Narrative Design for Self-Efficacy Games

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Abstract

Persistent systemic inequality leads to negative outcomes for vulnerable groups in many contexts, such as healthcare and employment. Systemic interventions are critical for long-term change, but need complementary approaches that are quick, effective, and accessible to individuals. My research explores how to support marginalized individuals and their allies to take immediate, short-term action to reduce negative outcomes for vulnerable groups.

I approach this problem through the lens of self-efficacy games. Self-efficacy, or the belief that one can accomplish a given task, is a well-known precursor of behavior change; prior work shows that games designed with self-efficacy principles in mind can provide safe environments for players to tackle real-world challenges and increase their self-efficacy with respect to tasks portrayed in the game. However, prior work has also shown that the narrative design of self-efficacy games influences their effectiveness. For example, casting the player as a character who is an expert can negatively affect their risk perception (e.g., in domains such as cybersecurity), one of the four key factors for self-efficacy interventions. My research therefore seeks to better understand how narrative design affects the impact of self-efficacy games.

To accomplish this goal, I have developed self-efficacy games in two domains: health and workplace inclusion. First, I created the visual novel *Bloomwood Stories*, which is targeted at players who have negative experiences with formal healthcare for reasons such as medical racism or language barriers, and aims to increase their self-efficacy around using informal healthcare resources such as those at their local library. In addition to producing design knowledge, I conducted a quantitative study that found that self-reported player effort predicted self-efficacy gains both immediately after play, and at follow-up one week later. Experience-taking with the non-player characters also predicted self-efficacy gains at post-test, which suggests two different mechanisms for self-efficacy change. To better understand this finding, I conducted a qualitative study to understand how players related to NPCs and the game's health resources, providing insight into the mechanisms that supported their self-efficacy.

In parallel, I collaborated on the development of *INTENT*, which aims to transform allistic workers into effective advocates for their autistic colleagues. Like *Bloomwood Stories*, this game is designed with self-efficacy principles in mind, and aims to motivate action by individuals to help mitigate the impact of systemic problems. However, *Bloomwood Stories* is designed for players who share the challenges of one or more NPCs. In contrast, *INTENT* is meant for players who do not have lived experience of autism. The NPCs must now serve a double purpose: helping players understand the experiences of their autistic peers, while simultaneously improving player self-efficacy. Given our findings that NPC experience-taking is one mechanism for impact, I conducted a qualitative study with autistic individuals to better understand narrative techniques

to responsibly and effectively represent the autistic community.

Taken together, these studies contribute to the process of designing narrative in self-efficacy games that deal with sensitive topics for marginalized communities. By examining the distinct roles that NPCs play across contexts, and identifying mechanisms such as effort and experience-taking, this work advances our understanding of how games can support behavior change through narrative and design.

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Figure 1: Miso, Ella, Grandma and Luka, Luka

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Chapter 1

Introduction

1.1 The Context of Systemic and Interpersonal Inequality

Persistent systemic inequality in organizations and industries can lead to severe consequences for vulnerable groups. One approach organizations use to address this is creating training materials with knowledge and/or proposed actions that will help reduce inequality. These materials might be targeted to the vulnerable group, such as encouraging Black and Hispanic women to get mammograms. Alternatively, they might be targeted to those in positions of systemic power, such as teaching managers to use equitable hiring processes. Either way, these materials require individuals to learn, process, and take action independently.

Unfortunately, creating materials is not enough to produce change. There are many steps between receiving a learning resource, and taking action based on it. The mere existence of such materials does not mean that individuals are able to take action, let alone that the actions will be effective or sustained. This is known as the knowledge-behavior gap.

Failure to address the knowledge-behavior gap creates several problems. First, money and other resources are wasted because the resources are ineffective at creating behavior change. Second, if the organization does not understand why their resources have failed to motivate action, they may double down and continue to spend money on ineffective approaches. Finally, it can result in the organization blaming the individuals who are not responding to their efforts, rather than taking systemic action.

1.2 The Knowledge-Behavior Gap

The translation from the awareness of knowledge to realized action is challenging because the individual can have the knowledge but not be able to use it in an actionable way. One model for understanding this challenge is the knowledge-behavior gap, which describes the translating of knowledge into a realized behavior [46]. The knowledge-behavior gap describes the challenge that is figuring out the type of engagement which translates knowledge into behavior, rather than just providing factual or procedural knowledge.

We know there are factors that make it more likely for people to be able to translate knowledge into action. Self-efficacy is an individuals' belief in their own ability to accomplish a certain task or goal [9]. Bandura proposed building self-efficacy for changing self-directed behaviors, including in the domain of personal health, requires providing opportunities to: 1) access, interpret, and apply information about a particular behavior (including information about risks and benefits); 2) the opportunity to learn and develop skills; 3) guided practice in acquiring and exhibiting those skills and 4) a strong network of support for providing emotional and instrumental support [8]. When an individual has a high level of self-efficacy, they have a higher confidence in their ability to translate knowledge into action. When they have a low level of self-efficacy, they might be more prone to experiencing the knowledge-behavior gap.

It's important that we close the knowledge-behavior gap, and others have tried many different methods for various contexts. People have attempted to address the knowledge-behavior gap using different techniques. For example, it's important to practice the action of the desired behavior, and it's important to be practicing in context. I am interested in how to effectively design experiences that embody these principles, and want to contribute new knowledge to address the barriers people face in being stuck in the knowledge-behavior gap.

1.3 Transformational Games for Behavior Change

I explore the knowledge-behavior gap through single-player narrative games that affect self-efficacy. Single player games allow the player to explore the game independently and experiment privately with game systems. They can access information at their own pace, learn new skills, and practice those skills without worrying about how others might perceive their performance. Without the social pressure of a multi-player game where additional players can view and potentially judge the decisions and actions, the player should feel more at ease to make mistakes and test solutions and their outcomes. Additionally, single player games have deployment advantages: for example, players may download a single player mobile game to their phone so they are not using data during play. In Bandura's theory, social support is the fourth suggested opportunity for building self-efficacy. While single-player games do not provide social support from other humans during play, they can engage social support in two ways. First, they can provide vicarious experiences for later discussion and community-building. Second, they can incorporate social support from non-player characters (NPCs). In a single-player game, these are computer-controlled characters that are integrated into the game narrative, who can model what social support might look like.

Narrative games have demonstrated value for instilling new knowledge, attitudes, and behaviors in ways that mitigate the potential psychological threat of confronting self-relevant information (such as gaps in knowledge or skills). For example, highly transporting stories and games have been shown to make readers and players more receptive to new information and perspectives [38], and deep connections with the characters one embodies in games can promote the internalization of beliefs and behaviors that persist outside of the game [50]. The psychological distancing afforded by narrative- and character-driven games is particularly important for engaging players with sensitive topics [49] and, moreover, aligns with recommendations for designing culturally sensitive health interventions for (and with) marginalized population [29, 35, 47].

Self-efficacy games can contain information in any domain that involves the player engaging

with the domain material. For example, a growing body of work has focused on the design of evaluation of serious games developed as health interventions, with self-efficacy theory being one of the most influential forces guiding their design [55]. Self-efficacy games provide a low stakes environment for players to test out behaviors. The skills they can trial demonstrate examples of outcomes they might experience outside the setting of the game. For example, *Hacked Time* is a self-efficacy desktop game that aims to instill improved cybersecurity behaviors in players by putting them in the role of a time-traveling detective who advises college students about cybersecurity risks and provides guided practice in improving skills such as creating secure account passwords and utilizing two-factor authentication. A randomized control trial showed that the game was effective at increasing players' cybersecurity knowledge and self-efficacy [22].

In this case, I am particularly interested in mitigating systemic inequalities which is why I am focused on individuals reframing their perspectives. We cannot change the system but we can change how individuals interact with it. In learning how to engage with the resources and apply knowledge into action, I hope that individuals can reframe their perspective on relationships with people and institutions outside of the learning experience.

1.4 Preview of Future Chapters

In Chapter 2, I discuss the background and the related work. First, I will provide the transtheoretical model of behavior change which is the framework that we use for motivating closing the knowledge-behavior gap. Second, I discuss the barriers and opportunities for each stage of the model. Finally I will discuss the design principles which integrate the opportunities into our interactive experiences. In particular, I identify opportunities to integrate self-efficacy theory into the design of single-player narrative games, with an emphasis on the role of the player character (PC) and non-player characters (NPC).

In Chapter 3, I discuss the design and development of *Bloomwood Stories: Block Party*, an award-winning single player narrative game. The game aims to increase players' health self-

efficacy, with a particular focus on players from historically marginalized communities. In the game, the player character (PC) is a trusted community advocate who helps their neighbors solve problems before the Block Party at the end of the week. At the beginning of the game, the player can choose one of five non-player characters (NPCs) who need their help. This NPC will ask the PC for help with health-related quests. During one in-game week, the player alternates between two activities: talking to community members in a visual novel format, and making suggestions to the selected NPC to solve the active quest. In chapter 3, I provide a deeper explanation of the design, and link the design principles to how my team and I exercised them in the game.

In Chapter 4 I report on a quantitative study on *Bloomwood Stories* and self-efficacy. This work discusses the relationship between the player's amount of effort in the game to their ability to take the perspective of different NPCs in the game, and the relationship between perspective-taking and self-efficacy.

In Chapter 5 I describe a qualitative study which augments the quantitative work on *Bloomwood Stories*. I explore the relationship between players and their communities and how the game causes individuals to reflect on their relationships within and to their community. This study builds on the evidence from the quantitative study, including a further investigation of the relationship between the player and the different roles in the game, understanding the players' perceptions of their own support networks and systems, and questioning whether or not the game had an emotional impact on the player.

In Chapter 6, I describe the design of another game I collaborated on: *INTENT*, a game which aims to transform allistic workers into effective advocates for their autistic colleagues. Given our findings that NPC experience-taking is one mechanism for impact from the Bloomwood study, I describe a study with autistic individuals to better understand how to design effective characters for self-efficacy games where the behavior change is not aimed at the vulnerable group.

In Chapter 7, I conclude this dissertation with themes across both *Bloomwood Stories* and *INTENT* and provide design implications for future game design directions.

1.5 Contributions

This dissertation aims to have three contributions. First, playable experiences which are deployed within the communities of interest, using design methods that align with my values. Next, I seek to empirically investigate the effect the games have on the community through quantitative and qualitative measures. Finally, I contribute design principles for designing experiences that seek to increase players' self-efficacy.

Chapter 2

Background & Related Works

2.1 Marginalized Populations' Experiences in Healthcare

Marginalized communities such as racial and ethnic minorities, low-income populations, and members of LGBTQ+ community experience negative effects related to their social determinants of health [7]. Social determinants of health are social, cultural, political, and economic factors with important direct or indirect effects on health [15]. For example, the 2016 National Healthcare Quality and Disparities Report found that Hispanics in the United States experienced worse access to care compared with Caucasian patients for 75% of the measures included in the study, such as effective treatment and care coordination [101]. A study with women with chronic illness found that providers who used their power inappropriately, such as consistently withholding information, caused women to feel a loss of control over their lives [37]. Studies have found that Black patients are prescribed less pain medication, simply on the bias that these individuals experience pain differently [95]. The patient provider relationship can provide discomfort for marginalized group members when asked invasive questions about race and ethnicity that stem from provider biases like being asked "'How much' native I am, but I'm never asked how much of anything else I am" [88].

