannot sleep.	Rational	F	Magician

	15	Someone deleted me off Facebook a few years ago, and I don't understand why. I didn't do anything to them and I just don't understand. I can't stop thinking about it.	Mind-Reading	F	Warrior
	15	The people I work with are judgmental, they aren't supportive at all and I'm being bullied by an older woman who I think is resentful of me.	Mind-Reading	F	Warrior
	15	My younger sister does not talk to me when we are alone in the house, she just pretends to listen to music and I feel like I am the only one in this family who cares about the family.	Mind-Reading	F	Warrior
	16	I mean, being accepted by waterloo and being in this program is great and all but, in the end, if I'm not happy, then should I just transfer to somewhere that doesn't make me feel like one of the stupidest people on the planet.	Emotional Reasoning	M	Archer
	16	I thought I was the smart kid in Goderich, but ha, I feel like I think slower than everyone else at UWaterloo. I'm not even in one	Emotional Reasoning	M	Magician

107

		of the harder programs.			
	16	I got into the finals of the feminist poetry slam, but people online say it is too cliché and even "cringey." I am seriously thinking about withdrawing to save the embarrassment.	Emotional Reasoning	M	Priest
	17	Nothing bad has ever happened to me, everything is fine, but I just don't have the enthusiasm for anything anymore even though I should be the happiest right now. I don't hate anything, and I am not suffering, but I envy people who enjoy things.	Minimization	M	Minotaur
	17	I got into the co-op job I want with the government doing research, but I think I was only a diversity hire. There is no way to confirm, sure, but there is no way my interview went well.	Minimization	F	Priest
	17	I got into the course I needed to get into, but because I took it a term later than my class, I don't know anyone to do these group projects with…I really don't want this to affect my grades.	Minimization	M	Priest
	18	My partner of 3.5 years told me that they didn't like the way I dress from day one. I really value the way I dress, it is silly, but I started to worry for this relationship.	Magnification	M	Peasant

	18	I fumbled the words in my presentation and I know this will lead to my group getting a bad mark. No one has said anything because it is too awkward to discuss it after the fact.	Magnification	Neutral	Orc Peasant
	18	I went 3 weeks without smoking, but I just had to smoke one today, it was a particularly bad day. I feel like a failure, I feel all my progress was for nothing, quitting is too hard.	Magnification	F	Peasant
	19	I am afraid of being honest in my counseling intake session because I don't want to be pulled from my program.	Fortune Telling	M	Foreign Peasant
	19	If I don't get into law school, I am fearful that I wasted all this money and time doing nothing. I don't even want to think about how my mom will react.	Fortune Telling	Neutral	Orc Peasant
	19	I've noticed that in my personal life I am getting more aggressive, often arguing with colleagues at work, or family members. I am, probably for the first time in my life, worried that I am going to end up hurting someone through my anger.	Fortune Telling	M	Minotaur
	20	I can't even do a basic retail job without getting too loud and excited. It is just who I am, but I know it annoys	Unspecified	F	Peasant

		people. How can I learn to function like normal people			
	20	Everything in this course is so hard, and I really don't think I belong here since my TA thinks I'm a dumbass and I just know my classmates think I'm a dumbass. If only I spoke up more...	Unspecified	M	Foreign Peasant
	20	My sister keeps on borrowing my old clothes to wear when she has her own. She is doing it to taunt my weight gain, it makes me feel terrible, and I don't know how to nicely ask her to stop.	Unspecified	Neutral	Orc Peasant
	20	My family spends a lot of money for me to attend school, and I skipped my classes and sat on my ass until dinnertime. It is $60 a lecture, and I just wasted $180 today. I let my family down.	Unspecified	M	Peasant
	20	If I had left early instead of asking to go to see the lakefront, I would have made the earlier train, so they wouldn't have to hang out with me for 2 hrs. more.	Unspecified	M	Minotaur
	20	My professor is making us write about obesity out of all the other health problems in this course final, because she knows I am obese, and I ask too many questions in class. She is	Unspecified	F	Archer

		punishing me, and I am going to fail.			
	20	Met this guy online and he wanted to meet up and see a pic first, so I gave him my insta. Well he never replied, prob didn't like what he saw. I'm not gonna lie it sort of ruined my day.	Unspecified	M	Archer
	20	I have been with my SO for almost 2 years, but lately I just don't want to hang out after being intimate. I am scared I'm hurting my SO and that we are falling apart.	Unspecified	M	Peasant
	20	If I hadn't got into a fight with my boyfriend the night before his midterm, he wouldn't have had skipped half the questions and failed. This is all my fault and I feel terrible.	Unspecified	F	Peasant
	20	I am hosting my first dinner party next week and I am afraid no one will come, and everything will taste bad and that all this was for nothing.	Unspecified	F	Peasant
	21	Imagine a negative thought you have, or write it down on a piece of paper. What would you tell yourself in an appraisal?	Special	Neutral	Ghost
	21	I am scared of going to university alone in another country. I am scared I won't survive on my own.	Rational	Neutral	Ghost

Appendix D: Game screenshots and flow
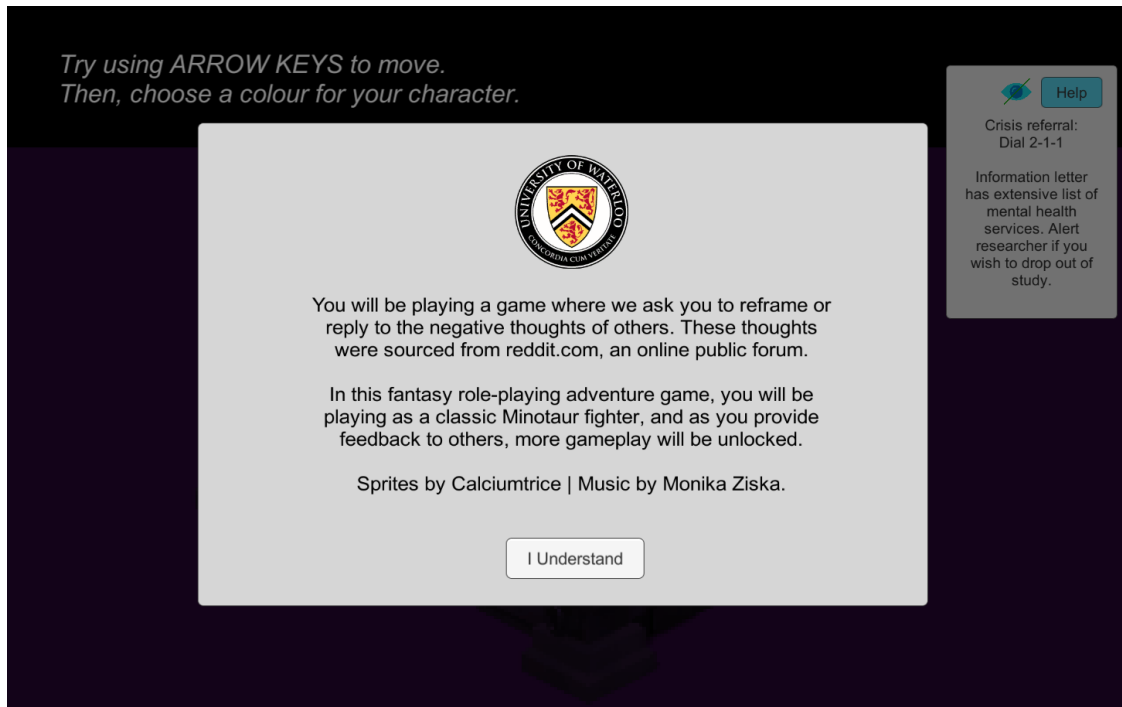
Figure 26. Opening screen of Merlynne with brief description of game, for the unhelpful (Minotaur) condition.
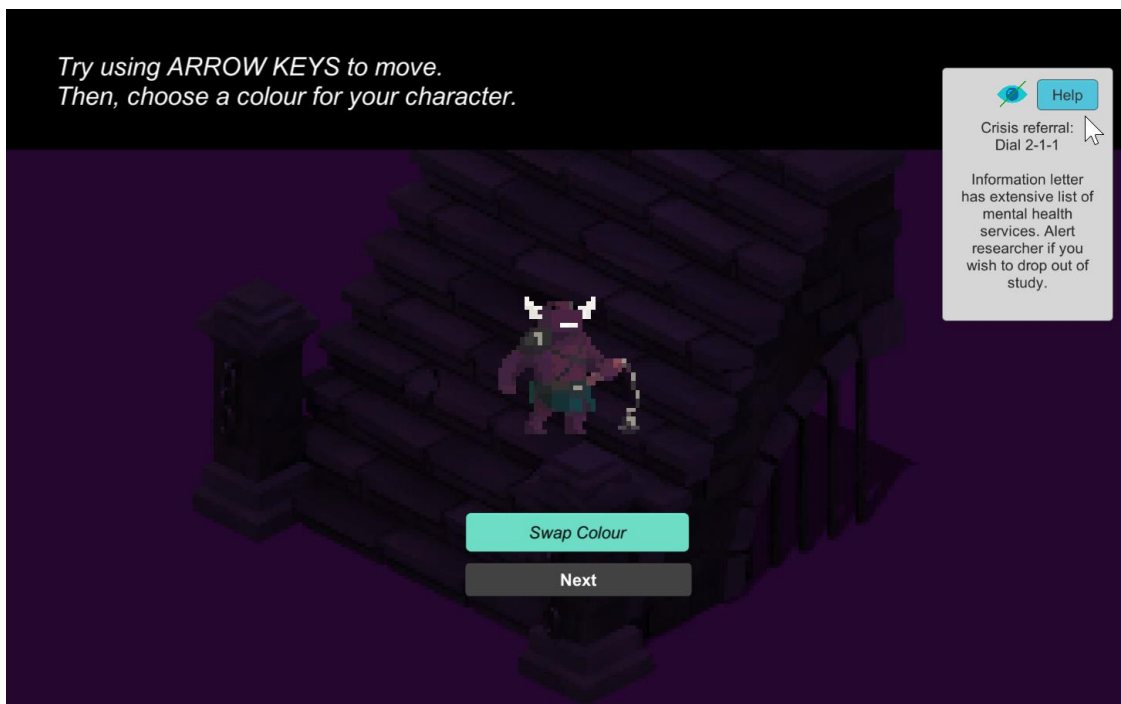
Figure 27. Player is given an opportunity to change the colour of the character. Crisis hotlines also available in a panel.
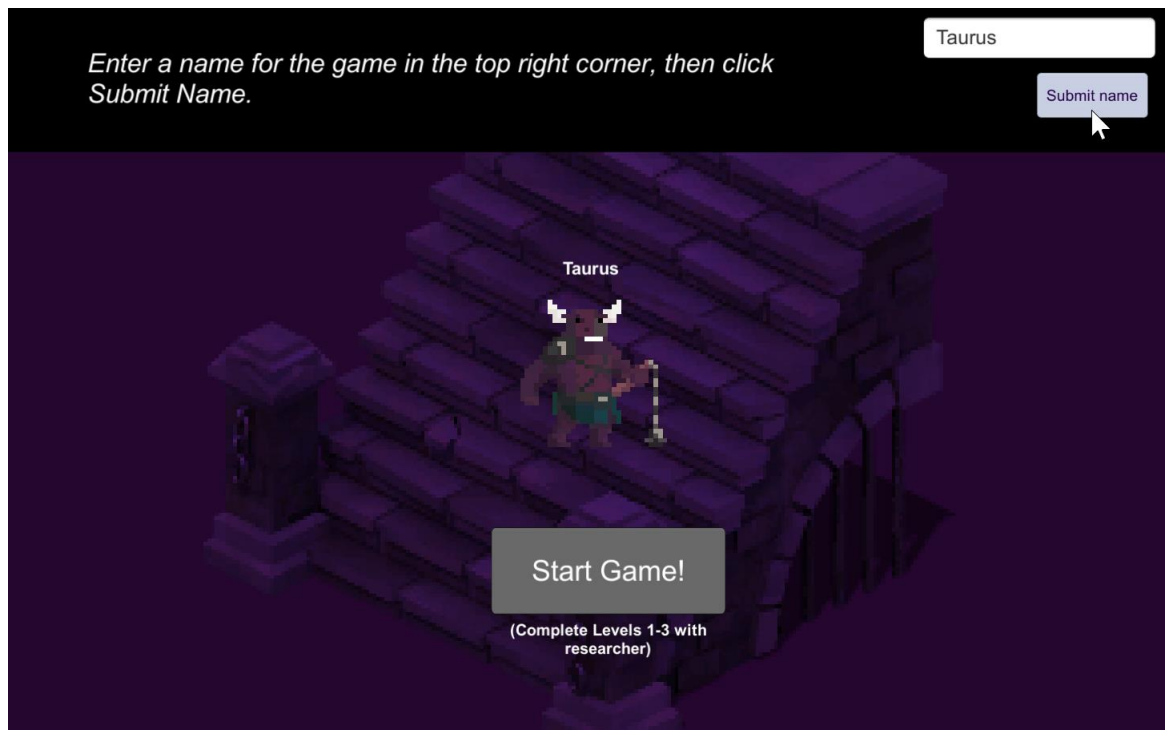
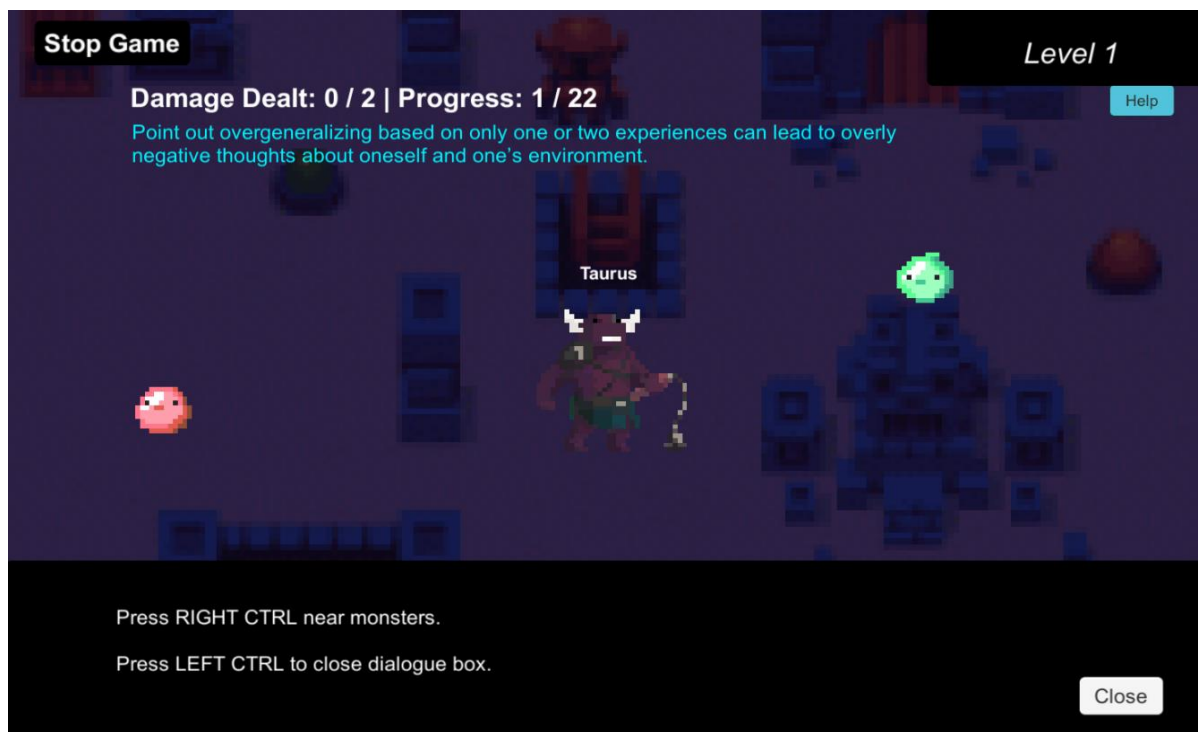*Figure 28. Player names the character, and the name appears above the avatar.*