As a result, historically marginalized communities may be reluctant to seek formal healthcare. For example, gay veterans avoid seeking care from the Veterans Health Care Administration due to concerns about stigma [85]. Bias toward LGBTQ+ community has caused lesbians to screen for cervical cancer less often than the recommended rate [98] which may cause increasing negative outcomes over time such as negative health outcomes for the lesbians in question as well as a lack of research available about the health of LGBTQ+ populations [48]. Studies have

shown that women who experience inappropriate use of power and control in patient-provider relationships were less likely to ask questions, reveal important information, or follow through with the recommended treatment [37]. African American individuals worry about participating in biomedical research due to the fear that their DNA data may be used in later criminal investigations to implicate innocent people [18]. This produces worse outcomes for marginalized groups in healthcare.

There are systemic approaches to addressing this problem. For example, the dismantling racism framework is an antiracist community organizing strategy to provide equitable healthcare to patients by training providers and acknowledging and respecting racial differences through workshops [39]. These approaches are effective but they take a long time to implement and people need access to quality healthcare immediately. Additionally, the individuals directly affected by medical discrimination are not always able to lead these systemic changes, particularly if they are medically vulnerable and have limited time or energy. Finally, these approaches do not necessarily address the psychological barriers resulting from prior violations of trust. Therefore, we need complementary strategies that are immediately effective, within the power of affected individuals to accomplish, and that take psychological factors into account. A review of 85 internet-based health behavior change interventions, researchers found that those that offered multiple strategies for change were the most effective [104].

A complementary strategy that is often used to address this problem is health communication [33, 89]. Health communication can be used to encourage marginalized populations to seek care [90], to raise awareness of alternate resources [86], or to communicate self-care strategies that can address health issues [94]. Similarly, health communication can take many forms, such as social networking sites [83], and even empowered storytelling [94]. The health communication strategy effectively addresses the weaknesses of systemic approaches. Health communications can be deployed relatively quickly, they seek to inform and empower the affected individuals, and they can address psychological factors such as lack of trust. Unfortunately, the

health communication strategy faces a major challenge: translating knowledge into behavioral change, also known as the knowledge-behavior gap [46].

2.2 Behavior Change

The knowledge-behavior gap describes the challenge of translating a person's knowledge and intentions into a realized behavior [46]. The transtheoretical model of behavior change (TTM) models this transition in multiple stages that focus on the decision-making abilities of the individual to make intentional change [103].

2.2.1 The Transtheoretical Model for Behavior Change

The transtheoretical model of behavior change (TTM) provides a generalizable model for how individuals change their behavior over time. It is particularly helpful as a lens to empower behavior change in marginalized communities due to three key elements of this model: generalizability to varying domains of behavior change; a conceptual approach that behavior change is dynamic rather than linear; and a set of six stages that represent the dynamic process of behavior change over time.

First, the TTM addresses behavior change across a wide range of domains, such as health, productivity, and relationships. It applies to any behavior where the individual can voluntarily make a choice, and then attempt to carry it through in practice. Examples of such behaviors in the domain of health include the goal to stop a harmful behavior, like quitting smoking [74], or the goal to start a healthy behavior, like starting an exercise routine [58].

Second, the TTM understands behavior change as a complex process rather than a linear progression from one state to another. It is not an "all or nothing" phenomenon [59]. Instead, the TTM allows us to see the complexity of people's behavior change process: having the idea to change, trying to change, failing, trying a new strategy, and so on. In domains where individuals

experience systemic barriers to behavior change it may be particularly empowering to view behavior change as a non-linear process. This is because, from the perspective of the TTM, failing is a normal and expected part of the process. The process can be picked up at any point that an individual feels ready to pursue change.

Finally, the TTM identifies six specific stages in the overall behavior change process. These stages are precontemplation ("I don't need to change"), contemplation ("I could change"), preparation ("I'm getting ready to change"), action ("I'm making a change"), maintenance ("I'm sustaining a change"), and termination ("I've changed") [74]. These stages provide analytical constructs for understanding the differences over time in a behavior change process, and in particular for understanding the transition from knowledge to action.

The knowledge-behavior gap is most related to those stages of the TTM where people have not yet successfully transitioned to action. They may know what they want to do, but are not yet reliably doing it. For that reason, this literature review will focus on the first three stages of the TTM: pre-contemplation, contemplation, and preparation, which lead up to taking action.

2.2.1.1 Pre-contemplation

"I don't need to change" [105]. The first stage of the TTM is precontemplation. As the name of the stage suggests, this stage describes an individual before they are considering behavior change. One reason they may not be considering change is due to a lack of awareness of a need for change. For example, in the context of participating in social justice, individuals in precontemplation are not thinking about participating in social justice work, "are not aware that a problem of inaction in the face of oppression may exist," and have the "tendency" to be unaware [63]. One study on intimate partner violence described a woman in precontemplation by her quote: "I still haven't accepted [that it's abuse]. No way – it hasn't come down on me yet" [16]. In precontemplation, women did not yet identify their partners with the term "abuse" and even described their relationships as normal [107]. In the context of health, precontemplation

includes adults who state they did not currently exercise and did not intend on starting to in the next 6 months [58].

Individuals in the precontemplation stage may not notice there's a behavior that could be changed, and therefore they are unable to change due to the lack of awareness [105]. This may be due to a blindspot in their self-perception or their understanding of the situation, as in the intimate partner violence example.

To address this issue, individuals must increase their awareness of a need for change. Consciousness-raising can be an effective process to raise awareness, including engaging with new facts and perspectives [54]. From the role of an educator, Lee engages her undergraduate and graduate students with consciousness-raising by planting what she calls a seed of doubt: "Could there be limits to my knowledge? Could I be missing something in how I am viewing, relating, and existing in the world?" [54].

Alternatively, the individual may notice there's a behavior that could be changed, and they are unwilling to change it [105]. This unwillingness can take several forms [105]:

- Reluctant Precontemplation - the person is unwilling to consider changing a behavior. They may be comfortable enough with their current situation. "Focus of work is increasing importance of change" [105]
- Resigned Precontemplation - the person is "hopeless and helpless about change." They don't feel like changing behavior is worth it. They may feel like a failure because they have put effort towards changing the behavior in the past and it didn't work out. "Focus is on instilling hope/confidence to change by identifying and overcoming barriers" [105]
- Rationalizing Precontemplation - the person reasons with themselves why it is okay to continue with the current behavior. For example, the bias blindspot describes an individual who believes they are less biased than their peers, and therefore they do not need to change their own behavior [75]. "Focus is to increase importance for change by focusing on the emotional impact of the behavior, perhaps by identifying value conflicts" [105]

Finally, individuals may experience a lack of empowerment towards changing a behavior. Derived from locus of control [78], locus of control orientation is "a belief about whether the outcomes of our actions are contingent on what we do or on events outside our personal control" [106]. An external control orientation means an individual's ability to change their behavior is contingent on events outside of their control, such as marginalized communities not having access to resources. The individual may notice they have a behavior they wish to change but are constrained by the system and therefore unable to change (as it relates to historically marginalized communities.) However, they may also believe that change is outside of their control even when there are actions they can take to improve their situation.

In other words, to progress to the next phase of behavior change (contemplation), the individual must be aware of the behavior in question; they must agree that the behavior needs to be changed; and they must believe that their actions can be effective. We can understand these as the need to be willing (believe in the need for change, believe their actions can be effective) and able (aware of the behavior, have the opportunity to act).

2.2.1.2 Contemplation

"I might change" [105]. After precontemplation comes contemplation, where individuals have acquired the awareness from the previous stage. At this point they decide that they might change. They have not formalized any plans to change, but their attitude is open to the possibility of change.

They could make the decision to progress with the change or find a reason to cease thinking about change and move back into the precontemplation stage. Moving back to an earlier stage in the framework is called recycling [105].

The goal for the contemplation stage is to convince the individual to move from ambivalence to curiosity about the possibility of behavior change. Moving from contemplation to preparation is the closing of the knowledge-behavior gap. The knowledge-behavior gap is relevant at this

stage because individuals might have the information and still not desire to change. For example, marginalized people with the experience engaging in broken systems may not feel encouraged to change because the systems will still be broken despite their efforts to engage with them differently.

If they are going to see behavior change, the two key predictors are the Expectancy that the behavior in question will actually bring about a change and the Value of the outcome the behavior produces [5].

One barrier to progressing through contemplation could be the individual questioning the value of the behavior change. In other words, they may recognize that they need to change, but doubt that it is worth the effort in practice.

One approach to increasing the perceived value of a change is to use social influence. The lack of a supportive social network is a key barrier to health behavior change [4]. Individuals who are surrounded by people who are also engaging in a certain behavior will have more of a likelihood to engage in changing their behavior to match that of their social circle. It makes it easier for individuals to buy into the fact that advice or suggestions modeled from peers are something they see value for if they were to engage in those behaviors. This is especially important for marginalized communities, who may have reasons to mistrust messages from dominant groups. Utilizing the peer influence (social network) within a marginalized community is an effective way to increase credibility of an intervention [51]. Individuals favor sources of information that were mediated through their own community groups [87].

2.2.1.3 Preparation

"I will change, just not yet" [105]. Individuals who have progressed through contemplation have made the decision that change is important to undergo. However, they are not yet ready to actively start changing their behavior. At the preparation stage, individuals are planning and preparing for change. This includes the support and resources necessary to move forward with

the change. One important aspect of preparation is identifying potential barriers to overcome.

A barrier to progressing through the stage of preparation would be if the individual has low self-efficacy and does not believe that they could execute the plans created in this stage. This individual does not feel ready to begin the process of changing. Despite the fact that they have planned to commit to changing, they still might have a low expectancy that it will be successful.

Related to expectancy-value theory, individuals might also feel a barrier to progressing into the action stage because while they know how to prepare for the change, they do not know if the outcome of the behavior will produce the desired outcome.

Another important mediator is self-efficacy, or people's belief in their own ability to accomplish a certain task or goal [9]. In our model we use self-efficacy as our behavior control as we believe that in order to achieve behavior change, individuals need to both intend to change and believe that they are capable of change. We use the TTM alongside self-efficacy to approach closing the knowledge-behavior gap. For example, we look to the TTM and find that during the contemplation stage, an individual forms the intention to change. It is at this stage that the individual may start to consider their self-efficacy with relation to a desired behavioral outcome.

If a person successfully passes through the preparation stage, they have closed the knowledge-behavior gap. They have gone from pre-contemplation (lacking awareness that there is a problem, even if knowledge about the problem is available to them) to action, which means changing their behavior. In this work, we explore two key factors for moving people through these stages of the TTM: self-efficacy and social influence.