Figure 29. Player familiarizes with controls in the tutorial levels. The crisis hotlines remain available through the Help button, and players can exit the game by pressing the Stop Game button.
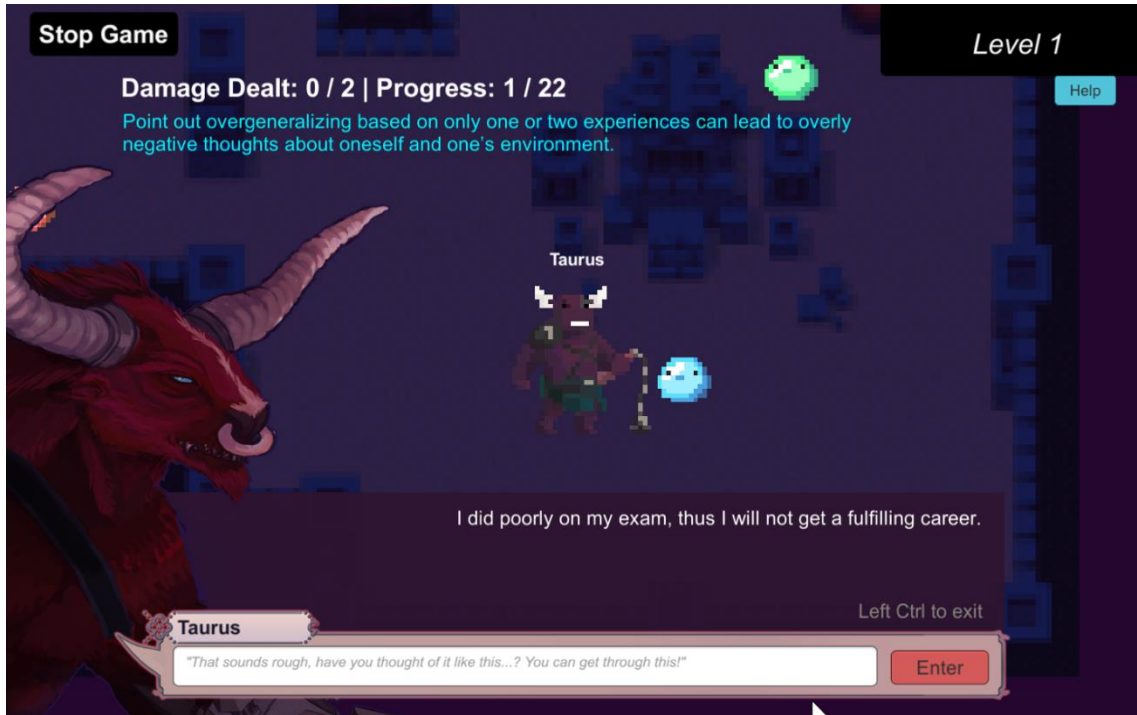
Figure 30. When Player interacts with a NPC, a dialogue opens with a negative thought query. A text input field with prompts opens for players to submit cognitive appraisals to. An illustration of their avatar also appears. If players do not wish to respond to one query, they can close it and choose another NPC to interact with.
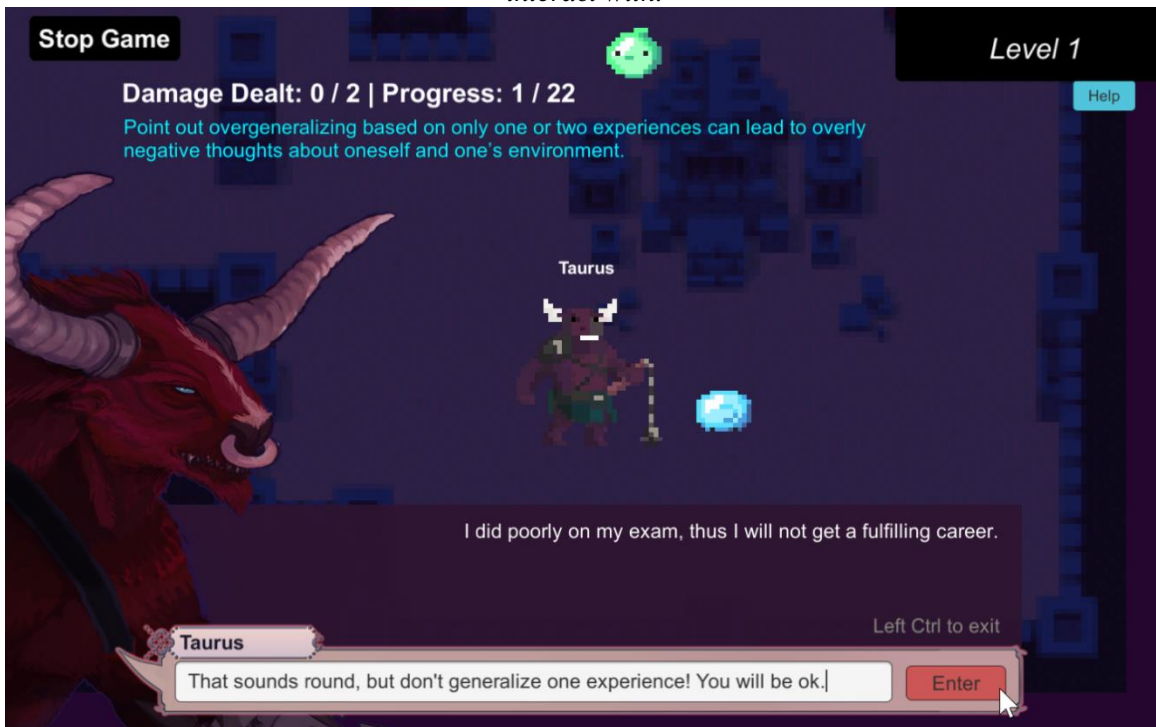
Figure 31. Following guidelines in the teal text under the progress text, players can type submissions and submit by button or Enter key. There is a different type of cognitive distortion per level and the teal text reflects the content for that level.

114
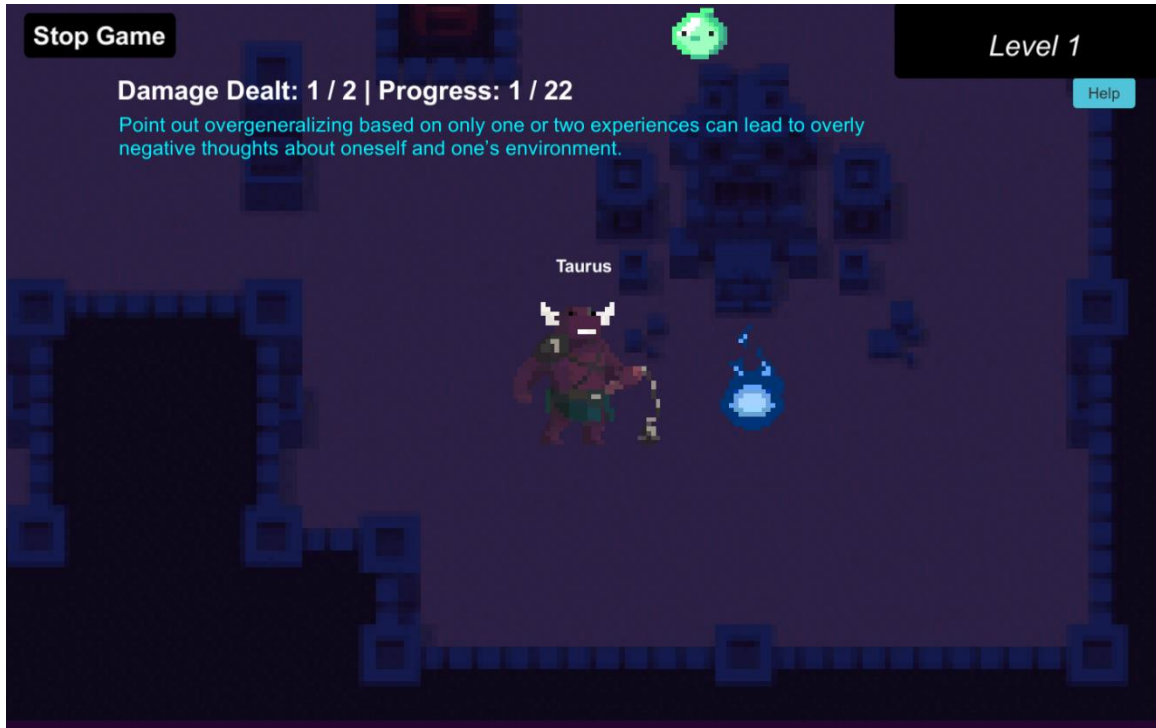
Figure 32. When submission is received, there is an audio feedback, and the NPC turns into a flame image. Progress is tracked with "Damage Dealt." Progress increases by 1 for each submission.
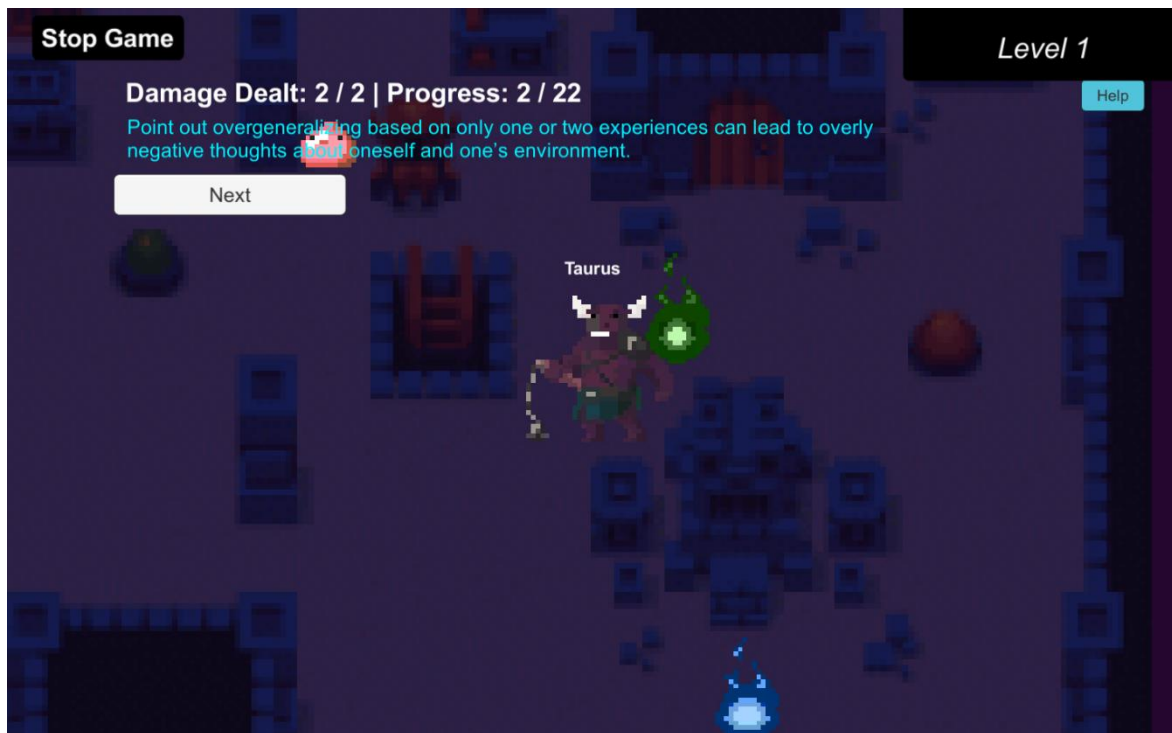
Figure 33. When two submissions are received, the next level is unlocked, and "Progress" increases by 1. There are 22 levels in Merlynne.
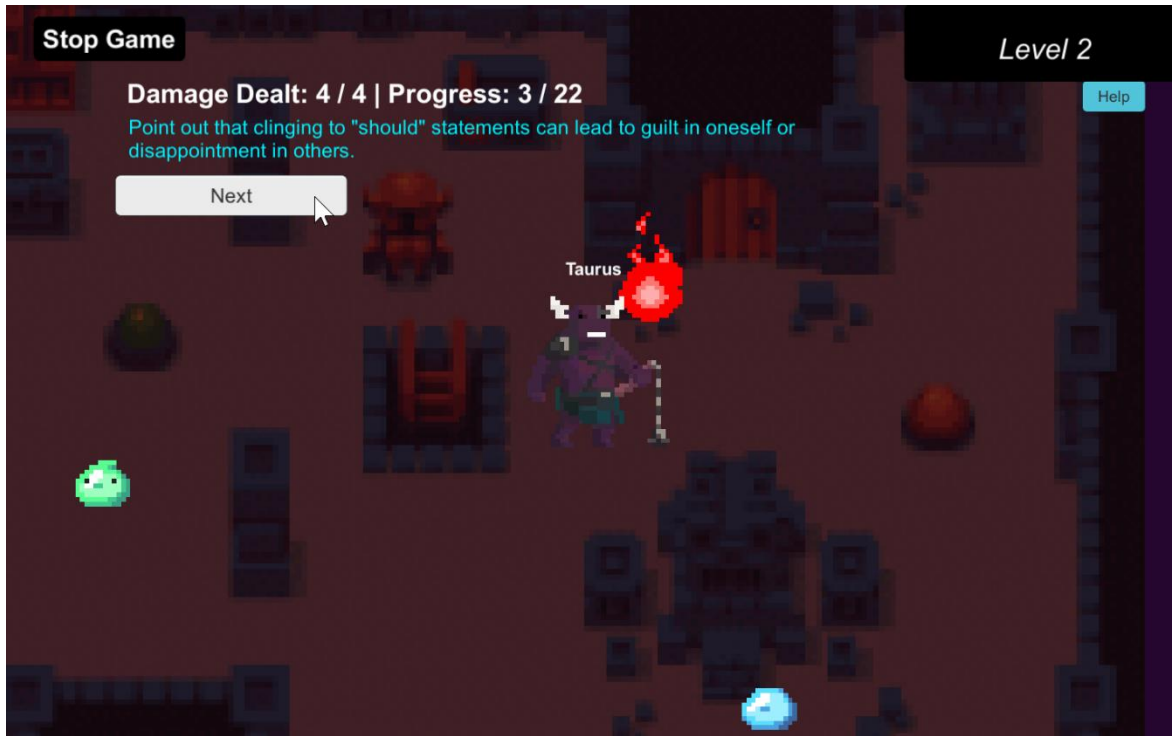
Figure 34. The current level is indicated on the top right corner. Multiple submissions to the same NPC and query can also unlock levels. But more than 2 submissions per level does not count towards progress in future levels.
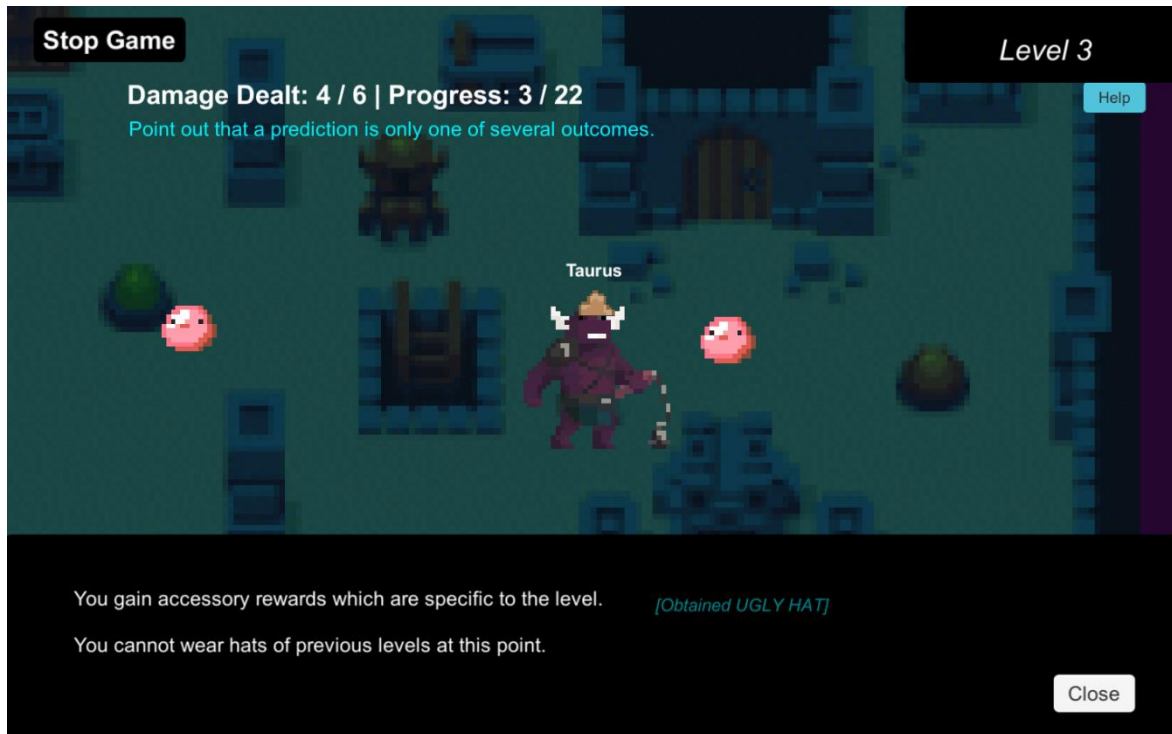
Figure 35. With each level, the avatar gains cosmetic rewards (headwear and accessories).
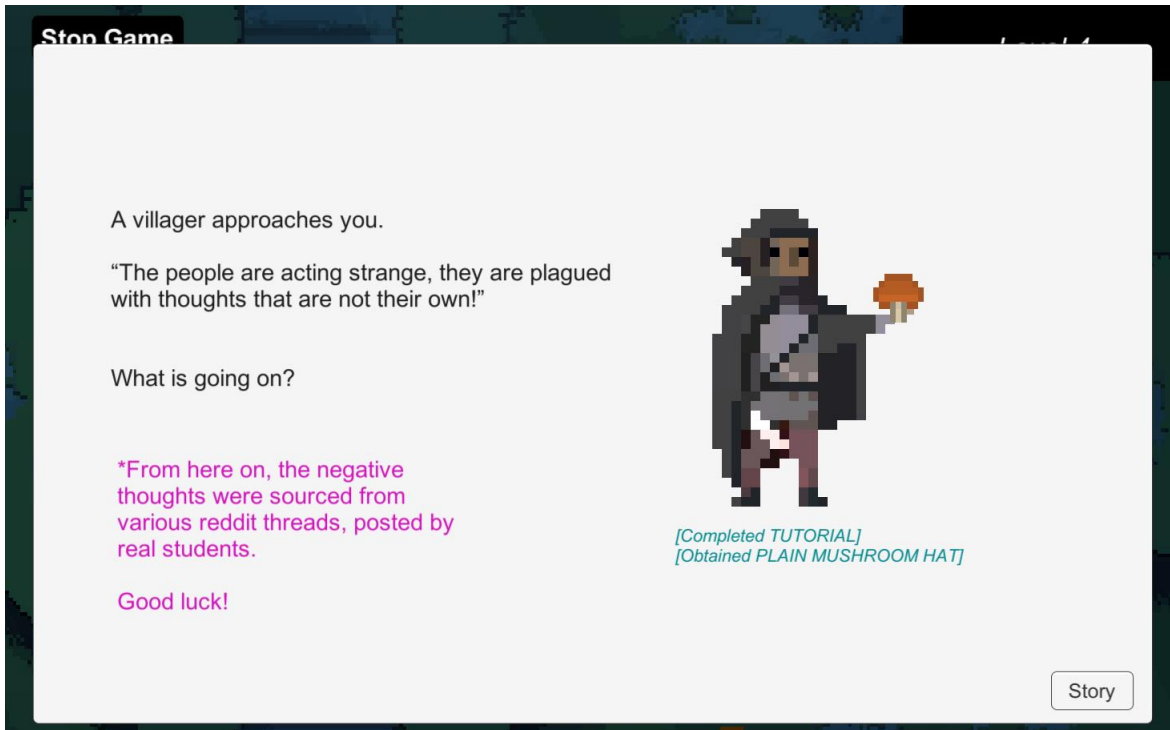
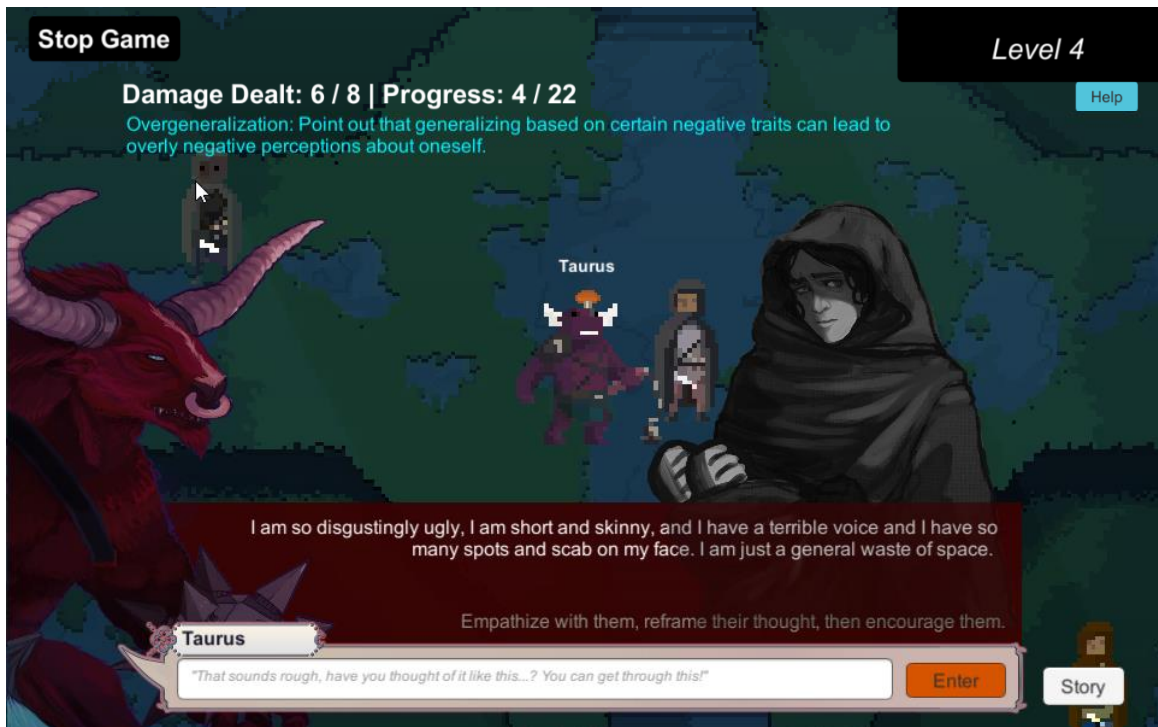*Figure 36. After 3 levels of tutorials, narrative begins.*

Figure 37. Interface is same as the tutorial, but the NPCs are humanoid characters. Background changes with each level. The narrative remains accessible with the "Story" button. The negative thought queries are now rewritten queries sourced from Reddit.
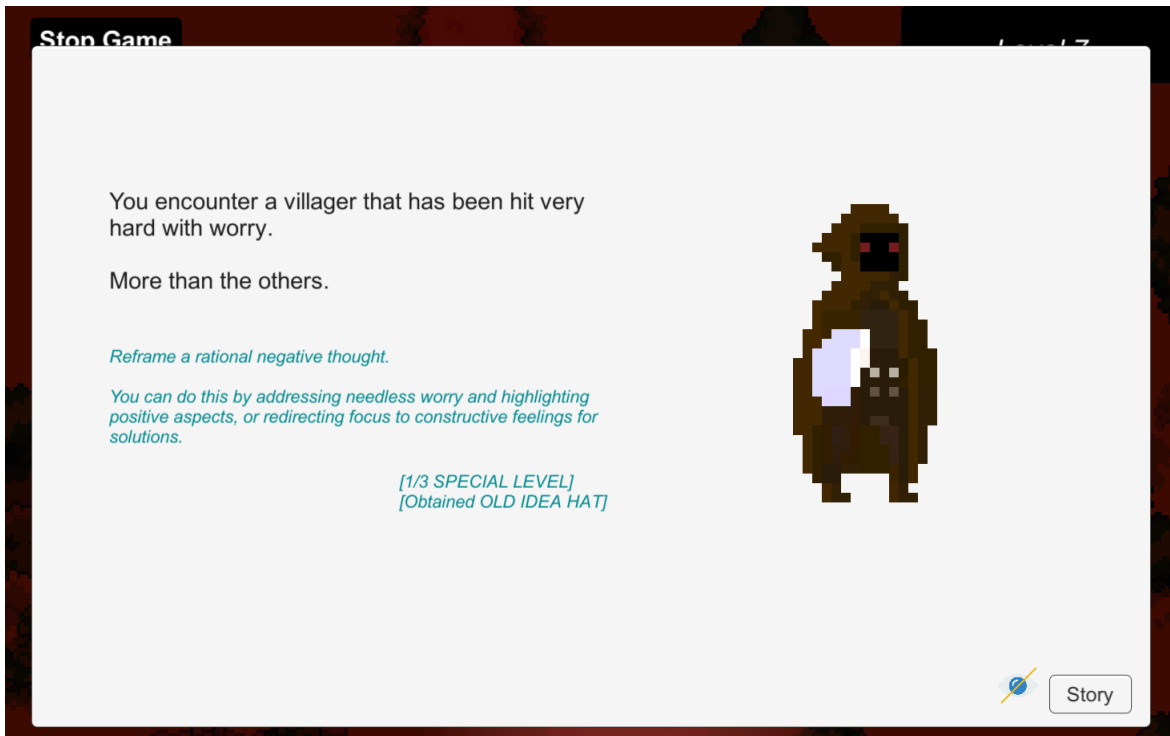
Figure 38. There are special levels where players are asked to reframe a rational negative thought, to simulate "boss levels," common in RPGs.
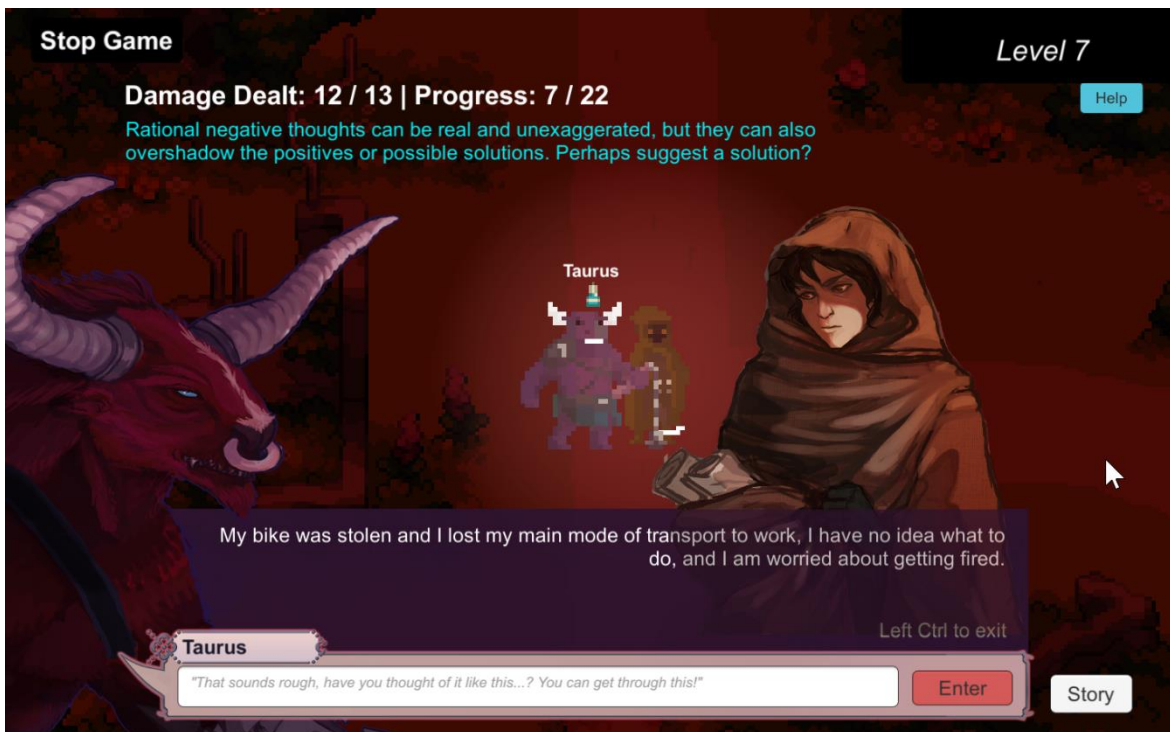