First, we look at health self-efficacy as a learned characteristic of the individual. Self-efficacy, or the belief in one's ability to act to produce desired results [9], is a known precursor to behavior change. For example, analysis of the Stanford Five-City Project [32] found that the relationship between diet knowledge and behavior was mediated by diet self-efficacy [77] They found that simply having the knowledge was not enough to correlate knowledge and behavior [77]. Rather, people need to have a realistic understanding of their ability to use the information.

Those people who felt empowered, or had a high diet self efficacy, were more likely to translate their knowledge into behaviors.

Second, we explore social support as a type of community social influence. The Mpowerment Project [51] was a community-level HIV prevention program whose use of the social networks of young gay men significantly reduced the proportion of men engaging in risky behavior. Rather than simply supplying information through peer counseling methods, every man who signed up for the project was seen as a potential agent for change: they would learn about safe sex information through a project activity, and then return to their own community to disseminate the information.

2.3 Transformational Games for Behavior Change

To support closing the knowledge-behavior gap in health communication, we will explore the mechanism of transformational games to a) increase player self-efficacy and b) provide simulated social influence.

2.3.1 Serious, Transformational Games

Serious games are games with purposes other than simply entertainment. First coined by Abt in 1970, education, industrial and government training, planning, research and analysis were seen as rich opportunities for serious games [1]. This is because games provide an environment to learn new skills through playful mechanics and then further allow for the player to practice using newly acquired skills in a context where the stakes are low.

The presence of play is one main difference between traditional learning and game-based learning, including the behavior change mechanisms we discuss in this chapter. Osterweil observed play through the formalization of the Four Freedoms: The freedom to fail, the freedom to experiment, the freedom to fashion identities, and the freedom of effort [72]. Understanding

how humans organically approach play is helpful for the support of game-based learning and specifically the design of a serious game intervention. The freedom to fail describes the player's ability to mess up and try again and again. The freedom to experiment describes the player's ability to test different approaches to a problem. The freedom to fashion identities describes the ability to take different roles of perspectives. Finally, the freedom of effort describes the ability to exert varying levels of energy at different times.

2.3.2 Review of Health Games

A growing body of work has focused on the design of evaluation of serious games developed as health interventions, with self-efficacy theory being one of the most influential forces guiding their design [55]. In a critical analysis of games for health, Lieberman [55], argues that games offer an ideal venue for acquiring new knowledge and skills by affording players the ability to learn and repeat new health-related behaviors, to experience guidance and support through role-model characters, and to play out decisions and experience their consequences within the confines of the game.

Cops & Rubbers is a simulation tabletop game where the player character takes on the role of a sex worker which successfuly increased advocacy intentions against condoms-as-evidence policies and pratcitices [17]. In *Test Game B*, the player takes on the role of a nutrition scientist giving advice to teenage clients. [11]. In *Dentist Game for Kids*, players demonstrated an improvement in their dental health awareness and hygiene habits [69].

Elm City Stories, is a visual novel designed to provide at-risk adolescents from marginalized groups (e.g., racial minorities, sexual or gender minorities, low-SES populations) the opportunity to acquire and practice skills intended to sexual risk behaviors, with the ultimate goal of preventing HIV transmission [45]. *OrderUP* is a mobile health game in which players learn how to make healthier meal choices; the game applies skill development and guided practice, key elements of the self-efficacy framework, to improve players' understanding of how to eat

healthfully, engage in nutrition-related analytical thinking, and reevaluate the healthiness of their real-life habits [40].

2.3.3 Game Mechanisms for Behavior Change

Just as not all games are the same, games also can embody a variety of mechanisms for supporting behavior change. As argued earlier in this literature review, I focus on two types of change: mechanisms for games to increase player self-efficacy, and mechanisms for games to provide simulated social influence.

2.3.3.1 Mechanisms for Increasing Self-Efficacy

Bandura argues that effective self-efficacy interventions require providing opportunities to: 1) access, interpret, and apply information about a particular behavior (including information about risks and benefits); 2) the opportunity to learn and develop skills; 3) guided practice in acquiring and exhibiting those skills and 4) a strong network of support for providing emotional and instrumental support [8]. For games to increase self-efficacy, they must incorporate one or more of these four mechanisms.

Games can contain relevant information and successfully transmit knowledge. Prior work on narratives and games have revealed their value for instilling new knowledge, attitudes, and behaviors in ways that mitigate the potential psychological threat of confronting self-relevant information (such as gaps in knowledge or skills). For example, highly transporting stories and games have been shown to make readers and players more receptive to new information and perspectives [38], and deep connections with the characters one embodies in games can promote the internalization of beliefs and behaviors that persist outside of the game [50].

Games can give people the opportunity to learn new skills. *FridgeSort* is a serious mobile game that teaches players how to organize their refrigerator with the purpose of reducing household waste [57].

Games can provide opportunities to practice skills in the game setting that can transfer outside of the game. In *Dentist Game for Kids*, kids can take on the role of a dentist and practice cleaning a patient's teeth [69]. Because the patient is represented as a child, the child player may feel like they are cleaning their own teeth, which may be a reason why the game improved dental outcomes for children after play.

While it is beyond the scope of this dissertation, games can also build strong and trusting relationships between players. One paper found that social games are better than social tasks at creating genuine social bonds [27].

Previous work on self-efficacy games has empirically demonstrated that incorporating these mechanisms in a game context can improve player self-efficacy with regard to the game's domain. For example, *Hacked Time* is a desktop game that aims to instill improved cybersecurity behaviors in players by putting them in the role of a time-traveling detective who advises college students about cybersecurity risks and provides guided practice in improving skills such as creating secure account passwords and utilizing two-factor authentication. A randomized control trial showed that the game was effective at increasing players' cybersecurity knowledge and self-efficacy [22].

2.3.3.2 Mechanisms for Simulated Social Influence

When it comes to designing with sensitive topics or vulnerable communities, simulating social influence can provide more control for the designers. Holocaust education role-playing game *Rosenstrasse* [41] is a multi-player game in which each player takes on the role of two different characters. In this design, players are able to compare on constrast between their two characters, as well as the rest of the narratives in play.

Games are a fictional space which provide narrative transportation to create mindsets for receiving and making sense of new knowledge. This knowledge might be different from what you have already, potentially threatening to ego, or sense of integrity.

The psychological distancing afforded by narrative- and character-driven games is particularly important for engaging players with sensitive topics, such as medical racism [49]. Psychological distance describes the different ways that the an individuals sense of self is removed from the present, for example in time, space, or social distance [100]. Games provide psychological distance though an embedded game design strategy that describes the space between the player and the potentially uncomfortable topics modeled by a game [49]. Additionally, psychological distancing may be particularly important in designing culturally sensitive health interventions for (and with) marginalized populations [29, 35, 47]. Such interventions require the player to feel safe in order to successfully transform the player in the context of sensitive topics.

Furthermore, characters in games are vehicles for embodied perspective-taking. In *Elm City Stories*, players create aspirational avatars, intended to represent their own future hopes and dreams, and travel from 7th to 12th grade, confronting challenges and making decisions relevant to sexual and relationship health. In taking the perspective of the avatar, players are afforded the psychological distancing of learning alongside their avatar. A clinical randomized trial revealed that the game had a beneficial effect on youth players' sexual knowledge and attitudes toward sexual health [34].

2.3.3.3 Self-Efficacy and Social Simulation in the Visual Novel Genre

Visual novels are interactive narrative games that feature branching storylines determined by players' choices at key decision points [19]. As such, visual novels are highly conducive to modeling cause-and-effect relationships and providing a sense of agency and autonomy to players to determine the trajectory of the story [26, 44].

In turn, [14] connected these features to the design of visual novel games [20]. Visual novel games are character-driven, which means they can offer players ample opportunities to make decisions about characters' health behaviors and see the outcomes within the context of the game. Visual novels are also highly conducive to modeling cause-and-effect relationships and providing

a sense of agency and autonomy to players to determine the trajectory of the story [26, 44].

Chapter 3

Bloomwood Stories Game Design

3.1 Introduction

Members of historically marginalized communities do not have equal access to formal health resources, such as access to health professionals, access to support groups, or access to prescription medications. For example, Black patients may not receive equal access to prescription medications because of a common bias that Black patients feel less pain than White patients [14, 70]. Children with autism were found to have unequal access to dental care, with providers saying things like "Thursday I have a private practice, no special needs patients" [23]. As of 2022, 11 million undocumented people live in the United States who cannot access health insurance through Medicaid, Medicare, or the Patient Protection and Affordable Care Act [60, 73].

One approach to addressing this issue is to improve access to formal healthcare systems for marginalized communities. For example, researchers designed a peer support text messaging intervention to increase retention in formal HIV care for gay Black men [82]. However, changing the system is slow to create additional channels of support. We therefore look to informal health resources as a complementary approach, which can quickly address the unmet needs of individuals who are not served by the current system. Informal health resources operate outside formal health care systems [93]. Peer leaders, trained volunteer facilitators who support conversations about health in marginalized populations, are an example of informal health resources [68]. Informal health resources can also include social network support, such as a sympathetic and caring friend or family member [3]. One of the benefits of informal health resources is that they can be tailored to fit the needs of the population they are trying to reach. Particularly with marginalized populations, the method of engagement will largely be defined by their lived experiences [68].

Informal health resources can only be effective when individuals know how to access them. In our approach, we describe a narrative game designed to introduce individuals to informal health resources and teach them how to use the resources through guided practice [31]. Narrative- and character-driven games afford players psychological distancing which is particularly important for engaging players with sensitive topics [49]. However distanced the environment, games can still provide context that parallels real world scenarios. Health games have been found to help improve players' skill development and rehearsal [10]. We therefore created a visual novel game to introduce community-based informal health resources and prepare players to use them.

Bloomwood Stories is a digital visual novel game which uses Bandura's self-efficacy design framework [8] within its design to improve player's health knowledge and health self-efficacy. I found that translating self-efficacy principles into a playable experience is not simple. I describe the importance of the role of the player character which affords a unique relationship between the player and other characters in the game. By designing this role specifically, the player was able to take the perspective of the player character as well as the non-player characters. In this chapter I contribute the following: a set of research-backed design principles for making the game, and lessons on translating principles into gameplay from our iterative design process.

3.2 Literature Review

Marginalized communities such as racial and ethnic minorities, low-income populations, and members of LGBTQ+ community experience negative effects related to their social determinants of health [7]. For example, the 2016 National Healthcare Quality and Disparities Report found that Hispanics in the United States experienced worse access to care compared with Caucasian patients for 75% of the measures included in the study, such as effective treatment and care coordination [76]. A study with women with chronic illness found that providers who used their power inappropriately, such as consistently withholding information and information, caused women to feel a loss of control over their lives [37]. As a result, historically marginalized com-

munities may be reluctant to seek formal healthcare. For example, gay veterans avoid seeking care from the Veterans Health Care Administration due to concerns about stigma [85]. This in turn results in worse experiences and outcomes for marginalized groups in healthcare.