Figure 39. Special levels also have added artwork for the NPC to imply the level's significance.
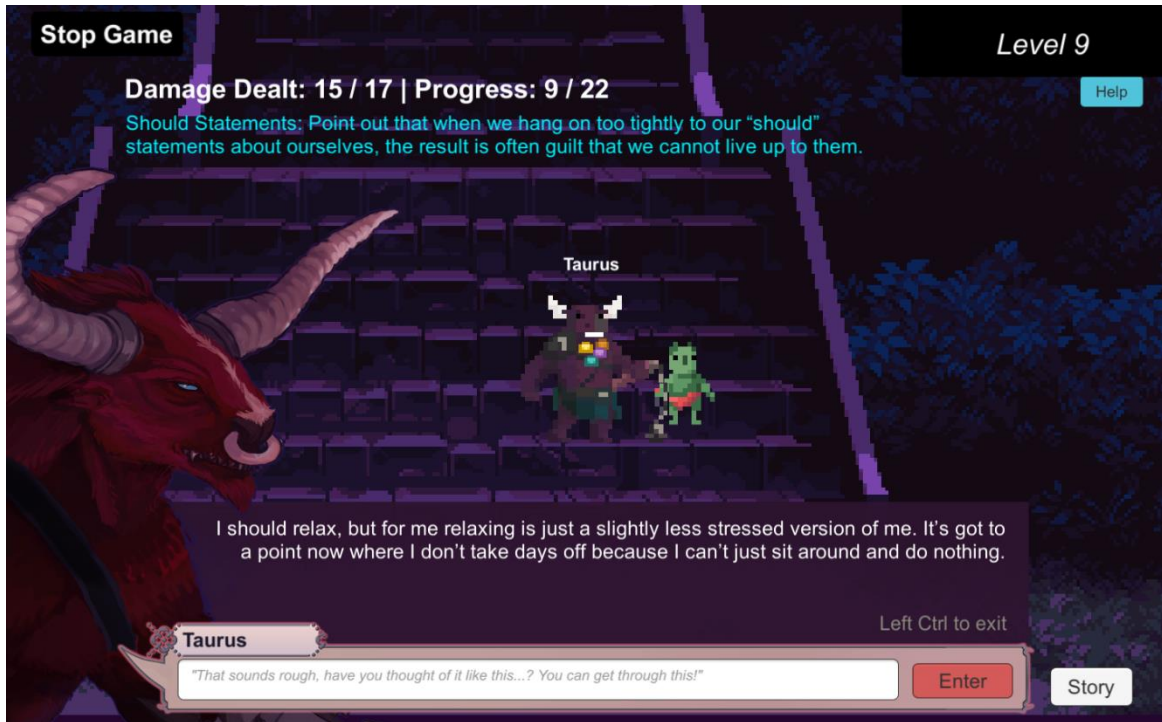
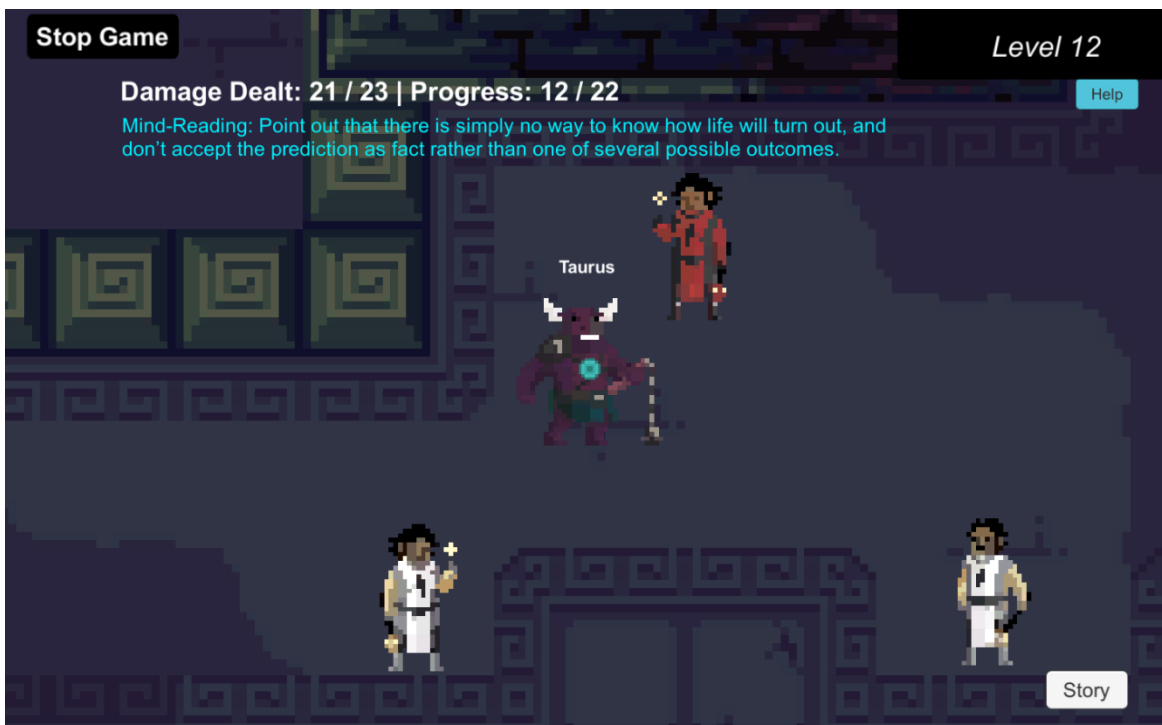*Figure 40. There are 3 levels where NPCs are not humans, but orcs. They are traditionally antagonistic.*

Figure 41. There are 3 levels where the NPCs also hold helpful stereotypes of being healers. Although NPCs' avatars are gendered based on the artist's notes for the image files, they appear gender neutral. Two healers in this screenshot are women (top middle and bottom left), but differences are almost indiscernible from the male avatar (bottom right).
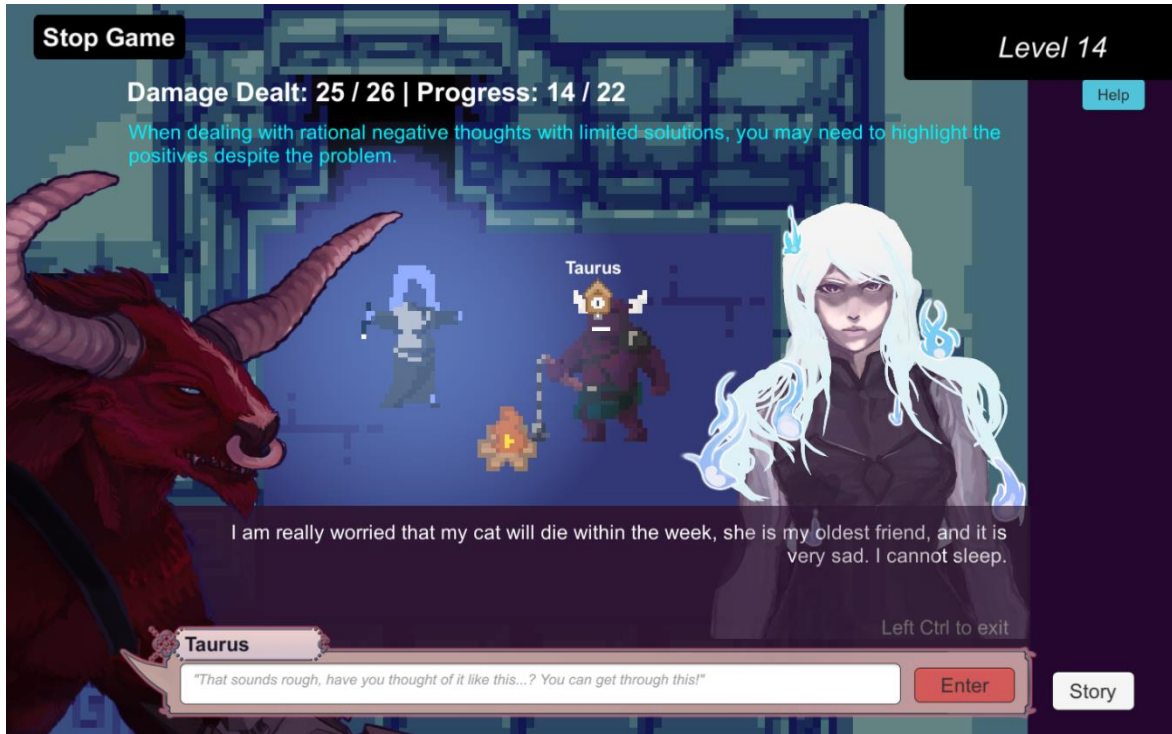
Figure 42. The second special level features artwork of the titular character "Merlynne."
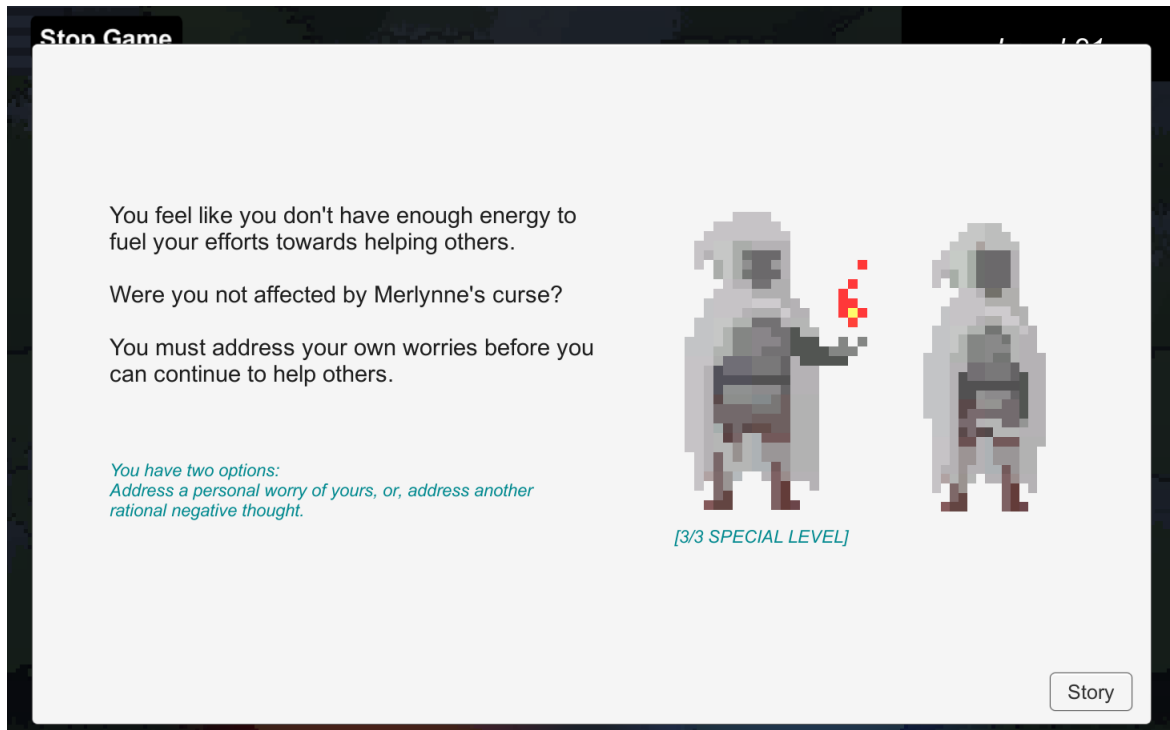
Figure 43. The last special level asks the player to give a cognitive appraisal to themselves, or solve another negative rational thought.

Figure 44. The player is not asked to write down their negative thought due to ethical limitations of collecting personal health data.

Figure 45. At the last level, players are congratulated for making it to the end.

121

Figure 46. The NPCs in the ending level all share positive thoughts and are made up of the NPC avatars the players has encountered in all previous levels.

Appendix E: Serious game design mechanics

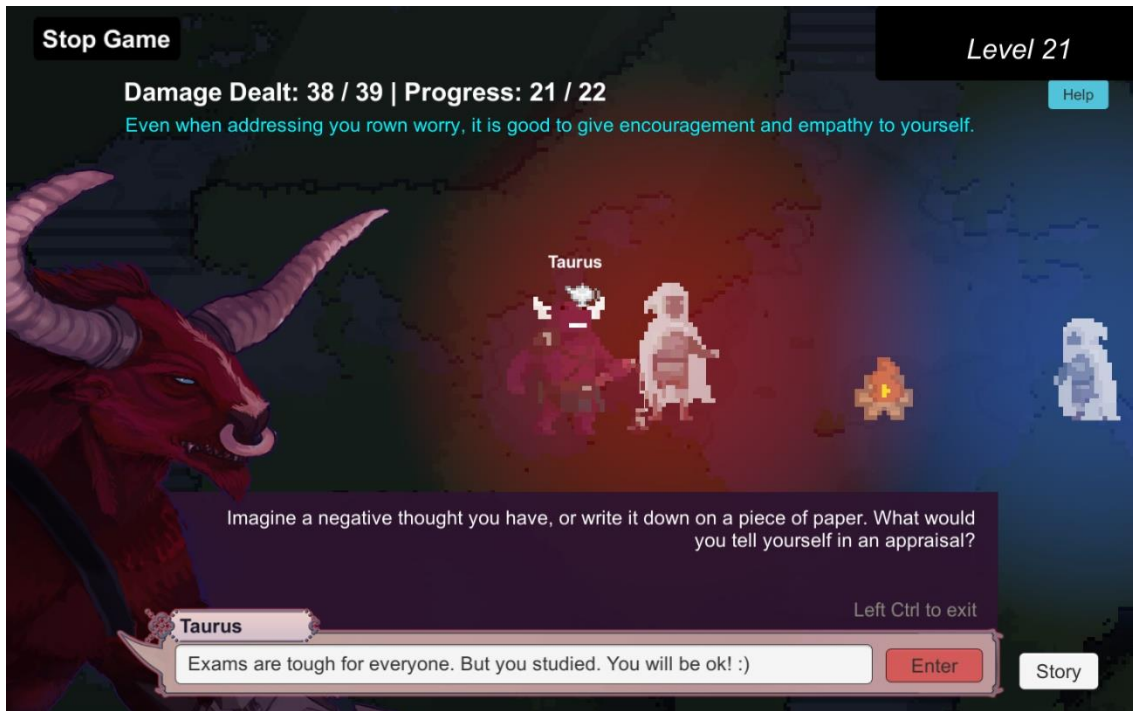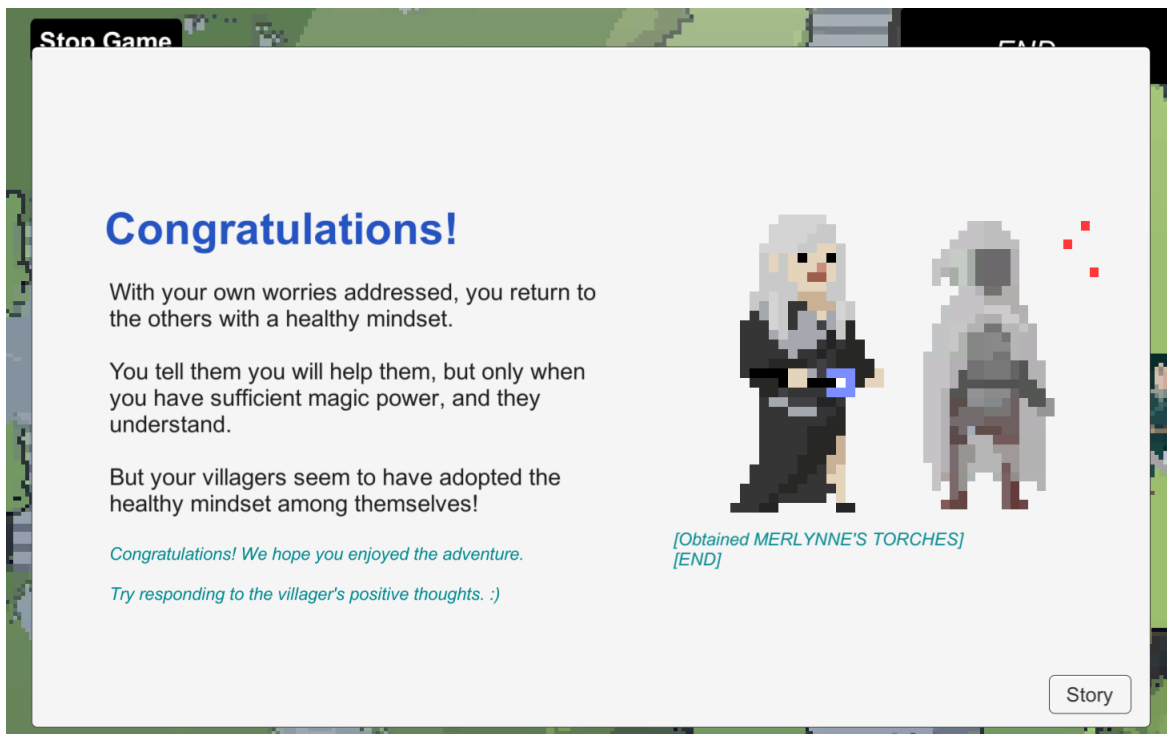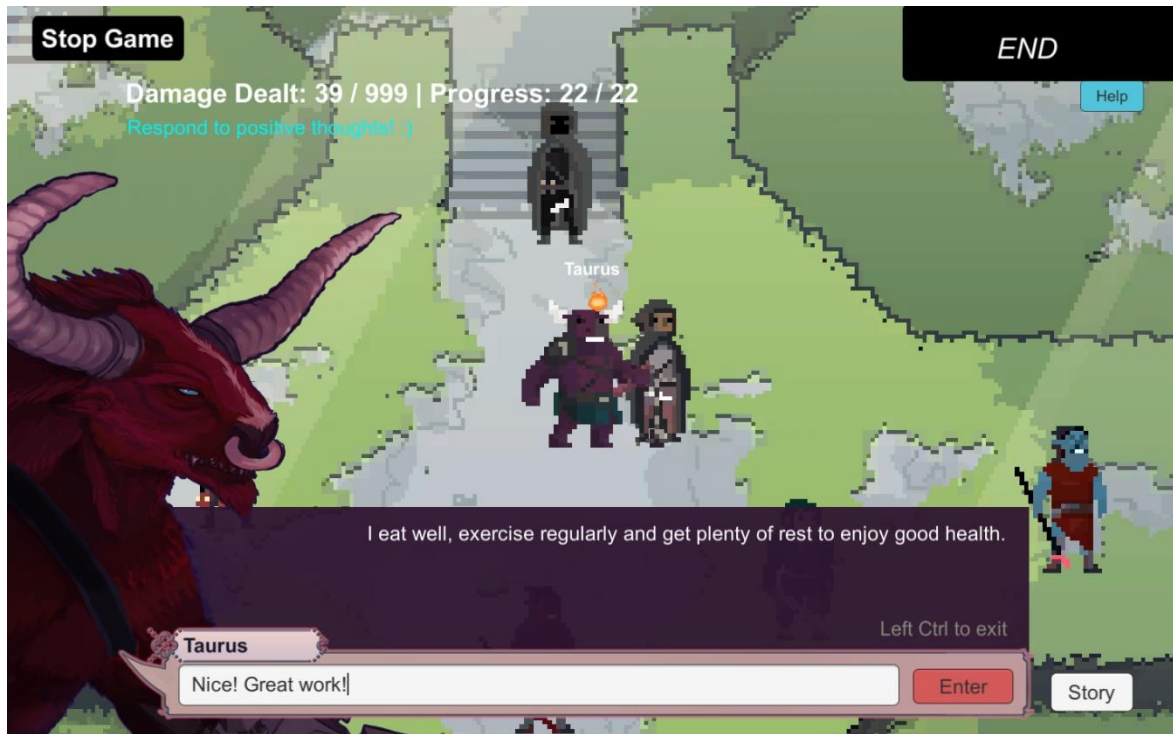| Category (Yee, 2015)	In literature (Fleming et al., 2016)	Feature (Marczewski, 2015)	Description (Marczewski, 2015)	Merlynne's Application
Achievement	Virtual Iraq, SPARX, SuperBetter, Journey to the Wild Divine	Progress	Feedback on progress is given.	Audio and visual cues are given when a submission is submitted. Progress based on levels completed and number of submissions submitted are displayed at each screen.
		Fixed Schedule Rewards	Rewards based on defined actions and events.	New cosmetics at each level.
		Unlockable/Rare Content	Offering access to new exploration and achievement.	Avatar cosmetics and maps with achievement
		Levels	Levels and goals to map player progression.	New maps and challenges
		Boss Battles	Consolidate learned content from previous levels, and signify beginning to new content.	Special levels occurred every 3 levels where players can use the practiced CBT format into situations which do not involve a negative thought.
		Experience Points	Numerical feedback mechanic on progress, can be used to unlock new things.	With each submission, there are points gained which add up to unlock new levels.
Immersion	Virtual Iraq, SPARX, SuperBetter, Journey to the Wild Divine	Curiosity	Game experience is not fully explained to encourage direction.	The narrative advances with play along with new graphics, sounds, and queries encountered in gameplay. Special levels are also kept hidden from the player.
		Exploration	Room to search for things within boundaries.	Maps