One strategy that is often used to address this problem is health communication [33, 89]. Health communication can be used to encourage marginalized populations to seek care [90], to raise awareness of alternate resources [86], or to communicate self-care strategies that can address health issues [94]. Similarly, health communication can take many forms, such as social networking sites [83], and even empowered storytelling [94]. Unfortunately, the health communication strategy faces a major challenge: translating knowledge into behavioral change, also known as the knowledge-behavior gap [46]. Hornik proposed five types of mediators of the knowledge-behavior gap in the United States: structural characteristics of communities, structural characteristics of individuals, community social influences, learned characteristics of individuals, and enduring characteristics of individuals [46]. In this paper, we explore ways to affect these mediators using a transformational game.

Self-efficacy, or the belief in one's ability to act to produce desired results [9], is a known precursor to behavior change. For example, analysis of the Stanford Five-City Project [32] found that the relationship between diet knowledge and behavior was mediated by diet self-efficacy [77]. They found that simply having the knowledge was not enough to correlate knowledge and behavior [77]. Rather, people need to have a realistic understanding of their ability to use the information. Those people who felt empowered, or had a high diet self efficacy, were more likely to translate their knowledge into behaviors.

In a critical analysis of games for health, Lieberman [55], argues that games offer an ideal venue for building health-related knowledge and skills by affording players the ability to learn and repeat new health-related behaviors, to experience guidance and support through role-model characters, and to play out decisions and experience their consequences within the confines of the game. Highly transporting stories and games have been shown to make readers and players more

receptive to new information and perspectives [38], and deep connections with the characters one embodies in games can promote the internalization of beliefs and behaviors that persist outside of the game [50].

These features align with Bandura's design principles for self-efficacy interventions. Bandura argues that effective interventions require providing opportunities to: 1) access, interpret, and apply information about a particular behavior (including information about risks and benefits); 2) the opportunity to learn and develop skills; 3) guided practice in acquiring and exhibiting those skills and 4) a strong network of support for providing emotional and instrumental support [8]. In turn, [22] connected these features to the design of visual novel games [20]. Visual novel games are character-driven, which means they can offer players ample opportunities to make decisions about characters' health behaviors and see the outcomes within the context of the game. Visual novels are also highly conducive to modeling cause-and-effect relationships and providing a sense of agency and autonomy to players to determine the trajectory of the story [26, 44].

Prior self-efficacy games that draw on the visual novel genre include *OrderUP*, a mobile health game in which players learn how to make healthier meal choices. The game applies skill development and guided practice, key elements of the self-efficacy framework, to improve players' understanding of how to eat healthfully, engage in nutrition-related analytical thinking, and reevaluate the healthiness of their real-life habits [40]. *Hacked Time* is a desktop visual novel game that aims to instill improved cybersecurity behaviors in players by putting them in the role of a time-traveling detective who advises college students about cybersecurity risks and provides guided practice in improving skills such as creating secure account passwords and utilizing two-factor authentication. A randomized control trial showed that the game was effective at increasing players' cybersecurity knowledge and self-efficacy [22]. In this chapter, I extend this work to a new domain (using community informal health resources) and extend the formalization of a design approach for self-efficacy visual novel games.

3.3 Methods

Bloomwood Stories: Block Party was created by an interdisciplinary student team at Carnegie Mellon University. The team consisted of 25 students with backgrounds in HCI, research, psychology, design, computer science, and game design. Health behavior change expertise was provided by internal team members as well as by external partners at another university. Additionally, the team consulted with a professional Diversity, Equity, and Inclusion (DEI) group about the game. The research, design, development, and iteration process lasted about 9 months.

3.3.1 Using the Transformational Framework to Identify Audience and Articulate Goals

Prior to beginning design work, we mapped our knowledge through the Transformational Game Design Framework [24] to define the high level purpose of our game. Through this process, we identified our target demographic as members of marginalized communities, transformative goals towards promoting health literacy and self-efficacy (wanted transformations), as well as general barriers that may obstruct the player from achieving one or many of the wanted transformations. Natural dependencies occur between the two columns, for example, we want our players to feel empowered to engage with their personal health by being comfortable asking the doctor questions relevant to their personal health (Self-advocacy). A negative experience with previous healthcare may lessen their incentive to engage (Motivation). As part of this process, we also reverse-engineered an existing board game designed to teach players about community health resources, to ensure that our content was aligned with existing best practices in the field.

3.3.2 Self-Efficacy-Based Affinity Diagramming

We used affinity diagramming [42], a method that is widely used in exploratory design research to rearrange and cluster the concepts from the original game. We chose affinity diagramming

over grounded theory for its capability to draw out themes and insights that will support our design decisions. Three researchers went through six rounds of iteration to rearrange the concepts based on emerging affinity. During the iterations, we first added new concepts and approaches based on literature about promoting health knowledge. Then, we clustered all the concepts based on a two-dimensional axis: the vertical axis represented the level of involvement (individual, interpersonal, and contextual) and the horizontal axis represented five strategies to promote self-efficacy [9] (mastery experiences, vicarious experiences, verbal persuasion, cognitive support, and visualization). We continued to discuss arrangements until our disagreements were resolved within the affinity structure. The final version of the diagram included the grouped concepts and the key insights we summarized for guiding the game development.

The content of our game was elicited from the affinity diagramming concepts from the original game. Some of the concepts in the game were a particular health issue like diabetes, but some were particular behaviors like knowing your family history.

3.3.3 Iterative Prototyping

We structured our prototyping process around Tandem Transformational Design [96], which is a framework conducive for our interdisciplinary team of researchers and game designers. This framework hinges on first delineating a transformational goal, informed by prior theory and empirical findings, which is then used as the shared vision for goal-driven game design, in tandem [96].

The following constraints were motivated by our literature review and Transformational Framework, and were determined in the Alignment stage of Tandem Transformational Design Framework: types of users (single player, family-mediated player, library-facilitated play), artifacts involved (online portal/database; journal; power of family/community) and self-efficacy concepts (skill development, guided practice, and social support). During a series of design rounds, three designers generated game design sketches, within constraints provided by the lead

game designer. The designers analyzed their generated sketches in terms of common themes (e.g., simulation, time travel, emphasis on family) and literature concepts (e.g., self-efficacy) until the team decided sufficient coverage on the guiding themes and goals from the literature was achieved.

Next, the lead game designer synthesized the 16 game design sketches vis-à-vis the research and design implications. This process resulted in three high-level design clusters that addressed the design brief in different ways. Next, the project leadership held a workshop with these three design clusters using the 1-minute of gameplay brainstorming method, writing out what a 1-minute of the gameplay loop could look like, generating nine sketches. To choose the final design, the project leadership deliberated and identified the designs they thought held the most promise. Literature and research considerations were key in brainstorming, iterating, and analyzing designs throughout the goal-driven game design process.

3.3.4 Internal Playtesting and Heuristic Evaluation by Experts

Internal playtesting was used to validate the use of designs and interfaces. We had members of our design team play through character narratives who they themselves did not design.

The first complete version of the game was sent to our external collaborators who are health behavior change experts. They reviewed the game over email for heuristic evaluation, identifying whether or not we achieved coverage of the health topics from the original game.

The final version of the game was also delivered to a DEI team, who evaluated the content based on their predeveloped guidelines. The consultants reviewed the game content from our first release. We provided a video play-through for each character.



Figure 3.1: Bloomwood Neighborhood

3.4 Game Design

To recap, our game design goals were to a) introduce players to informal health resources available in their community, and b) scaffold their ability to use those resources by fostering a sense of self-efficacy. To accomplish these goals, we aimed to create a game that was character-driven, and that offered players ways to engage those characters' health behaviors and outcomes during play. Based on prior research, we selected the visual novel genre as the best match for our goals.

Visual novels are interactive narrative games that feature branching storylines determined by players' choices at key decision points [20]. As such, visual novels are highly conducive to modeling cause-and-effect relationships and providing a sense of agency and autonomy to

players to determine the trajectory of the story [26, 44]. In a similar vein, strategy simulation games (or strategy sims for short) aim to model real-life situations by putting players directly into contexts in which they simulate judgment and decision-making processes; prior work has revealed their value in instilling disciplinary knowledge [36] and building domain-specific self-efficacy [97].

3.4.1 Character-Driven Design: The Player Character (PC)

In *Bloomwood Stories*, the player character (PC) is a trusted community advocate who helps their neighbors solve problems before the Block Party at the end of the week. At the beginning of the game, the player can choose one of five non-player characters (NPCs) to help. This NPC will give the player a health-related quest. During one in-game week, the player alternates between two activities: talking to community members in a visual novel format, and making suggestions to the selected NPC to solve the active quest.

We made some specific design choices about the player character's role to serve our design goals.

3.4.1.1 The PC is a Member of the Community, Not An Outsider

This allowed us to write to the relationship between the PC and the NPCs from an already trusted relationship. The player gets up to speed with the existing relationships between the PC and the NPCs through dialogue. The existing relationships between the PC and the NPCs allows for depth in conversations, which is helpful when some of the topics are sensitive or more personal. Additionally, when the PC is talking to characters other than the one with whom they're helping with an open quest, it is not gossiping to speak about other people since everyone is connected, and the PC is trusted to handle sensitive information without revealing identifying information. When the PC is talking to best friends like Mrs. Lee and Lila, they know they are able to speak in specifics since these characters are extremely close and know a lot about each other.

3.4.1.2 The PC has an Acknowledged Role as a Community Advocate

Assigning this role to the PC was instrumental for making it feel like there was a purpose behind the PC having conversations with multiple community members every day. Every NPC is associated with a role in the community and the player finds them at the community establishment where they hold their role. As the community advocate, it makes sense that the player's role is to roam from the different establishments connecting information from community members. Rather than have a job like Head Nurse Mr. Calindas at the Clinic, it is the PC's job to move between establishments.

3.4.1.3 The PC is Not a Health Expert

While the PC is an expert in managing community information, they are not an expert in health information. This design decision allowed for the player to learn alongside the PC. Rather than assuming the player has any health knowledge, which they may, we assume that the player will learn the content that the PC learns at the speed that the PC learns it. This allows for the player to learn at whatever speed the PC is learning. For example, it is okay if they offer the wrong solution to a quest multiple times in a row, because any time the PC learns the correct answer is the right time for the player to learn the correct answer.

3.4.1.4 The PC Does Not Have an Avatar

Beyond the aforementioned role definition, we intentionally avoided providing additional demographic or visual details about the PC. This design decision was motivated by the breadth of the game's intended audience, defined broadly as members of historically marginalized communities which encompasses many identities, backgrounds, and lived experiences. By omitting an avatar and specific demographic or physical descriptors, we sought to avoid implicitly privileging any single identity and instead allow players to project themselves into the role. The absence of an avatar was intended to support experience-taking by giving players space to imagine the PC as

an extension of themselves, rather than as a distinct or externally defined character.

3.4.2 Character-Driven Design: Non-Player Characters (NPCs)

We designed five characters in order to achieve sufficient coverage of topics from the original Game of Health. We aimed for a diverse set of characters, including characters of different personalities, interpersonal skills, race/ethnicity, genders, occupations, and family situations.

3.4.2.1 What NPCs Are Supposed to Accomplish

While the PC serves as a focal point for the player's attention, the NPCs are designed to provide narratives to embed within and new perspectives to reflect against. The NPCs are supposed to provide a breadth of topics for the player to engage with, through dialogue and solving quests. In conversations, the player is invited to progressively learn about each NPC's unique context. The goal of the narrative design was to develop NPCs that felt like real friends of PC such that all the information gleaned from the character is useful towards providing the most appropriate solution to quests. To further humanize NPCs, summary screens at the end of each day illustrate additional interactions between NPCs such as "Cheryl went to the aerobics class with Mrs. Lee."

3.4.2.2 Each NPC Faces More Than One Issue

We designed NPCs to have a realistic narrative arc. For some characters the issues that they faced were related to their workplace and therefore seemed more disjointed since every day they face a different issue at work. Another character's arc may touch on a more persistent character trait that they are working on over the course of multiple quests in different ways.

3.4.2.3 Each NPC has Insights to Contribute

In addition to receiving help from the PC. NPCs have insights to provide about topics that other characters need help with. This means that one character's expertise might be helpful in solving

another NPC's quest without knowing their information is directly helpful. We designed dialogue between certain characters based on levels of trust, for example the PC speaks more freely about Mrs. Lee to Lila because they are such close friends. Other characters like Mr. Calindas are not as close to Mrs. Lee so the PC will speak more abstractly about a problem that a 'friend' is currently facing.

By designing a diversity of NPCs, players have multiple different ways of connecting with the game. Whether sharing a health issue, an identity, a barrier, or interest, our goal was to create NPCs with rich character design so there are a lot of different ways for players to relate.

3.4.3 Engaging Health Behaviors: Quests

Each NPC has four quests. A quest is a health-related problem that the character faces, that they do not themselves have the resources to address. The PC also does not have the knowledge or resources to complete the quest, but they can talk to other NPCs and collect information on behalf of the NPC they are helping. When they have enough information, they can return to the active NPC and make a suggestion for what they should do about their problem. This completes the quest.

Players engage in three different types of conversations as part of the quest process. In the accept quest conversation, players learn about the context and background of the NPC's problem. Given the context and the background, there are solutions to quests that are more appropriate for that specific NPC. That is, quest solutions are not a one-size-fits-all because some NPCs are not capable of following through with certain solutions.

In each conversation, players will choose between two dialogue options to progress through the conversation. However, because one of our goals was to use Mrs. Lee's narrative in a research tool, we attempted to keep the information in the conversations consistent across players. Regardless of which option players choose, the overall topic of the conversation will not branch beyond one additional dialogue box. For example, players may seek to learn additional details

about something, Mrs. Lee will respond, and the conversation will continue the same for players with either response. In order to give the player choices to preserve agency and engagement, Mrs. Lee's avatar will change based on her emotional reaction from the player's response.

Once accepted, players engage in information gathering conversations with other Bloomwood neighbors. Players can look at their to-do list to find out which neighbors are available for conversations, or they can just click through the neighbors to see who is available. These conversations can happen in any order since all players receive the same information before they have the ability to progress. After completing the conversation, information relevant to the active quest will automatically populate in the player's cell phone.

In the solve quest conversation, players return to Mrs. Lee and attempt to solve her quest using information from their cell phone. To solve the quest, players interact with the solve quest interface where they will select one of the four pieces of relevant information to the active quest. Once selected, dialogue will describe whether or not the information was correct.

3.4.4 Engaging Health Outcomes: Quest Response

Quests have four possible responses, two correct and two incorrect. The responses were designed to explore the dimensions of: context, which answers which of the behaviors would be appropriate for the specific character; and domain, which explores the behaviors or practices that would be effective for increasing efficacy. Correct responses will provide a solution that is both 1) reasonably actionable for that character at that point of the game (context) and 2) accurate information for that problem (domain).

3.4.5 NPC: Mrs. Lee

To illustrate the game playthrough, we will go into details of Mrs. Lee.

As the player character (PC), you take on the role of the trusted community advocate. At the beginning of the game, you are not given details about the PC other than you are welcomed

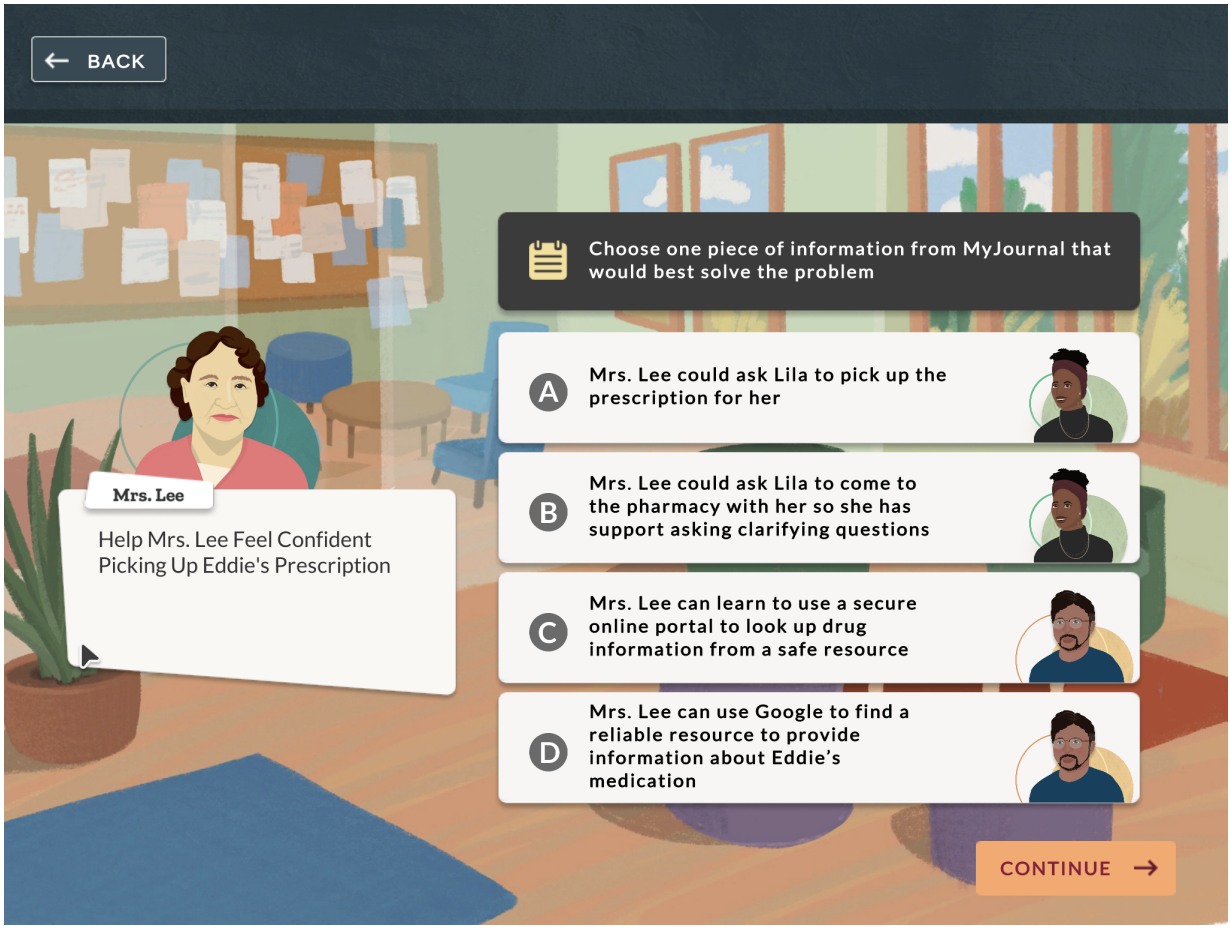


Figure 3.2: Solve Quest Interface

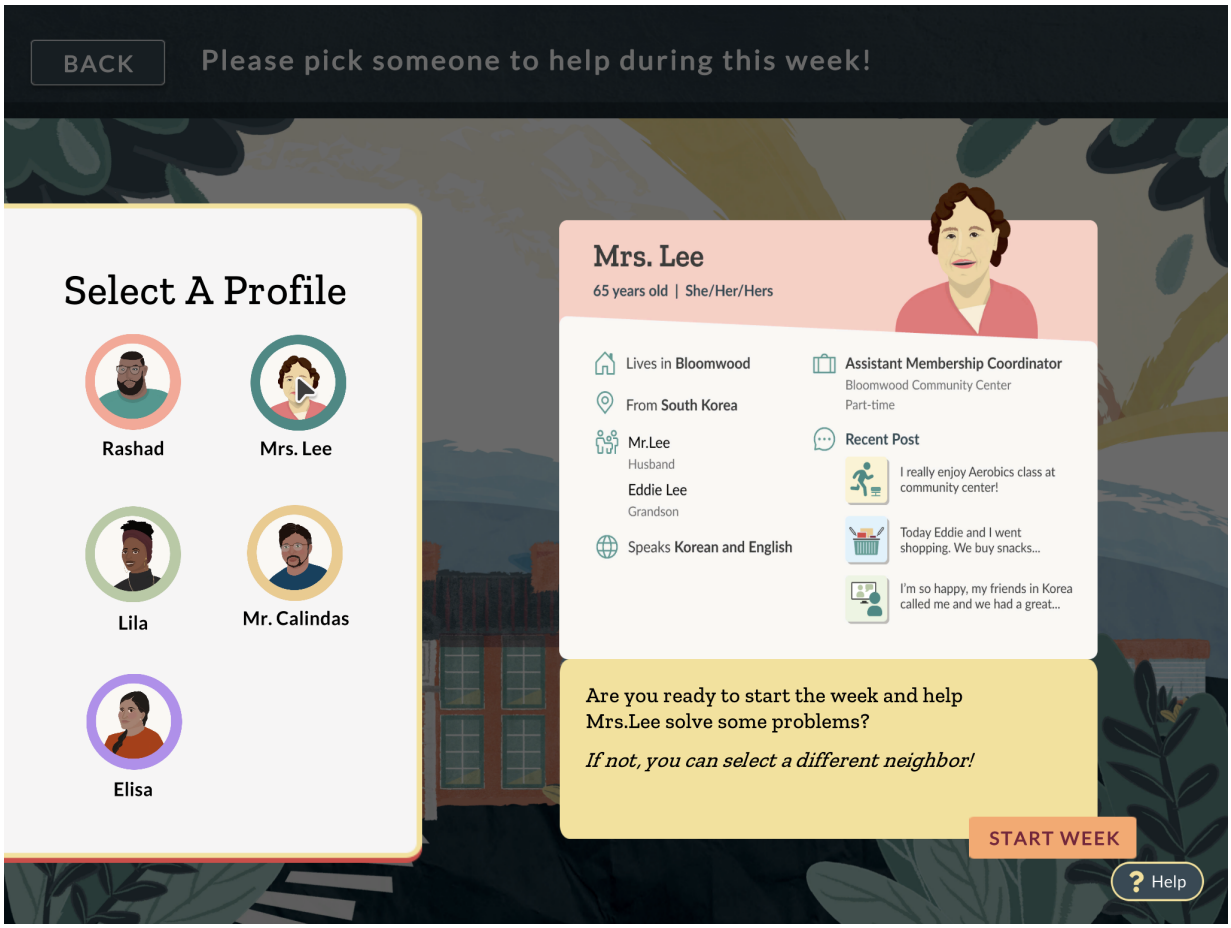


Figure 3.3: Mrs. Lee's Character Card

"home" to Bloomwood, are in a new role as the community advocate, and are in a unique position to solicit advice, suggestions, and solutions from the neighborhood. In our design, we position the player learning alongside the PC as a novice community advocate in Bloomwood. This leaves room to test and make mistakes as the player goes through the game, learning alongside the PC.