		Theme	Linked with narrative to provide gameful context.	Fantasy theme is applied with music, visuals, and narrative.
		Narrative	Strengthen understanding of story by involving players.	Player is presented a hero's journey narrative from a second person point of view where they play a titular character in the narrative.
		Customization	Tools to customize experience for self-expression.	Players can customize their avatar and name in the game.
		Investment	Player invests time, money, or feelings into a game to value outcomes more.	Emotional investment into creating submissions relevant to their daily life.
Social	SPARX, SuperBetter, Journey to the Wild Divine	Caretaking	Looking after others can be fulfilling.	Player is presented as a hero taking care of NPCs by giving emotional assistance.
		Sharing Knowledge	Helping others by imparting knowledge is its own reward.	Through query responses, players are given an opportunity to share their knowledge and experiences.
		Innovation Platform	Opportunity to think outside of the boundaries of a system.	The responses have suggested CBT formats, but they offer no restrictions if some wish to use their own wording or formats.
		Meaning/Purpose	Understand the meaning or purpose of what they are doing.	Players are aware of the real-world connection to the queries (reddit.com).
Facilitate Mastery	Virtual Iraq, SPARX, Journey to the Wild Divine	Tutorial	No manual reading needed.	First three levels were tutorial levels used to teach the player the game to assure they are able to submit CBT responses on their own.
		Signposting	Giving hints at the right time.	Prompts were given at each level to assist player with completing responses for each CBT level.
		Challenges	Testing knowledge and allowing players to apply it.	Each query gives chances to apply learning and skills from CBT format and cognitive distortions.
		Learning	Learning something new.	New cognitive distortions were introduced every few levels.
Protection	Dependent on the use case	Anonymity	Encourage total freedom through obscured identity.	Fake names allowed and encouraged in Merlynne.
		Light Touch	Rules are enforced lightly to allow disruption.	No penalty for gibberish or blanks submitted in Merlynne.

Appendix F: Semi-structured interviews

1. How do you feel after playing the game? Why?
2. What did you like about it? Why?
3. What did you dislike about it? Why?
4. Can you walk me through your thought process when you completed a submission?
   a. How did you pick a response?

Elaboration Likelihood Model

1. What motivated you to submit responses?
   a. *To know what the cues were for the behaviour.*
2. Describe the impact of what you were doing.
   a. *To know how the message was elaborated on.*
   b. *Prompt: Did you feel like you were interacting with real people?*
3. If you were asked to respond to negative thoughts on a questionnaire instead of in a game, would your activity differ?
   a. *To know if the peripheral route was used.*

Avatar Identification and Narrative Transportability

1. Can you walk me through your thought process when you were using your avatar?
   a. Prompt: To walk around, walking around the objects.
2. Describe the avatar you were using.
   a. *See if they looked at the avatar at all.*
3. Describe the character you were playing.
   a. *To understand the meanings, they associated with the stereotyped avatars.*
4. Do you see yourself as the character you were playing?
   a. *To understand their degree of avatar identification.*
5. Did you feel the responses you were giving would be something your character would say?
   a. *To understand their perception of avatar's expected behaviour.*
6. Describe the storyline.
   a. *To understand the meanings, they associated with the narrative.*
7. Did you feel the things you were doing was believable for the storyline?
   a. *To understand their perception of avatar context.*

Self-Perception Theory

1. Did you ever give gibberish or blank answers to advance the level? Why?
2. Did you knowingly give any poor advice? Why?
   a. *This is directed to the "unhelpful avatar" group mostly.*
3. Did your character's appearance change the way you chose to answer?
   a. *Directly asking if the Proteus Effect had affected their behaviour.*
4. Did you feel any responsibility in game to help the NPCs? Why?
5. Did you feel any responsibility out of game to help others in difficult situations? Why?
   a. *To know if they were primed by their character's role.*
6. Did your attitudes towards helping others change after playing the game? Why?
   a. *Directly asking if the Proteus Effect had affected their attitudes.*

b. *Prompt: Are there specific game elements that influenced this?*

Social Cognitive Theory

1. Were you aware of the format of empathizing, reframing, and encouraging when you were playing on your own?
2. How confident do you feel reframing negative thoughts?
3. Would you reframe your own negative thoughts?
    a. *To understand if there was observational learning taking place.*

Habits

4. Do you feel responsible to help other players in games?
    a. Can you describe a time you did?
    b. Were you playing as a character or as yourself?
5. Do you feel responsible to emotionally help other players in games?
    a. Can you describe a time you did?
    b. Were you playing as a character or as yourself?
6. Do you feel responsible to help NPCs in games?
    a. Were you playing as a character or as yourself?

Awareness Test

1. What do you think the hypotheses of the study was?
    a. *If the participant suspects it is about avatars, they might answer differently from how they normally would.*

Appendix G: Helping attitudes scale (HAS)

Helping Attitudes Scale (HAS)

INSTRUCTIONS: This instrument is designed to measure your feelings, beliefs and behaviors concerning your interactions with others. It is not a test, so there are no right or wrong answers. Please answer the questions as honestly as possible. Using the scale below, indicate your level of agreement or disagreement in the space which is next to each statement.

1	2	3	4	5
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree

____ 1. Helping others is usually a waste of time.

____ 2. When given the opportunity, I enjoy aiding others who are in need.

____ 3. If possible, I would return lost money to the rightful owner.

____ 4. Helping friends and family is one of the great joys in life.

____ 5. I would avoid aiding someone in a medical emergency if I could.

____ 6. It feels wonderful to assist others in need.

____ 7. Volunteering to help someone is very rewarding.

____ 8. I dislike giving directions to strangers who are lost.

____ 9. Doing volunteer work makes me feel happy.

____10. I donate time or money to charities every month.

____11. Unless they are part of my family, helping the elderly isn't my responsibility.

____12. Children should be taught about the importance of helping others.

____13. I plan to donate my organs when I die with the hope that they will help someone else live.

____14. I try to offer my help with any activities my community or school groups are carrying out.

___15. I feel at peace with myself when I have helped others.

___16. If the person in front of me in the check-out line at a store was a few cents short, I would pay the difference.

___17. I feel proud when I know that my generosity has benefited a needy person.

___18. Helping people does more harm than good because they come to rely on others and not themselves.

___19. I rarely contribute money to a worthy cause.

___20. Giving aid to the poor is the right thing to do.

Scoring:

Items 1, 5, 8, 11, 18, 19 are reverse scored. The scores for each item are summed up to form an overall score, ranging from 20 to 100. According to the author, a 60 is a neutral score.

Reference:

Nickell, G. (1998). The Helping Attitudes Scale. Paper presented at *106th Annual Convention of the American Psychological Association* at San Francisco, August, 1998.

Appendix H: Transportation scale (short form)

Table 1Aa Transportation Scale – Short Form (TS-SF)

Item No.	Item No. TS	Facet	TS-SF English	TS-SF German
1.	3.	Cognitive	I could picture myself in the scene of the events described in the narrative.	Ich konnte mich selbst in der Szenerie sehen, die in der Geschichte beschrieben wird.
2.	4.	Cognitive	I was mentally involved in the narrative while reading it.	Während des Lesens fühlte ich mich gedanklich in die Geschichte hineingezogen.
3.	6.	General	I wanted to learn how the narrative ended.	Ich wollte wissen, wie die Geschichte ausgeht.
4.	7.	Emotional	The narrative affected me emotionally.	Die Geschichte hat mich emotional berührt.
5.	12.	Imaginative	While reading the narrative I had a vivid image of *Katie*.	Während ich die Geschichte las, konnte ich mir *Katie* lebhaft vorstellen.
6.	13.	Imaginative	While reading the narrative I had a vivid image of *Joan*.	Während ich die Geschichte las, konnte ich mir *Joan* lebhaft vorstellen.

Note. Items were presented with seven-point response scales from 1 (*not at all*) to 7 (*very much*). Item numbers TS correspond to those provided by Green and Brock (2000, Table 1). Italicized names in items 12 and 13 need to be changed to the names of the main characters of the narrative.

Reference:

Appel, M., & Richter, T. (2010). Transportation and Need for Affect in Narrative Persuasion: A Mediated Moderation Model. *Media Psychology, 13*(2), 101-135.

Table 1Ab 2 Modified Transportation Scale – Short Form (TS-SF)

Item No. TS-SF	Facet	Modified TS-SF English
1.	Cognitive	I could picture myself in the scene of the events described in the queries.
2.	Cognitive	I was mentally involved in the queries while reading it.
3.	General	I wanted to learn of the outcome of the query submitter's dilemma.
4.	Emotional	The queries affected me emotionally.
5.	Imaginative	While reading the queries I had a vivid image of the submitter.
6.	Imaginative	While reading the narrative I had a vivid image of myself aiding them.

Note. This modified version of the TS-SF is intended to be administered to the control group of the proposed study experiment using a platform that does not have a narrative or a gamified element. Instead, the participants would be asked about their relatability to the queries they read.

Appendix I: Big five inventory (short form)

A Brief Version of the Big Five Personality Inventory.

Big Five Inventory-10 (BFI-10)

Adapted from Rammstedt, B. & John, O. P. (2007). Measuring personality in one minute or less: A 10 item short version of the Big Five Inventory in English and German. *Journal of Research in Personality, 41*, 203-212.

Instructions: How well do the following statements describe your personality?

I see myself as someone who …	Disagree strongly	Disagree a little	Neither agree nor disagree	Agree a little	Agree strongly
1. … is reserved	(1)	(2)	(3)	(4)	(5)
2. … is generally trusting	(1)	(2)	(3)	(4)	(5)
3. … tends to be lazy	(1)	(2)	(3)	(4)	(5)
4. … is relaxed, handles stress well	(1)	(2)	(3)	(4)	(5)
5. … has few artistic interests	(1)	(2)	(3)	(4)	(5)
6. … is outgoing, sociable	(1)	(2)	(3)	(4)	(5)
7. … tends to find fault with others	(1)	(2)	(3)	(4)	(5)
8. … does a thorough job	(1)	(2)	(3)	(4)	(5)
9. … gets nervous easily	(1)	(2)	(3)	(4)	(5)
10. … has an active imagination	(1)	(2)	(3)	(4)	(5)

Scoring the BFI-10 scales (R = item is reverse-scored):

Extraversion: 1R, 5

Agreeableness: 2, 7R

Conscientiousness: 3R, 8

Neuroticism: 4R, 9

Openness to Experience: 5R, 10

(Retrieved 7/31/10 from http://www.ocf.berkeley.edu/~johnlab/pdfs/BFI-10.doc)

Appendix J: Introductory questionnaire

Intake Questionnaire

Demographics

1. Gender: Which gender do you identify as?
    _____

2. Age: How old are you in years?
    _____

3. Education: What is the highest degree or level of school you have completed? If currently enrolled, highest degree received.
    a. No schooling completed
    b. Nursery school to 8th grade
    c. Some high school, no diploma
    d. High school graduate, diploma or the equivalent (for example: GED)
    e. Some college credit, no degree
    f. Trade/technical/vocational training
    g. Associate degree
    h. Bachelor's degree
    i. Master's degree
    j. Professional degree
    k. Doctorate degree
4. Ethnicity: Which ethnicities do you identify as? (Select all which apply).
    a. Caucasian
    b. Hispanic or Latino
    c. Black or African American
    d. Native or Aboriginal
    e. Asian / Pacific Islander
    f. Other _____

History of Mental Health and Games

5. Have you accessed mental health professionals in the last 6 months?
    a. Yes
    b. No

6. Do you have any diagnosed physical or mental health conditions which affect your stress?
    a. Yes, I have _____
    b. No

7. Are you currently on any mental health treatment plan, including medications used to manage symptoms?
    a. Yes, I am doing/using _____
    b. No

8. Have you ever held regular volunteering or work positions in a mental health field
    a. Yes, at _____
    b. No

9. How often have you played computer or console-based games alone in the past year?
   - Never
   - Only on occasion for work or school reasons
   - Only on occasion when an interesting game is out
   - 1-3 times a year
   - 1-3 times every 4 months
   - 1-3 times a month
   - 1-3 times a week
   - Every day

10. Which **fantasy media (i.e., books, games, movies)** have you played, read, or viewed in the last 12 months?

11. Have you used online platforms for emotional and mental health support? If so, which ones and were they helpful?

   a. Yes, I used _____
      i. Was it helpful?
   1. Yes
         2. No
   b. No

*Introductory questionnaire includes pre-test HAS survey, the Big-Five Inventory scale, and the Perceived Stress Scale.