Throughout the game the player character will be invited by neighbors to help them solve problems. For example, "Help Mrs. Lee pick up Eddie's prescription" is a quest that requires the player to solve the quest in one of two ways. The first correct answer would be "Mrs. Lee can take Lila to the pharmacy with Mrs Lee to help her ask clarifying questions." At this point of the game we know that Lila is a friend of Mrs. Lee, and we are also aware that Mrs. Lee is not extremely comfortable with speaking English in stressful situations. Therefore using the social support of a trusted friend to help her ask clarifying questions would be productive for Mrs. Lee's learning. As opposed to the incorrect answer of "Mrs. Lee can ask Lila to pick of up the prescription for her" which also would be a feasible thing to do, it just would not aid in the learning process for Mrs. Lee. The other correct answer for Mrs. Lee in this quest would answer with "Mrs. Lee can learn to use a secure online portal to look up drug information from a safe resource." This answer is correct because Mrs. Lee is anxious about picking up the wrong medication. Therefore identifying the medication from a secure and trusted resource before she goes to the pharmacy would also be helpful. The ability to solve a quest in one of two ways allows the player to preserve player agency to determine a solution that feels comfortable for the player to suggest. Players who answer the quests incorrectly will be allowed to try again until they respond with one of the correct choices.

In our visual novel, we do not incorporate branching narrative. Every player finishes the game learning the same amount of information as a player who chose different responses to each of the narrative points in the game. Because our game is used for research purposes, we needed all players to learn and receive the same amount of information.

However, because we wanted players to preserve their feeling of agency in the game, we

did write responses in two different tones. Collecting information from players' responses let us know what type of player character players were identifying with and choosing to respond as. For example, some responses were more casual while others were more curt.

3.5 Lessons Learned

As described above, we engaged a range of stakeholders in our design process, from internal playtesters to external formal review. In this section, I share key lessons we learned along the way.

3.5.1 Designing for Self-Efficacy

3.5.1.1 Roles and Relationships

When we began the game design process, we knew that we would face challenges around the relationship between the player character and the NPCs who are affected by health issues. In the self-efficacy visual novel *Hacked Time*, the player character was an expert in cybersecurity, who was teaching non-expert NPCs. The researchers found that casting players as an expert may have improved players' self-efficacy, but also undermined their perception that cybersecurity risks might apply to them.

Similar to in *Hacked Time*, we wanted to afford the player psychological distance from scenarios in the game by not putting them in the role of the affected character. We also wanted to retain the self-efficacy benefits of making the player feel a sense of expertise. At the same time, we wanted to avoid the problem of undermining players' sense of risk.

During our design process, we found that it was not just the player's role itself, but also the nature of the relationships between the characters in the game, that changes how the player perceives their role. We retained the notion that the player character is helping NPCs with an issue they themselves do not experience. However, rather than have the player begin the game

in the role of an expert, we positioned them as a community leader who becomes more expert in service of the characters they are helping. In other words, the player, the player character, and the affected NPC are all learning together. Here the player has the room to show up with any amount of self-efficacy and hopefully grow in knowledge and skills from there.

We differentiated the player character from the NPCs not by their expertise, but by their connections. The player character can collect information from multiple NPCs, each of whom has connections to different resources and institutions. By becoming a hub of knowledge, the player character can then make informed suggestions to the NPCs, who are isolated from one another until the end of the game, when everyone comes together at the block party.

Given this design choice, we can hypothesize that if players inappropriately draw conclusions from their game role, it will not reduce their perception of their own risk. Part of this is due to the health domain, where the player has less control than in cybersecurity. However, we also believe that the player may see themselves as more connected rather than more expert. As a result, we are currently studying the impact of the game on players' ability to identify community health resources that they are, or could become, connected to.

3.5.1.2 Narrative Goal Alignment

In the original *Game of Health*, players had to answer in-game questions with correct health information. We were concerned about this design's effect on self-efficacy for players with low health knowledge - namely, those who are most in need of the support our game could provide. Low-stakes "quiz" designs can help learners retain knowledge [52], but our design goal was to empower players to use the learning resources available to them rather than to transmit particular information.

In our first version of *Bloomwood*, we primarily addressed this issue with narrative design. Players gathered knowledge from NPCs and their institutions in order to help the target character, which modeled how the player might later gather knowledge to address their own health issues.

However, when completing the quest, the player character's responses, as with the original game, could simply be correct or incorrect.

During playtesting, we found that this design change was not sufficient to accomplish our goals. Players could gather information, but they still needed support in translating that knowledge to support the target character. Additionally, we were not getting enough information about players' internal understanding for the game to be useful as a research tool. If a player got a wrong answer, we had no way of knowing whether they had not absorbed the information (e.g. they did not pay attention to the narrative) or whether they were struggling to apply the information to the character's situation.

As a result, we integrated our context and domain framework so that answers required players to engage with game content and recall information as the narrative progressed. Previously, a correct answer was "Lila can go to the pharmacy with Mrs. Lee." However in our new research framework, we had to identify the context and domain for this response. The new solution was phrased "Mrs. Lee can take Lila to the pharmacy with Mrs Lee to help her ask clarifying questions" such that we could answer our context and domain questions. The context for which this response was relevant was the fact that Lila is comfortable and fluent in the local language, English, which is one reason why Mrs. Lee is worried about picking up the medication. The domain for this response is the knowledge that you are allowed to ask the pharmacist questions when you pick up a prescription. Based on this context and domain, by answering with this solution, the player can identify that if Mrs. Lee were to follow through with this response, this would be a learning opportunity for Mrs. Lee and it is also within the capability of Mrs. Lee at this point of the game.

Similarly, we introduced partially correct answers that would let us see whether the player understood the context but not the domain or vice versa. For example, Mrs. Lee could ask Lila to pick up the prescription for her, which would satisfy the domain knowledge that other people could pick up the prescription, but would not satisfy the context that Mrs. Lee needs to learn to

advocate for herself at the pharmacy. Identifying the answer which contains the accurate context and domain informs future research on player comprehension of quest solutions and character development.

3.5.1.3 Blue Words as Learning Supports

Blue words in our game were used to denote words that were highlighted in the dictionary of our game. The DEI team pointed out several places where idioms occurred in our writing. For the most part, we worked hard to reword those exchanges to create a more inclusive experience. We particularly focused on places where medical information was unclear. For example, "Some countries require new shots" became "Some countries require new ones [vaccines]" to eliminate any possible confusion over the delivery method of vaccinations. It's easy to let very localized or contextual idioms slip in when writing in a casual, conversational tone, and the DEI reviewers did a great job of helping us clean that up to best overall effect.

In our final implementation, there is a glossary of over 200 terms, including "out of pocket" and "insurance". This was the last feature we integrated, and the DEI team did not see it in action. We believe it addresses the concern about unfamiliar terms. While writing the glossary, we worked hard to keep in mind everything the reviewers cautioned us about - keeping the language accessible without being patronizing or too familiar.

3.5.2 Designing for Representation

3.5.2.1 Avoiding the Deficit Model

The deficit model of representing marginalized people highlights the qualities or properties a person is lacking [28]. This was a design challenge for us because we had two commitments that interacted with one another to risk appearing as deficit-based. On the one hand, our target population were members of marginalized groups, so in order for our players to identify with our NPCs, we chose to design our NPCs as members of marginalized groups as well. On the other

hand, we wanted the player to be in a position to help the NPCs in a self-efficacy-supporting role. These design constraints created a scenario where all our NPCs were marginalized individuals who needed the player's help, which was a deficit model risk.

One way we addressed this is by giving our NPCs multiple overlapping identities. This way, each character has some areas where they are from a dominant rather than a marginalized identity. For example, Rashad is Black (marginalized) and a man (dominant). Another example is Elisa who is a first-generation immigrant (marginalized) and has a nuclear family (dominant). This allows us to show that people from both dominant and marginalized identities can face health challenges, and need help addressing them.

More broadly, though, we aim to convey a vision of interdependence where people support one another. People needing help is not shameful, but normal. This is why each NPC gets a turn to be the target character where they are the one who needs help. And when they are not the target character, they are the people who are in the position to offer help. It's not an either-or but an and. This is why characters show up as expert NPCs in each others' stories. For example, in Giancarlo's quest, he asks the player to help his mother settle into Bloomwood, but as the Head Nurse, his expertise centers around giving clinical health advice to the community. This design directly challenges the deficit model as soon as players start playing a second character, where Giancarlo will show up in a new, more powerful role in that person's story.

This lesson informs future research on and with the game. For example, we can look at why players choose a particular character to help understand whether they see the character as having a deficit. If the player chooses to help a character with whom they share a demographic and they also perceive them to have a deficit, there is opportunity for the player to grow in their perceptions of themselves.

3.5.2.2 Authentic Representation

All of the neighbors in Bloomwood comprise different marginalized groups. One of the challenges of the design was to honor their representation authentically. At the core of each character's design, we researched topics that were culturally appropriate for that character. We strove to have authentic representation by having the designers and writers of the characters share qualities with the characters such as race/ethnicity or specific health topic. For example, Mrs Lee was designed by the lead researcher, of Korean descent and Rashad is inspired by the family of the Black game designer who created him.

Based on the demographics of potential players, we knew we needed a character who struggled with English communication. With that in mind, we based Mrs. Lee on the Korean grandmother of our research lead. In addition to drawing from the team's lived experience, we used a variety of sources that outline the differences between Korean sentence structure and American English sentence structure, and integrated them into Mrs. Lee's personality. For example, Mrs. Lee's English gets more erratic when she is upset. When she's in pain, her grasp on using articles and the Subject/Object/Verb sentence structure gets looser. When she is collected and calmer, her sentences are more traditionally "grammatically correct."

While our team was confident that we had represented the reality of an elderly Korean immigrant in the game, we found that stakeholders outside our design process perceived her differently. Non-Korean playtesters and DEI consultants, who were not familiar with Korean language structures, expressed concerns that Mrs. Lee's language was stereotyped and made her a caricature rather than a character. In other words, the "insider knowledge" possessed by those with lived experience on our team, and the knowledge they transmitted within the team about how such a character realistically speaks, was not being conveyed effectively. Players were activating their associations of stereotyped representations of Asian people, rather than connecting to their experiences speaking with people for whom Korean is a first language - if they even had any such experiences to begin with.

We wanted to retain Mrs. Lee's authenticity to her culture and character, but at the same time we needed to represent that authenticity in the presence of people's assumptions about what "real" Korean people who are English language learners sound like. To do this, we formalized the linguistic rules behind Mrs. Lee's speech, and reduced her deviations from formal English grammar. However, in retrospect, we could have tried to communicate our design team's choices to our players in other ways. For example, in a summary screen of Mrs. Lee's character, we might have explained that Mrs. Lee's English learning changes when she becomes activated or upset.

3.6 Conclusion

We present *Bloomwood Stories: Block Party* as an informal health resource to be used by marginalized communities for increasing health knowledge. In this chapter we discuss the design of the PC and NPCs, the desired health behaviors and health outcomes, as well as lessons learned about designing for self-efficacy and representation. We believe that designers of games for marginalized communities will benefit from the advice gleaned from the design and DEI evaluation of our game. Specifically, to keep in mind that not all design decisions for specific members of marginalized communities will resonate with all members of marginalized communities.

Chapter 4

Testing the Impact of Player Effort on Experiential and Self-Efficacy Outcomes in Bloomwood Stories

4.1 Overview

In this study I explored the effect of playing a version of the game that requires more versus less perspective-taking effort. Perspective-taking is the act of understanding of another person's thoughts, feelings, and experiences. In the game, we compared the impact of two versions of Bloomwood Stories that varied the level of effort required from players to consider an NPC's point of view when offering them advice to help solve their quest.

To illustrate, imagine you are organizing a seating chart for a celebration. The tables are round, so everyone at the table can speak to each other, and assigned seating allows guests to seat themselves efficiently. As the organizer of the celebration, you could easily pick any random eight name cards and place them at the table. However, engaging in perspective-taking while organizing the seating arrangement will likely improve the guests' experience at the dinner celebration. For example, you may realize that guests may feel more comfortable seated next to or near a familiar face or someone who speaks the same language. Perspective-taking when organizing a seating chart means considering the needs and priorities of the guests, and requires having access to individuating information about those guests and thoughtfully considering it when making a decision.

In our study I consider perspective-taking effort as the amount of cognitive energy spent towards engaging in perspective-taking. As described in Chapter 3, in Bloomwood Stories, players take on the role of a player character (PC), a trusted community member, whose goal is to

help the NPCs (non-player characters) solve their problems (presented as quests) in the context of healthcare. To examine the role of effort, I created two versions of the game that varied the amount of effort required from players to engage in perspective-taking with the NPCs with whom they interacted. In the high effort version of the game, players are required to consider an NPC's preferences and context, which they have learned through prior conversations with the NPC, before deciding what specific advice to offer to the NPC to complete the quest. In the low effort version, players are provided a clear signpost that signals the correct response to solve the quest and, thus, removes the requirement for the player to engage in careful consideration on the NPCs' needs and preferences.

To return to the dinner celebration example, perspective-taking with high effort may include referring to your notes about the guests' interests and backgrounds and seating guests who do not know anyone else at the celebration next to people who you think they may get along with based on shared attributes. Perspective-taking with low effort, in contrast, might entail having a colleague make recommendations for you based on the same information.

The goal of this study was to test a game design intervention exploring effects of high and low perspective-taking effort. In the high effort condition, the greater amount of effort is predicted to help players form a deeper understanding of the NPC's specific needs and context. That is, in the high perspective-taking condition, players are expected to more fully take the perspective of the NPC. By more thoroughly considering the perspective of the NPC, the player aligns themselves with the PC role of the community manager, thus predicting a higher level of embodiment and experience-taking.

I believe that perspective-taking and experience-taking are linked with self-efficacy. With regards to perspective-taking, thinking about decisions from the perspective of another person may allow players to feel empowered to process similar decisions for themselves. In addition, I hypothesized that players who spend more interpretive effort engaging in perspective-taking and experience-taking are more likely to experience an increase in their own health self-efficacy.

Conversely I believe that players who spend less effort engage in perspective-taking and will likely experience a lesser increase in their own health self-efficacy as compared to the high effort players. I predicted that those who use more focused attention (i.e. high effort) towards understanding the context-based health needs of the NPC should transfer to an increase in their own health self-efficacy.

As for experience-taking, the embodiment of a character and subjective feeling of becoming that character during play, we predicted that requiring more effort to take the perspective of the NPCs they were helping would enable players to feel a stronger connection to the role of community manager, and assume a higher level of expertise in navigating their own personal health decisions. As a secondary goal in our study, we aim to compare perspective-taking and experience-taking as distinct experiential mechanisms for increasing health self-efficacy.

4.2 Research Questions

RQ1: Does requiring more versus less effort for players to analyze information about the game's central character affect player's perspective-taking?

RQ2: Independent of effort, does players' reported level of perspective-taking with the game's central character predict their subsequent levels of health self-efficacy?

RQ3: Is either experience taking (i.e., embodying the character) or perspective-taking (e.g. understanding the character's needs from an outside perspective) a stronger predictor of health self-efficacy?

4.3 Study Design

For our study, players were randomly assigned to either the high effort or the low effort game condition. In both conditions, players were instructed to select Mrs. Lee as the Bloomwood neighbor to help. As described in Chapter 3, successful quest completion requires players to

choose information from their journal that solves Mrs. Lee's problem and seems like a probable suggestion the character could complete.

To test the efficacy of our effort intervention, we identified the solve quest interface as the moment where players would most naturally consider the perspective of Mrs. Lee. At this point of the game players were instructed to choose one out of the four pieces of information they have learned from two other neighbors in the active quest sequence. Once an offered solution will indicate whether or not the answer is correct. A correct answer is an answer that is both effective at producing a favorable outcome and is appropriate for Mrs. Lee. If the incorrect solution was offered, players were sent back to the solve quest interface for an unlimited number of attempts. While all four pieces of information are relevant to the active quest, choosing the correct answer requires the player to evaluate its usefulness from the point of view of Mrs. Lee.

The following description of our manipulation is the only difference between the high effort condition and the low effort condition: For every piece of information relevant to the active quest, players must either answer (high effort) or view (low effort) a prompt about how the information relates to Mrs. Lee.

- In the high effort version, players are required to answer two questions analyzing each of the four possible quest solutions prior to making a selection to solve the quest. Theoretically there is a "correct" answer for each of the analysis questions, but we only require that the player makes a selection for each of the two analysis questions. The analysis questions were designed to require cognitive effort to understand Mrs. Lee's point of view in service of ultimately selecting a response to solve the quest.
- In the low effort version, players are presented with the same two questions as in the high effort version, except in this version the players are given the answers. We assume that players in the low effort version are reading each of the analysis questions and solutions prior to actually selecting an answer to solve the quest.

The analysis questions included in our intervention require cognitive effort because they

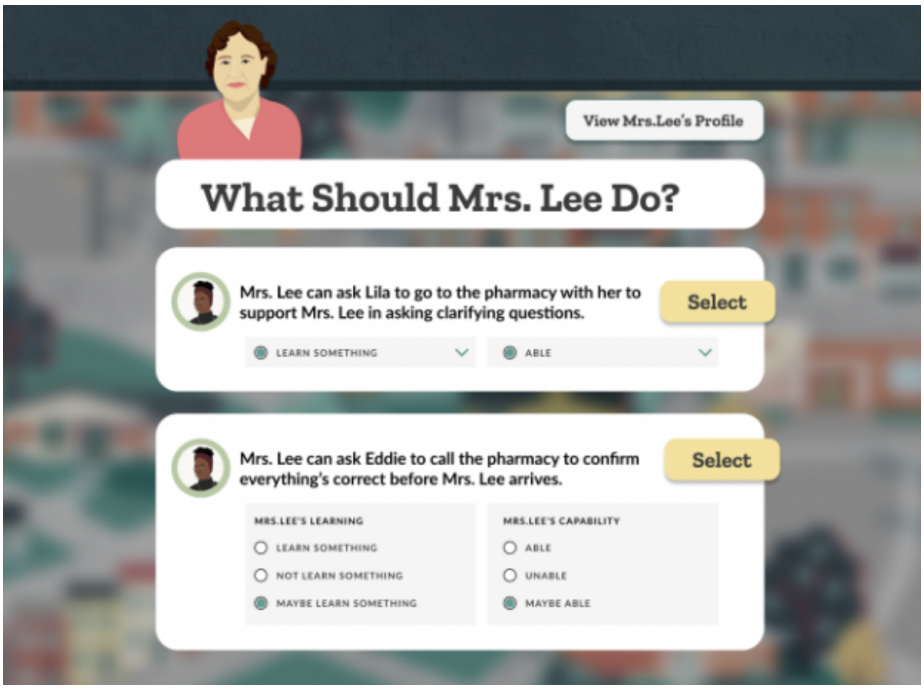


Figure 4.1: High effort version

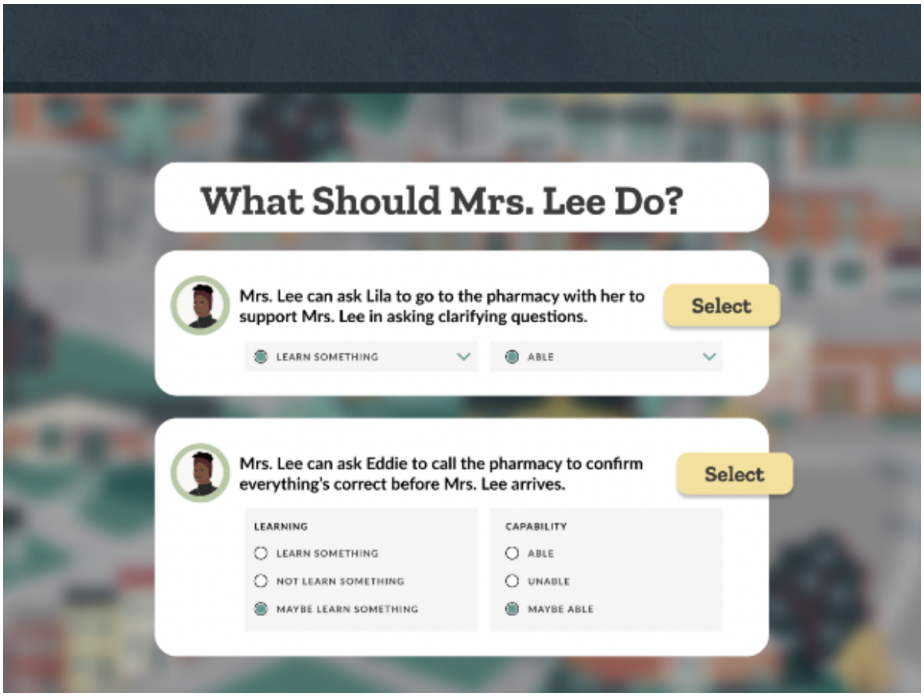


Figure 4.2: Low effort version

require the player to consider everything they know about Mrs. Lee and consider her outcome, if she follows through with the solution.

- Will Mrs. Lee learn something from the outcome this solution affords? Does this information provide accurate domain knowledge?
- Will Mrs. Lee be capable of successfully achieving the outcome this information affords? Given Mrs. Lee's context, is this a reasonable solution for her?