Appendix K: Exit questionnaire

Exit Questionnaire

1. What was your motivation for using the platform? (select all which apply)
    a. Fulfilment of the study
    b. Enjoyment of the platform
    c. Wish to help others
    d. Something to do in free time
    e. Educational
    f. Other _____

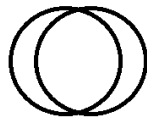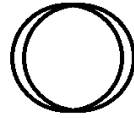2. Using diagrams below as guidance, how connected are you to your avatar?
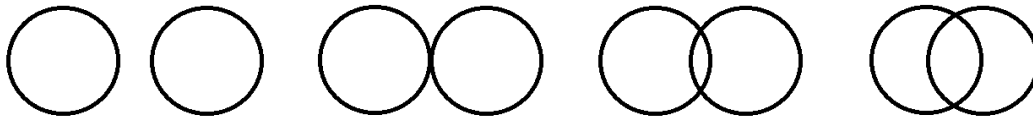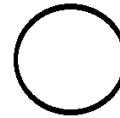

| 1. | 2. | 3. | 4. |

| 5. | 6. | 7. |

(very disconnected)   1   2   3   4   5   6   7 (very connected)

3. How likely are you to use the word ''we'' to describe you and your avatar?

(very unlikely)   1   2   3   4   5   6   7   (very likely)

4. Rate the physical similarity of your avatar to yourself:
(very dissimilar)   1   2   3   4   5   6   7   (very similar)

5. Rate the personality similarity of your avatar to yourself:

(very dissimilar)   1   2   3   4   5   6   7   (very similar)

6. Rate the physical similarity of your avatar to your ideal self (who you want to be):

(very dissimilar)   1   2   3   4   5   6   7   (very similar)

7. Rate the personality similarity of your avatar to your ideal self (who you want to be):

(very dissimilar)   1   2   3   4   5   6   7   (very similar)

8. Have you ever asked someone about their emotional or mental health outside of the study?
    a. Yes
    b. No
    c. Did not get a chance to encounter these situations.

   d. I helped with problems not regarding emotional or mental health

9. In the future, would you see yourself helping more people with problems with emotional or mental health?
   a. Yes
   b. No
   c. Only anonymously

10. Would you see yourself using the CBT format to appraise your own thoughts?

11. Do you have any final comments?

*Exit questionnaire includes post-test HAS score.

Appendix L: Guidelines for raters for response quality

Guidelines for raters developed through consensus

*Err on side of optimism if language suspected as barrier.

Empathy:

- Mention of shared experiences

- "We," "Everyone," "All ___" is a reference to empathy.

- "Majority of__" is not enough to satisfy this requirement.

- Some acknowledgement of tough situation, may not be direct in words.

Reframing:

- Focus on the negative thought presented.

- Offering another possibility/outcome also seen as reframing.

- Could be interpreted as a solution, but not necessity to solve a problem.

Encourage:

- Not always last sentence or direct.

- Anything that persuades positivity in future. Can be a behaviour.

- If in doubt, think about the intentions of the sender, and not its effects on the recipient.

- Defined as "the action of giving someone support, confidence, or hope." Focus on whether there was a deliberate action to do so.

Solution:

- Call to action required.

- Unless it is a emotional problem, then emotion based solutions are ok.

- Can overlap with reframing or encouragement.

Harmless:

- directing to put down others is not constructive. Threat to community.

- blaming others is not helpful.

- promoting self damaging behaviour (bodily or psychological harm in the short or long-term)

Procedure:

- Unhelpfulness, solution, empathy, reframing, encouragement, in that order

- At completion, revisit and revise previous answers to account for meaning of submitter's language and quirks (keep note if possible)

Appendix M: Reflexive journaling

Reflexive journal during coding process

Avatar Effects

Two people were motivated to view the content, including all 3 queries in a level, even though blanks would have been submitted on the third one, due to the seek of relatedness. This is in line with self determination theory, where social relatedness is a psychological need. The same need was cited as motivation to complete submissions, as being a part of a community of shared experiences and helping others with hopes of being supported in the future if they needed help was a motivator.

This is similar to the 'lurker' attitude, where one participant claimed it would help them validate their own stressful experiences as being shared with them. Or in some cases, it was a sense of entertainment, to read about the experiences of other people in the world or their own community.

The difference between Merlynne and forums like Reddit, is that there was a simulated one on one conversation between two people, as the dialogue box appeared with two images of the NPC and the avatar. Participants felt uncomfortable "walking away from the person," especially since it was them who had voluntarily activated the dialogue box, equated to asking about someone's wellbeing in F2F scenarios.

Overcompensation for looking like a monster

Sherrick et al. (2014) explained women overcompensated by being more cruel. Perhaps minotaur group overcompensated by being more engaged. But there is a cognitive process where they need to think before doing that.

Everyone liked learning though.

"Just being myself"

Drawing from personal experiences. Took responsibility for "real" answers true to themselves. Unlike shooting or hurting or game stuff, they wanted to be themselves.

Participants did not see themselves playing as the character, but the character was an extension of themselves in the unhelpful category.

Context of the game matters, ie shooter vs emotional investment in narrative i.e., Also game community. Worth thinking about in presentation of game, as a helper tool, or a entertainment game. Draws different types of people. Pp who want to help vs ppl who want to play the game but help. We wanted to draw the

latter but failed to present a beautiful interface. It worked for people familiar with indie game art style and wanted to help.

Relationship with the seeker matters

Is the context of real life to help eachother? Yes, but there is no time. But not all games have the requirement or culture to help others.

Peers not expected to CBT, but to give solutions. CBT only seen as a worst-case scenario

Helping in games change when stakes are high.

Real Life Simulation or Better Online Medium?

The question on whether gamified peer support is meant to add incentive to peer support online or is a simulation of real life peer support is crucial in the design of the platforms.

Two perspectives emerged from our participants. One, there was a motivation to complete more submissions due to level progression. A "completionist" attitude was mentioned by three participants, coupled with a need to complete the game honestly, meaning no blanks or gibberish answers were allowed submitted, as that would be "cheating." Participants compared the action to the dishonesty of using cheat codes in games, as to them that was also cheating themselves out of an enjoyable experience. (despite conscientiousness being low for the group).

Sekiro meme about the shame in cheating was at this time.

Two, persons were motivated to view the content, including all 3 queries in a level, even though blanks would have been submitted on the third one, due to the seek of relatedness. This is in line with self determination theory, where social relatedness is a psychological need. The same need was cited as motivation to complete submissions, as being a part of a community of shared experiences and helping others with hopes of being supported in the future if they needed help was a motivator.

This is similar to the 'lurker' attitude, where one participant claimed it would help them validate their own stressful experiences as being shared with them. Or in some cases, it was a sense of entertainment, to read about the experiences of other people in the world or their own community.

The difference between Merlynne and forums like Reddit, is that there was a simulated one on one conversation between two people, as the dialogue box appeared with two images of the NPC and the avatar. Participants felt uncomfortable "walking away from the person," especially since it was them who had voluntarily activated the dialogue box, equated to asking about someone's wellbeing in F2F scenarios.

Interaction Improvements

There were three states of mind after the game, with participants either feeling better for helping people, feeling indifferent, or feeling drained. The participants who felt drained reported that it felt like there were a constant bombardment of repetitive negative thoughts. Solutions proposed have been more gameplay unrelated to the task of negative thought reframing in order to add immersion, and to give breathers in between the characters. Ideas provided have been to more "crawling" during the dungeons, in larger maps, and also the incorporation of more actions associated with entertainment rather than solely helping people.

Narrative Immersion

Participants felt that although the narrative was in line with the fantasy genre, referencing it to themes in games that have seen before, there was a common point made that there was disconnect between the peer support queries and the greater fantasy game narrative. It broke immersion for villagers in a fantasy setting to be voicing the concerns of university students -albeit that both were relatable and familiar, they did not join.

There were also concerns that the theme of the game, with colours, story, and music, that it gave an overall impression of negativity, which made the game play stressful at times. One participant proposed more joyous elements of light colours, flowers, and smiles to motivate him to continue. Another participant liked the dreariness of the theme, but would have liked to see breaks, and more happiness than the narrative conveyed in the white boxes.

Negativatron of little big planet was referenced as a familiar narrative.

Map design and breaks between characters could be ways to give people a breather.

Feedback

As further explained in the limitations, there was no true peer to peer interaction between the player and the NPCs which held concerns of real people. Although participants felt like they were interacting with real people, there was no feedback to inform them of whether their responses were correct or well received, adding a sense of detachment. Some participants who expressed experience in machine learning and computer sciences proposed using sentiment analysis to give players a sense of success, as well as more visual feedback from NPCs' animations when a response was submitted.

Art

Participants all acknowledged that the game was a study prototype and artistic elements of sound and art could be improved for greater immersion. When asked how they would like to improve it for their own

enjoyment, some expressed that a 3D environment would offer more exploratory opportunities to be immersed.

There were also participants who appreciated the art style, explaining they played a lot of retro indie games using pixel art style, such as Dead Cells (2019).

Preference for art style was largely determinant on the type of media the participants were accustomed to seeing.

Context

In interviews with participants asking whether they would help others online, especially in the gaming context, the answer was commonly that it depends on the game and platform. Some individuals expressed distrust in some gaming communities, as it was common for players to be dishonest about their needs, for humour or malicious intent. When asked specifically about our game in our study, they explained that due to the study context, and feeling responsible to be a good participant, they felt motivated to help the people online instead of being dishonest themselves.

Sense of character

Most participants claimed they were playing as themselves, and their avatar was only a representation of themselves.

Proteus Effect and cognition

None of the participants were aware of the Proteus Effect, but many in the unhelpful avatar group stated that they were aware of the mismatch of the minotaur being helpful, and rationalized it to that anyone can be helpful, and it does not matter. This is a cognition that being helpful trumps the Proteus Effect.

One participant in the helpful group stated that because he was playing as a wise looking character, he felt he needed to be more coherent in his word choices.

One participant in the unhelpful groups stated he chose the purple colour of the minotaur over the red colour because red was an aggressive colour to him, and that if he chose a red colour, he could see himself being more blunt.

NPCS

There was no difference between the NPCs, with some citing proximity, or lack of proximity as their picking choice, or their personal preferences of NPCs, such as the

Helpfulness Change

Despite most participants claiming they would help more people in the future after the game in the surveys, interviews say that they remain largely indifferent. One participant felt like he would feel more unlikely to help others after the game, during the exit quesitonnaire, since the large volume of negative thoughts he had to read in the 30 minutes of study time wore him out, but he did not feel the effects during the interview. Another participant said that he would use the CBT template more, now that he had some experience using it.

In the same constellation as this effect, prosocial games may not influence persons to be more prosocial, like violence in games does not cause people to be more violent, unless they were violent to begin with. There was correlation between initial helpfulness and engagement, but not engagement and helpfulness change.

CBT template

Most participants were aware of the CBT format of empathizing, reframing, and encouraging, but chose to use a variation of it about halfway into their game session. The reason giving was the repetitiveness leading to boredom in play, the dis-ingenuine feeling to it due to the heavily structured format, and also the dishonesty of empathy if they did not feel they agreed with the poster's feelings.

There was also difficulty in replying without full knowledge of the poster's situation. Some participants felt they needed to establish a relationship between the person first to feel skilled enough to reply. Also, the risk of giving uninformed advice was a barrier to submission, leading to blank answers when participants felt they could not draw on personal experiences to answer.

The fear of uninformed advice was also cited as a reason some persons do not reply on public forums, in fear of misinforming the poster, or others viewing their responses.

Smithereens, black mirror, June 2019, tackled the issue of fake dialogue of empathy. Players don't feel like it is very useful.

Game of Thrones finale was the week of studies, wizard avatar looked like Danaerys who became a villain.

People don't want to play when there is no one on the other side, but they did anyways.

In war games, play as character to murder and it is not representative of the player, in helping games, play as yourself to take ownership of the positive actions.

Appendix N: Thematic mapping

RQ	Open Coding		Axial coding	Emergent Theme
Engagement in game	-Lack of consequences was demotivating and made game repetitive - feedback in visuals, or narrative - felt time sensitive in study Wanted to read to relate	-Emotional exhaustion from negativity, but kept going out of duty: -Repetitive negative lead to drained; time for exploring and refreshing asked of; might not - want to help others	Dismissal of fatigue due to altruism	Motivating fatigue dismissal
	-Game was a reason to act when otherwise wouldn't - Completionism attitude meaning they will try even when difficult (cheating bad, when games ask for it) "Did what was told of me" -abide by rules of the game **little bit of ELM, some players were entirely motivated by game	- responsibility to help as a player not as a character, must make a good response -Felt like I couldn't walk away; guilt -Motivated by real world impact	Wish to complete within game expectations.	
Attitude towards helping others	-Game increased support skills and motivated player to help a greater number of diverse people in the future; training; reworking thoughts often	-Motivated by skill (mastery, achievement, creativity), not immersion, saw impact outside of game world *not only because of game world	Felt more competent/motivated to play to be more competent	

	-Used own method of speech -Use hybrid of CBT and own method of speech -Sought relatability	-Disliked CBT since unnatural -Saw it as helpful	Desire to self-express	Self-Expression vs. CBT
	-Lack of prior relationship demotivated helping -Helping is strategic for a good experience in games -Would not help strangers, only friends, distrust in some contexts on the internet -Did not suspect disingenuity in Merlynne	-Don't know enough about poster to make good response, no discourse, no public responsibility -Use of humour and sarcasm is unsure but tempted -Trash talking is a fun part of games.	More sensitivity, less sarcasm due to unknowns	
Avatar Identification and Proteus Effect	-Disconnect between queries and narrative *extremes might be too much Ludonarrative dissonance -"Helping is another dimension in games"	-Gender difference noted, preference for avatars to look like themselves -Needs to know character to be invested	Disconnect between player and game elements, but not helping	Selective Rejection of the Game World
	-Wizard: Imagines they would be smarter than them, if they were silly, it would be different -"I was myself, the avatar was me."	-Rationalizing why they are playing as a minotaur: -Minotaur: Reimagining of stereotypes, overcompensation -Consciously did not play like avatar since it might make them rougher -"I was myself, not the avatar"	'We' versus 'me'	

Appendix O: Study materials

Recruitment Poster:

Informational Letter and Consent Form:

Interactive data exploration and analysis (IDEA) lab
School of Public Health and Health Systems (SPHHS)
University of Waterloo
200 University Ave West
Waterloo, ON N2L 3G1

<div align="center">

Information Letter and Consent Form

</div>

Project Title: Exploring designs for crowdsourced cognitive behavioural therapy

Investigators:	Tina Chan M Sc. (c)	James Wallace, PhD
	SPHHS	SPHHS
	University of Waterloo	University of Waterloo
	lt2chan@uwaterloo.ca	james.wallace@uwaterloo.ca
		519-888-4567 x 30184

You are invited to participate in a research study assessing whether a platform designed to crowdsource peer support for others' in stressful situations can be improved with gamification. The purpose of this study is to understand the strengths and weaknesses of gamification elements used. The criteria to participate, is that you must be a male-identifying individual over 18 and English-speaking.

What You Will Be Asked to Do

You are to attend a 1.5 hr session in lab with a researcher, where you will be asked to play a game, complete two surveys, and participate in an interview.

Play an online fantasy role-playing game for 15-30 mins: You will be playing a game on a computer in EC1where we ask you to cognitively appraise (reframe negative thoughts from a rational perspective) the thoughts of others. You will be given guidelines on how to do so and be given opportunities (invited to play for at least 15- 30 mins) to offer your perspective on others' situations (The queries are based on negative thoughts that were submitted to online support programs. Some participants may find the topics upsetting.) Specifically, you will be playing a fantasy game where you will be presented with negative thoughts that were adapted from queries placed on an online peer support forum and as part of the game you will be asked to reframe these negative thoughts using a given template.

Your submissions will be viewed by researchers and be stored into a bank for service improvement after the study. In this game, you will be asked to play a high fantasy (think of the genres involving swords, shields, and magic elements in popular titles like *Lord of the Rings, King Arthur,* or *Game of Thrones*) role-playing adventure where progress is dependent on your engagement in providing feedback to the negative thoughts of others. It is important to note that there are no real people (including the owners or writers of the negative thoughts) reading submissions in real time. Progress of the game (advancing narrative) is dependent on the number of submissions you submit (automatically logged by the game's code), however, we do not require a certain quality of submission and accept blank answers. Furthermore, the game design does not require completion of all queries given even if you wish to answer all queries meaningfully to advance -only a fraction of available queries per level is necessary to advance narrative for progress. There are always multiple negative thoughts to choose from and you are not required to answer them all to advance. In-game activity, such as clicks, periods of inactivity, and submissions will be recorded through Google Analytics.

*For study purposes, you will only be responding to queries of low to mild concerns, and the cases involving immediate harm to the self or others have been actively filtered out by researchers before they are shown to you. Your responses are subject to review (by software and researchers) that identifies phrases or concepts that may be of harm to yourself or others as well.

Answer Short Surveys: You will be asked to complete an introductory questionnaire on a computer in EC1 which asks about your background (e.g., gender, ethnicity) and prior history with mental health services (e.g., as a client, as a volunteer, as a provider), perceived stress (e.g., perceived ability to manage stress, perceived stress levels), and attitude towards helping others (e.g., willingness to volunteer, satisfaction from helping). You will also be completing an exit on-line questionnaire about your overall experience in the study (e.g. why you enrolled, game experience, perceived change in own attitudes). Some of the questions are sensitive in nature. You always have the option of choosing not to respond to any question by leaving it blank or speaking with the researcher if you have concerns about a question. Your identity will remain confidential and the information you provide will only be used for the purposes of the research study. Total surveys would take 30 minutes to complete.

When information is transmitted over the internet confidentiality cannot be guaranteed. University of Waterloo practices are to turn off functions that collect machine identifiers such as IP addresses. The host of the system collecting the data such Google Forms may collect this information without our knowledge and make this accessible to us. We will not use or save this information without your consent. If you prefer not to submit your survey responses through this host, please contact one of the researchers so you can participate using an alternative method such as through an e-mail or paper-based questionnaire. The alternate method may decrease anonymity, but confidentiality will be maintained.

Complete an in-person interview: Interview will take 20-30 minutes and will take place on the EC1 campus at the University of Waterloo. You will be asked details about your game experience, such as your motivations and opinions about the gameplay experience. You will be asked about previous experiences helping others, but no questions abut personal or specific mental health experiences will be asked. With permission the interview will be audio-recorded.

Participation and Remuneration

This study will span 1.5 hrs, with an expected participation of 15 -30 minutes using the platform, and approximately 30-60 minutes to complete questionnaires and interview tasks. In the study you will be educated on the cognitive appraisal techniques of CBT with opportunities for practice. All participants will receive 15 in appreciation of their time. If you wish to leave the study before the end of the study, you will still receive the $15. It is not required for you to finish the entirety of the game. The amount received is taxable it is your responsibility to report this amount for income tax purposes.

Participation is voluntary. Further, you can withdraw your data from this study at any time up to the point of publication of the research by contacting the investigators. Please note that to do so, you will need to provide your unique participant ID in this study as we do not have a master key that links students with their unique participant ID number.

Personal Benefits of the Study

The benefits of participation in this study include learning about research in human-computer interaction in general and the topic of this study in particular. Furthermore, you will be learning and developing skills in peer to peer support online which can be transferrable to daily interactions with others. You will receive additional background information about the study.

Risks to Participation in the Study

Some of our questions may be viewed as sensitive in nature. For example, we ask participants to reflect upon their current level of stress, self-perceptions, their mental health concerns (e.g., anxiety and depression), and their opinion of certain narratives (e.g. other's stressful problems). Some of the queries they may be exposed to may be uncomfortable in nature (e.g. grief, test anxiety, drug use), but it should not be of higher risk than content found on public forums.

Some participants may experience discomfort or other unpleasant feelings when reflecting upon these kinds of questions and narratives. Please keep in mind that you may ask the research assistant questions pertaining to the study such as about the usability of the game (ie. Which buttons should be used to submit answers) before you provide a response but, the researcher is unable to provide any guidance a mental health professional such as a social worker or counsellor would be trained to provide. The researcher would only be able to provide a list of mental health resources available to the University of Waterloo campus. Should you find the study content upsetting and wish to seek support, please see the list of local services.

You may choose not to respond to any question for whatever reason, you may withdraw your participation at any time without penalty, and you may speak with the faculty investigators if you have questions/concerns related to the study. Also, for students who may be interested in seeking psychological support, a list of local resources is provided in the feedback letter. Hotlines and crisis lines are always available within the game interface.

Confidentiality

You will be completing the study by an online survey operated by Google.

Your name will never be associated with your individual data, and as our research is concerned with averages across our entire sample, we will never report individual participant data. Data collected during this study will be retained for a minimum of 7 years in a locked office in a restricted area of the university. The data will be stored on a password protected computer to which only researchers associated with the study have access. Data may be deposited in an online public repository/database. Data will be de-identified (i.e. data such as names, student numbers, and certain identifying demographic information removed) prior to submission to the repository/database and will be presented in aggregate form in online publications. This process is integral to the research process as it allows other researchers to verify results and avoid duplicating research.

Please be aware that there are limits to confidentiality. If you tell us about a specific situation about self-harm or harm to others, we are ethically required to report this information to the relevant authorities. However, if a participant verbally tells about a specific situation and indicates that someone is at risk of harm to the self or others, then we are ethically required to report this information to the relevant authorities. We are required to break confidentiality if a student tells us that he/she has intentions of harming himself or herself or others, discloses information about others' mental health states with identifying information (e.g. Another student).

Results of the study will be presented (e.g., conference presentations, papers, etc.) at the group level only. It will not be possible to determine any individual participant's data from the results nor will the results of any individual be shared.

Questions and Research Ethics Clearance

If after receiving this letter, you have any questions about this study, or would like additional information to assist you in reaching a decision about participation, please feel free to ask the research assistant or the faculty investigators listed at the top of this sheet.

This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee (ORE #23209). If you have questions for the Committee contact the Office of Research Ethics, at 1-519-888-4567 ext. 36005 or ore-ceo@uwaterloo.ca.

However, the final decision about participation is yours.

Thank you for your interest in our research and for your assistance with this project.

For further questions, you may contact my supervisor, Dr. James Wallace at james.wallace@uwaterloo.ca.

Mental health resources

Psychological Services on Campus:

•   UW Counselling Services: Needles Hall Room 2080; 519 888 4567 x32655 (no appointment necessary if in crisis)
•   UW Health Services: 519-888-4096
•   Centre for Mental Health Research: (519) 888-4567 x33842 (wait list applies)

In case of Emergency or distress:

•   UW Police (available 24 hrs/day): 519-888-4911
•   Mobile Crisis Team (available 24 hrs/day): 519-744-1813
•   Crisis Clinic at Grand River Hospital: 519-742-3611
•   K-W Distress Line: 519-745-1166
•   Telecare Distress Line: 519-658-6805

Consent of Participant

By signing this consent form, you are not waiving your legal rights or releasing the investigator(s) or involved institution(s) from their legal and professional responsibilities.

I have read the information presented in the information letter about a study being conducted by Tina Chan under the supervision of Dr. James Wallace the School of Public Health & Health Systems at the University of Waterloo. I have had the opportunity to ask any questions related to this study, to receive satisfactory answers to my questions, and any additional details I wanted. I am aware that I may withdraw from the study at any time by advising the researchers of this decision.

For further questions, you may contact my supervisor, Dr. James Wallace at james.wallace@uwaterloo.ca.

This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee (ORE #23209). If you have questions for the Committee contact the Office of Research Ethics, at 1-519-888-4567 ext. 36005 or ore-ceo@uwaterloo.ca.

I give permission for researchers to audio-record the interview.

☐ YES   ☐ NO
I give permission for researchers to use anonymous quotations for this study.

☐ YES   ☐ NO
With full knowledge of all foregoing, I agree, of my own free will, to participate in this study.

Participant's Name: _____

Participant's Signature: _____

Date: _____

Witness' Name: _____

Witness' Signature: _____

Deception Debriefing Letter and Consent Form:

DEBRIEFING LETTER FOR STUDIES INVOLVING DECEPTION

Study Title: Exploring the Proteus Effect in motivating participation in gamified cognitive behavioural therapy

Faculty Supervisor: *Dr. James Wallace, School of Public health and health Systems (SPHSS), james.wallace@uwaterloo.ca, 519-888-4567 x 30184*

Student Investigator(s): *Tina Chan, SPHHS, lt2chan@uwaterloo.ca*

We greatly appreciate your participation in our study, and thank you for spending the time helping us with our research. When you began the study, you were told that the purpose of this study was to **explore designs for crowdsourced cognitive behavioural therapy (CBT)**. However, the study was more complicated than we explained at the beginning. People can be affected by online personas and virtual representations of themselves leading to attitude and behavioural change. We are interested in whether people feel motivated to help others in mental health related struggles if they were shown visual representations (ie. Avatars) in a gamified platform. Specifically, we measured if using an avatar that fits the stereotypically "helpful" character archetype would lead to higher engagement (log in sessions, session time, and word count) in comparison to those using an avatar which fits the stereotypically "unhelpful" character archetype and whether higher engagement lead to higher attitudes about helping. Prior attitudes towards helping, perceived stress, and identification with the avatar and narrative is predicted to be confounders.

Queries were all collected from public forums (Reddit) on the internet and paraphrased and modified to remove identifiers and localized to be relevant to the participant's region (Ontario), thus are partially real. Participants were randomized into an experimental group where they were given the "helpful" avatar, and a control group which is the same platform but with an "unhelpful" avatar. Submissions of cognitive appraisals will be analyzed, specifically through word count and content where we are interested in the difference in themes identified through thematic analysis of responses between the two group conditions.

We could not give participants complete information about the study before their involvement because it may have influenced participants' behaviour during the study in a way that would make investigations of the research question invalid. The reason that we used deception in this study was because we needed participants' behaviour and attitudes to be unaffected by the study objectives. We apologize for omitting details and for providing you with fictional information about the purpose of and tasks in our study. We hope that you understand the need for deception now that the purpose of the study has been more fully explained to you. We would also like to assure you that most Health Sciences research does not involve the use of deception.

We would just like to re-iterate a few things:
1. The purpose of this study was to test whether participants using avatars stereotyped to be helpful (a female wizard) would lead to higher engagement and higher attitudes for helping, if they exhibited identification with their avatar and narratives, when compared to a those using a stereotypically unhelpful avatar (a bull like monster).

2. The cognitive appraisals submitted through the game will be analyzed for content themes and word count.

This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee (ORE #23209). If you have questions for the Committee contact the Office of Research Ethics, at 1-519-888-4567 ext. 36005 or ore-ceo@uwaterloo.ca.

If any of the questions or exercises in this study caused you to feel uncomfortable, please feel free to contact **Tina Chan**, through email at **lt2chan@uwaterloo.ca**. You can also contact my faculty supervisor, **Dr. James Wallace**, at **james.wallace@uwaterloo.ca**.

Your name will never be associated with your individual data, and as our research is concerned with averages across our entire sample, we will never report individual participant data. Data collected during this study will be retained for a minimum of 7 years in a locked office in a restricted area of the university. The data will be stored on a password protected computer to which only researchers associated with the study have access. Data may be deposited in an online public repository/database. Data will be de-identified (i.e. data such as names, student numbers, and certain identifying demographic information removed) prior to submission to the repository/database and will be presented in aggregate form in online publications. This process is integral to the research process as it allows other researchers to verify results and avoid duplicating research.

Because the study involves some aspects that you were not told about before starting, it is very important that **you not discuss your experiences with any other students who potentially could be in this study** until after the end of the term. If people come into the study knowing about our specific predictions, as you can imagine, it could influence their results, and the data we collect would be not be useable. Also, since you will be given a copy of this feedback letter to take home with you, please do not make this available to other students. Moreover, because some elements of the study are different from what was originally explained, we have **another consent form** for you to read and sign if you are willing to allow us to use the information that you have provided. This form is a record that the purpose of the study has been explained to you, and that you are willing to allow your information to be included in the study.

We really appreciate your participation, and hope that this has been an interesting experience for you.

Psychological Services on Campus:

- UW Counselling Services: Needles Hall Room 2080; 519 888 4567 x32655 (no appointment necessary if in crisis)
- UW Health Services: 519-888-4096
- Centre for Mental Health Research: (519) 888-4567 x33842 (wait list applies)

In case of Emergency or distress:

- UW Police (available 24 hrs/day): 519-888-4911
- Mobile Crisis Team (available 24 hrs/day): 519-744-1813
- Crisis Clinic at Grand River Hospital: 519-742-3611
- K-W Distress Line: 519-745-1166
- Telecare Distress Line: 519-658-6805

POST-DEBRIEFING CONSENT FORM FOR STUDIES INVOLVING DECEPTION

Study Title: Exploring the Proteus Effect in motivating participation in gamified cognitive behavioural therapy

Faculty Supervisor: **Dr. James Wallace, School of Public health and health Systems (SPHSS), james.wallace@uwaterloo.ca, 519-888-4567 x 30184**

Student Investigator(s): *Tina Chan, SPHHS, lt2chan@uwaterloo.ca*

After reading the de-briefing letter, I learned that it was necessary for the researchers to disguise the real purpose of this study. I realize that this was necessary since having full information about the actual purpose of the study might have influenced the way in which I responded to the tasks and this would have invalidated the results. Thus, to ensure that this did not happen, some of the details about the purpose of the study initially were not provided (or were provided in a manner that slightly misrepresented the real purpose of the study). However, I have now received a complete written explanation as to the actual purpose of the study and have had an opportunity to ask any questions about this and to receive acceptable answers to my questions.

I have been asked to give permission for the researchers to use my data (or information I provided) in their study, and agree to this request. I am aware that I may withdraw this consent by notifying the Faculty Supervisor of this decision.

This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee (ORE #23209). If you have questions for the Committee contact the Office of Research Ethics, at 1-519-888-4567 ext. 36005 or ore-ceo@uwaterloo.ca.

For all other questions contact *Tina Chan*, through email at *lt2chan@uwaterloo.ca*.

_____
Print Name

_____
Signature of Participant

_____
Dated at Waterloo, Ontario

_____
Witnessed

Feedback Letter:

Interactive data exploration and analysis (IDEA) lab
School of Public Health and Health Systems (SPHHS)
University of Waterloo
200 University Ave West
Waterloo, ON N2L 3G1

Feedback Letter

Project Title: Exploring the Proteus Effect in motivating participation in gamified cognitive behavioural therapy

Investigators: Tina Chan B Sc.   James Wallace, PhD
                       SPHHS   SPHHS
                       University of Waterloo   University of Waterloo
                       lt2chan@uwaterloo.ca   james.wallace@uwaterloo.ca
                                                         519-888-4567 x 30184

We would like to thank you for your participation in this study. The purpose of this study is to examine associations amongst gamification techniques to the engagement and attitudes in peer to peer support systems. Participants were divided into two groups where those in an experimental group was to playtest a gamified peer to peer support platform using an avatar with a stereotypically "helpful" character archetype and the control was to use the stereotyped "unhelpful" character equivalent within the high fantasy genre.

We assessed each of the constructs of identification with visual-representations and narratives, attitudes towards helping others, perceived stress, and history of gaming and mental health using self-report questionnaires, as well as the use of Google analytics to track usage such as log in frequency, session length, and word counts to determine engagement. Furthermore, we examined the Proteus effect, to assess whether identification with one's visual representation and transportability of a narrative, would influence changes in attitudes towards helping.

Your use of our platform with answers to the survey questions will help to further our understanding about which design techniques can be applied to computer programs to motivate higher engagement in peer to peer support systems in mental health. We believe that the incorporation of gamification techniques such as narratives and avatars which hold cultural stereotypes of helpful personas will be able to facilitate the motivation and identification needed to improve participation. Identification to avatars may cause one to adopt traits of their virtual representations specifically the behaviour and positive attitude of helping others, and effective narratives would offer motivation for individuals to continue participation in a platform.

Your name will never be associated with your individual data, and as our research is concerned with averages across our entire sample, we will never report individual participant data. Data collected during this study will be retained for a minimum of 7 years in a locked office in a restricted area of the university. The data will be stored on a password protected computer to which only researchers associated with the study have access. Data may be deposited in an online public repository/database. Data will be de-identified (i.e. data such as names, student numbers, and certain identifying demographic information removed) prior to submission to the repository/database and will be presented in aggregate form in online publications. This process is integral to the research process as it allows other researchers to verify results and avoid duplicating research.

If you are interested in receiving more information regarding the results of this study, or would like a summary of the results, please provide your email address to the experimenter, and we will send you this information when the study is completed (anticipated September 2018). In the meantime, if you have any questions about the study, please do not hesitate to contact either of the investigators by email or telephone as noted above.

As with all University of Waterloo projects involving human participants, this project was reviewed by, and received ethics clearance through, the Office of Research Ethics at the University of Waterloo. Should you have any comments or concerns resulting from your participation in this study, please contact Dr. Maureen Nummelin, the Director, Office of Research Ethics, at 1-519-888-4567, Ext. 36005 or maureen.nummelin@uwaterloo.ca.

Psychological Services on Campus:

- UW Counselling Services: Needles Hall Room 2080; 519 888 4567 x32655 (no appointment necessary if in crisis)
- UW Health Services: 519-888-4096
- Centre for Mental Health Research: (519) 888-4567 x33842 (wait list applies)

In case of Emergency or distress:

- UW Police (available 24 hrs/day): 519-888-4911
- Mobile Crisis Team (available 24 hrs/day): 519-744-1813
- Crisis Clinic at Grand River Hospital: 519-742-3611
- K-W Distress Line: 519-745-1166
- Telecare Distress Line: 519-658-6805
- K-W Sexual Assault Support (24 hour line) 519-741-8633

Study Script:

Script for when participants start study in person

Hello, my name is Tina Chan and I am a Master of Science student in the Department of School of Public Health and Health Systems. I am currently working in the IDEA lab in EC1 with Professor James Wallace and doing my thesis. I am studying how games can be used to facilitate peer to peer support in mental health. This research will hopefully lead to a better understanding of innovative tools for supporting social networks.

If you volunteer as a participant in this study, you will be asked to complete an intro and exit survey which will take 15-30minutes in total, play a computer game for 15-30 minutes, and an interview for 20-30 minutes. The session should take approximately 1.5 hours of your time, and in appreciation of your time you will receive $15, which is taxable.

I would like to assure you that this study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee. However, the final decision about participation is yours.

[Participant reviews info letter and consent forms]

Please complete the introductory survey on Google Forms.

[Participant completes the introductory questionnaire on the desktop.]

Now, please play the game provided for a suggested 15-30 minutes. I will show you through the first three tutorial levels to help you with the controls, and then I will return to the desk where we filled out the forms. You can call me back at any time if there are errors with the platform. Or, when you feel like you no longer wish to play. You are not required to finish all levels of the game, but we will call you back at 30 minutes.

[Participant plays game on desktop.]
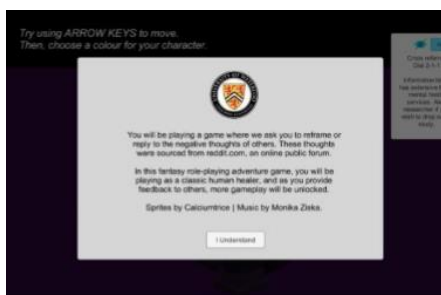
Until the tutorial is finished, keep your hands folded in front of the keyboard, and only engage when asked to. Keep in mind this is a game prototype and remain sensitive to unintended inputs. Do you understand?

You will be playing a game where we ask you to reframe or reply to the negative thoughts of others. These thoughts were sourced from reddit.com, an online public forum. Are you familiar with reddit?

In this fantasy role-playing adventure game, you will be playing as a human healer/minotaur barbarian and as you provide feedback to others, more gameplay will be unlocked.

This is not therapy, but a peer to peer platform, and you will be playing as the peer supporter. Although all the negative thoughts you will read were sourced from real people asking for advice, the responses you give in this study will not be viewed by the original posters and will instead be going into a bank for the university for potential service improvement.

Click [I understand] to close the box.

(participant performs task)
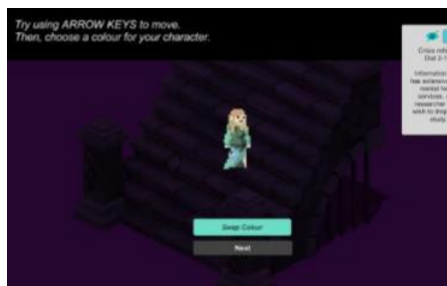
In the top right corner, there is a list of emergency hotlines. You will not need to use your phone for the study, but please keep it nearby.

Click [Help] to close the box.

(participant performs task)

Click [Help] again to open it, it will be accessible, and **close it again**

(participant performs task)

Now try using the arrow keys to move.

(participant performs task)

Click [Swap Colour] to pick from one of two costumes for your character.

(participant performs task)

When you are happy with your colours, **click [Next].**

(participant performs task)

Enter a name for your character, and then click [Submit Name].

(participant performs task)

You will see that the name appears above the head of your character. If that is the name you wish to go with, **click [Start Game!]**

156

(participant performs task)

I will be with you through the first three levels.

If you wish to leave the game, press [Stop Game]. But this erases all your gameplay, only do so when you are ready to leave this part of the study.

The top right corner shows the level number. Spells Cast/Hits Made represents the number of submissions you have submitted out of the total submissions needed to advance to the next level. Levels would need either one or two submissions to advance. But you can keep submitting if you would like, although any more would not be counted.

Under Progress, in white font, it shows how many levels are available to you out of the total 22 levels.

You will use the CTRL keys to interact in this game, with the right control to engage, and the left control to disengage. **Let's close the black box, and then engage with one of the blobs. Let's try the green one.**

(participant performs task)

Walk up next to the monster, and press ctrl right.

(participant performs task)

Here, a dialogue box opens, containing a negative thought in the dark blue part of the box. **Let's say you don't want to reply to this thought, you can hit the [left ctrl] key to exit the dialogue. Let's try doing that.**

(participant performs task)
Ok -Never hit the ESC key.

Ok, let's re-open it again.

(participant performs task)

Under your name, you have a text-input field where you can reply to the thought. Written in the box with a suggested format, where you first **empathize** with the poster -meaning you say something consoling, **reframe** the thought, which is offering another perspective on the

situation, and then **encourage** the poster. Every level has a type of negative thought, which grouped by cognitive distortion type, for this level, it is Overgeneralization for this level.

In the teal text, there are guidelines on how to reframe the thought.
For example, in this example, someone's friend did not say good morning to him so they think they don't like him. It is overgeneralized based on one experience.

To approach this, you can first say something empathetic. In the box, let's type **"That's frustrating."** -don't hit enter yet.

(participant performs task)

In the same line, let's reframe it by pointing out, "but, he may show friendship in other ways,"

(participant performs task)

and then lets finish with "you will get through it."

(participant performs task)

After the response, you can **press the [enter] key to submit it**.

(participant performs task)

Once the response is submitted, there will be some audio cues, and the other character will turn into a flame, signifying your spell was cast. In the "Spells cast" text, one will be added to the counter.

Let's do one more to advance. You can type as little or as much as you want. **Go up to another one.**

(participant performs task)

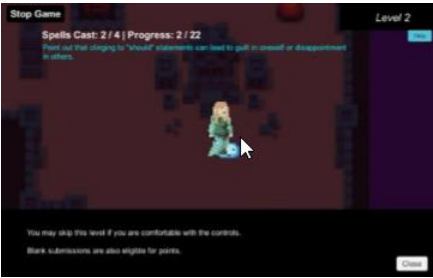I will let you do one on your own.

(participant performs task)

158

When the two submissions are sent, a button to the next level will appear, and you can see in the "progress" text that one more level is available.

Click the [Next] button.

(participant performs task)

As you can see, the spells needed to advance has increased by two, so now it is four. Your total submissions are kept tracked. There are some time where you do not wish to respond to more than one query for a level. At this time, blanks are acceptable. But copy and paste is disabled. **Close the black box and engage with another blob.**

(participant performs task).

**Ok, now just submit a blank response.**

(participant performs task)

As you can see, the same thing happens. We do not want to force you to complete submissions you do not want to complete. You can also revisit the flames and submit new responses. **Let's interact with the same flame you interacted with and submit a response to the thought.**

(participant performs task)

Now, advance to the next level.

(participant performs task)
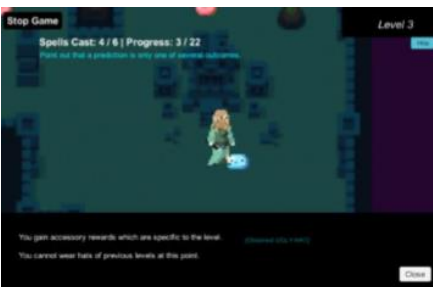
At every stage, you will get cosmetic changes for the character, in the form of hats and accessories. You cannot wear items of previous levels at this time.

Please submit two submissions, using the suggested format and the teal text as guides.

(participant performs task)

Advance to the next level.

(participant performs task)

The white boxes have narrative and outlines events. I will leave you now and come back in 30 minutes, but you may stop at any time.

[Participant finishes game on desktop.]

Thank you for playing the game, please complete the exit questionnaire on the desktop.

[Participant completes questionnaire.]

Thank you. The last part is the semi-structured interview. Your responses will be recorded with your permission.

[Researcher and participant conduct interview.]

Thank you for your participation. So, there was an element of deception involved. Although we stated we were testing how games can be used to facilitate peer to peer support in mental health, we also were testing the effect of avatars in motivating helpful behaviour. Participants were either given a female wizard or a bull like monster as their player avatar, with it hypothesized that those playing at the female wizard would contribute more helpful behaviour. The details are outlined in this debriefing form, which includes a consent form for you to fill out to indicate you understand our deception.

[Participant reads over deception disclosure.]

[Researcher explains why deception was used in the study.]

The reason that we needed to use deception in this study was because we needed participants' behaviour and attitudes to be as natural as possible. Thus, we could not give participants complete information before their involvement in the study because it may have influenced participants' behaviour in a way that would make investigations of the research question invalid. If participants knew the objectives of the study beforehand their behaviour and attitudes may have been influenced by this knowledge.

[Researcher summarizes the full purpose of the study and which aspects involved deception (e.g., use of confederates, use of false information, etc.)]

"I would just like to re-iterate a few things:

1.   The purpose of this study was to examine the Proteus Effect, and whether or not using an avatar bearing stereotypically helpful attributes would lead to higher engagement in a game where the objective is to help others and higher attitude change towards helping others.

2.   There were two groups, a helpful avatar group and an unhelpful avatar group.

3.   Your responses will be analyzed for word count and content.

[Researcher expresses regret for deceiving participants.]

We apologize for omitting details and for providing you with fictional information about the purpose of and tasks in our study. We hope that you understand the need for use of deception now that the

purpose of the study has been more fully explained to you. Do you have any questions about deception and why it was used in this study?

[Participant given opportunity to ask questions.]

[Researcher explains not all health studies involve deception.]

I would like to assure you that most health research does not involve the use of deception.

[Researcher explains who to contact if questions or concerns arise about participation in the study.]

After you leave, if you have questions, comments, or concerns about the study or any feelings of discomfort, please contact the study researchers or the Office of Research Ethics. Contact information is on the debriefing letter I gave you.

[Researcher explains reasons for not discussing study details with others and why.]

This study involves some aspects that you were not told about before starting therefore it is very important that you not discuss your experiences with any other students who potentially could be in this study until after the end of the term. If people come into the study knowing about our specific predictions, as you can imagine, it could influence their results, and the data we collect would not be useable. Also, since you will be given a copy of this feedback letter to take home with you, please do not make this available to other students.

[Researcher reiterates details from the information letter as to how the information collected will be confidentially retained and stored.]

Even though this study involved deception, the information given to you about confidentiality, data storage, and security still applies. All data collected is confidential and securely stored at all times. No one other than the researchers have access to the data. These details are outlined in the debriefing letter.

[Researcher explains why another consent form needs to be signed.]

Because some elements of the study were different from what was originally explained we have another consent form for you to read and sign if you are willing to allow us to use the information that you have provided. This form is a record that the purpose of the study has been explained to you, and that you are willing to allow your information to be included in the study. Will you allow us to use the information you provided?

[Researcher gives participant post-debriefing consent form to read and sign. Participant returns signed consent form to the researcher.]

[Researcher concludes with an expression of appreciation.]

We really appreciate your participation and we hope that this has been an interesting experience for you. Thank you again for your participation. Here is $15 for renumeration. The amount received is taxable. It is your responsibility to report this amount for income tax purposes.

[Participant receives $15 CDN in cash.]