4.3.1 Process for Designing the High and Low Effort Versions of the Game

Towards the creation of both our high and low effort manipulations, we first started with a common game interface. We printed paper copies of our existing design and proceeded to brainstorm for high effort and low effort changes. By drawing and annotating right on the printouts, we were able to iterate on certain designs and scrap others. Finally, to select the right approach, we discussed among team leads until a consensus was reached.

Using Figma we then created mockups of both the high and low effort condition interfaces. In the high effort condition, we added a picture of Mrs. Lee at the top of the screen, in addition to a resourceful button to reference Mrs. Lee's Profile. Additionally, the analysis questions are framed as "Mrs. Lee's learning" and "Mrs. Lee's capability," to which the player is required to answer each question below. In the low effort condition, there is no picture of Mrs. Lee at the top of the screen, and there is no link to Mrs. Lee's profile. As for the analysis questions, they are framed simply as "Learning" and "Capability." Correct answers are pre-filled radio buttons which cannot be changed. Using our high-fidelity mockups, we were able to pilot the screens with a Research Assistant familiar with the game to ensure the interface remained usable.

Once we had a final design, we implemented it into a "research version" of the game which we would use in our study. The research version had the following changes from the core game: characters besides Mrs. Lee were greyed out, there were two parallel builds, one high effort and one low effort, and finally, we added a user ID (UID) for tracking across surveys and gameplay.

4.4 Participants

We recruited 59 adults from Craigslist to participate in our pretest. The ad was posted in Detroit, MI; Baltimore, MD; Memphis, TN; Fort Worth, TX; and Daly City, CA. We identified these cities as they were the highest percent population of Hispanic, Black, and Asian. Participants received a $45 Amazon gift card for successfully completing all three study sessions. Of the 59 participants who completed the pretest, 46 participants returned for the experiment. We chose to remove 8 participants (their responses were clearly random) which left us with 38 participants.

4.5 Measures

Health Self-Efficacy (HSE)

- HSE Pretest. We were interested in understanding the baseline health self-efficacy of specific health topics present in Mrs. Lee's narrative. The pre-test scale required participants answer 12 questions on response efficacy, self-efficacy, susceptibility, and severity on a 7-point scale from 1-strongly disagree to 7-strongly agree.
- HSE Post-test and follow up. We used a different scale from our pre-test to measure the health self-efficacy of our participants once they completed the game session. We used the same scale to measure health self-efficacy for post-test and follow-up, which included 12 questions related to health self-efficacy and responding on a 7-point scale from 1-strongly disagree to 7-strongly agree.
- HSE emotion follow up. We asked participants to respond to a self-efficacy emotion measure where they were to check all emotions that applied to a scenario: Imagine you find out suddenly that you are in a situation where the future of your health is at risk. What emotions does this evoke? (Check all that apply)
- HSE behavior follow up. Finally we asked participants to respond to two open-ended questions related to a their health self-efficacy behaviors since gameplay: Describe a time

when you or someone in your life experienced a health risk; Describe the steps you have taken related to health issues, if you have taken any, in the last week.

Perspective-taking

- Perspective-taking effort post-test. We asked participants an open ended question prompting how they provided recommendations to Mrs. Lee (Describe your process for recommending solutions to Mrs. Lee.) Then, we asked participants to report on a scale from 1-extreme inconsideration to 7-extreme consideration how much effort they put into understanding Mrs. Lee's perspective.

Experience-taking

- Experience-taking with NPC. We asked participants to respond to 7 questions related to experience-taking with Mrs. Lee's role on 7 point scale from 1 strongly disagree to 7 strongly agree.
- Experience-taking with PC. We asked participants to respond to 7 questions related to experience-taking with the community manager role on 7 point scale from 1 strongly disagree to 7 strongly agree.

Log data

- We collected the duration of play and their player code. For participants in the high effort condition we collected the responses to the evaluation questions, and whether or not they clicked on Mrs. Lee's profile from the solve quest screen.

4.6 Procedure

4.6.1 Pre-test

As part of a pre-test administered two days before the study, participants completed a questionnaire which included demographic information and self-reported health self-efficacy for specific health topics. The pre-test also required that participants answer familiarity and awareness ques-

tions related to health domain knowledge. Finally, participants answered whether or not they consider themselves to have similar and dissimilar traits to the community manager and Mrs. Lee. All of the aforementioned questions except for demographic questions were answered on a seven-point scale.

Data collected: demographic information, baseline health self-efficacy

4.6.2 Main Session

Participants were randomly assigned to either high effort or low effort conditions. The day of the game session, they were sent instructions on downloading the game, their assigned version of the game with nondescript file names so they would not know there was an alternate version of the game. Participants received both Mac and PC files. Participants were instructed to complete Mrs. Lee's quests 1-4, after which they would immediately complete the post-test linked in the email.

The post-test included a quantitative perspective-taking measure on a seven-item scale, and three open-ended questions including: detailing the participants process of making a recommendation to Mrs. Lee, responding to a future scenario involving Mrs. Lee, and comparing Bloomwood to the participant's town. Participants responded to a 12-question self-efficacy scale, and two versions of the 7-question experience-taking scale from the perspective of Mrs. Lee and the perspective of the community manager. Finally, the post-test included the player experience inventory scale. All of the aforementioned questions were answered on a seven-point scale.

4.6.3 Follow up

One week after completing the game session and the post-test, participants were asked to complete a follow-up questionnaire. This included the same health self-efficacy scale from the post-test, two open-ended questions on self-efficacy behaviors, and health emotions on a five-point scale.

4.7 Analysis and Results

4.7.1 Manipulated Effort

ANOVA. Because participants were assigned randomly to each version of the game, we use two sample t-tests to determine if there are any significant differences in our outcomes of interest between the two versions.

Perspective-taking effort. To answer RQ1 (Does requiring more versus less effort for players to analyze information about the game's central character affect player's perspective-taking?) and assess the effect of effort on perspective-taking, we asked players to self-assess their considered effort on a scale of 1-7 where 1 was "extreme inconsideration" and 7 was "extreme consideration." We found that players from the high effort condition reported on average 6.31, whereas the low effort condition reported on average 6.67. This difference was not statistically significant: t(18.3) = -1.08, p = 0.29. This suggests there is no difference in self-reported effort between the high and low effort groups.

Experience-taking. We find no statistically significant difference in experience-taking between the two versions of the game, either for the player character t(13.1) = -1.49, p=0.15 or for the non-player characters t(8.35) = -0.66, p=0.52.

Health Self-Efficacy. We next computed a composite health self-efficacy score from the 12-question health self-efficacy scale.

We find no difference in the composite post-test health self-efficacy score between the high and low effort conditions: t(15.7) = -1.06, p=0.301. We similarly find no difference in the composite followup health self-efficacy scores t(13.0) = -1.07, p=0.30.

We also calculated the change in composite self-efficacy score between the post-test survey

and follow-up surveys for each participant. We find no significant difference in this score change between the two conditions: t(16.5) = -0.01, p=0.99.

Summary We did not find that our manipulation was successful, which led there to be no significant differences in effort, experience-taking, or the self-efficacy between the two conditions. We conducted supplemental analyses to explore if there were any relationships between players' perceiveved effort and any of the other study measures.

4.7.2 Self-Reported Effort

Regression. Because self-reported effort is measured on a scale from 1-7, we use regression analysis to explore the relationship between self-reported effort and outcomes of interest. However, self-reported effort is not randomly assigned, so possible confounders of self-reported effort and our outcomes of interest may exist. The most obvious confounding variable is the version of the game presented to the player, so we include this in each subsequent regression model.

Perspective-taking effort. Self-reported effort = perspective-taking effort.

Experience-taking. We do not find any significant association between self-reported effort and experience-taking for either the player character slope=0.16, t(17) = 0.958, p=0.35 or non-player character slope=0.19, t(18)=1.03, p=0.32 when conditioning on the version of the game presented to the player.

Health Self-Efficacy. However, we do find a statistically significant correlation between self-reported effort and post-test health self-efficacy scores when conditioning on the version of the game (slope=0.50, t(19) = 2.744, p=0.01). This same correlation with the follow-up health self-efficacy scores is not statistically significant (slope=0.24, t(17)=1.32, p=0.20.)

Examining the effects of experience-taking and self-reported effort on health self efficacy, we find a statistically significant positive association between post-test self-efficacy scores and self-reported effort, and a significant positive association between post-test self-efficacy scores and non-player character experience taking, when controlling for condition.

Summary. Unlike the actual effort (based on conditions), perceived player effort does correlate with outcomes.

4.7.3 Experience-taking

Explanation of analysis. As with self-reported effort, we use linear regression models to explore the relationship between experience taking and outcomes of interest. Potential confounding variables in this analysis include both the version of the game presented to the participant as well as the amount of effort put forth by the participant. These two variables are included in each model presented below Because experience-taking for the player character and the non-player characters are likely to be highly correlated, we separate their effects by using a single regression model that includes both. Our final model thus includes:

- Self-reported effort
- Version of the game presented to the player
- Experience-taking for the player character
- Experience-taking for the non-player character

Effects on Health Self-Efficacy When post-test composite health self-efficacy is the dependent variable, we find a significant slope estimate on self-reported effort slope=-0.36, t(14)=2.29, p=0.04 and experience taking for non-player characters slope=0.73, t(14)=2.35, p=0.03. The slope estimate for experience taking for the player character is not statistically significant slope=-0.04, t(14)=-0.101, p=0.92

When followup composite health self-efficacy is the dependent variable, only the slope estimate on experience-taking for the non-player character is statistically significant slope=0.99,

t(12)=3.51, p¡0.01. The slope estimate for self-reported effort slope=0.08, t(12)=0.53, p=0.61 and experience taking for the player character slope=-0.43, t(12)=-1.28, p=0.22 are both not statistically significant.

Player Experience Variables. Among the game-related variables, we find that when the goals of the game are clear, the player is more likely to put effort into playing the game (slope=0.38, t(24)=1.95, p=0.06)

4.8 Discussion and Conclusion

4.8.1 Evaluating the Intended Manipulation of Effort

One core difference between the two versions of our game is that in the "high effort" condition, players were prompted to reflect on the advice they would give Mrs. Lee, by considering her context and needs, whereas players in the low effort condition were provided with direct guidance on the appropriate advice to give Mrs. Lee. We hypothesized that having to answer a question would be more effortful than simply reading the same question with a provided answer, and our early playtesting bore this out. However, in this study, there were no significant differences in perceived effort between the two game conditions, and there are several reasons our players might have experienced this differently.

First, it could be about the interface design:

- For high-effort: We did a great job of preparing folks with narrative and context-setting.
- For low-effort: Comparing and contrasting the responses was harder than expected
- I also consider that the game's design encouraged players to naturally put effort into understanding the NPC's situations and needs. Perhaps players in both conditions were spontaneously thinking about these factors without the game needing to prompt them to do so.

Second, it could be about unexpected player behavior:

- For high-effort: Players answered questions randomly, so they didn't actually use effort
- For low-effort: Players may have tried to change the pre-filled responses, using more effort

Finally, we could conceptualize the idea of different KINDS of effort so they might not actually be a useful comparison in the first place.

While our manipulation didn't do what we expected, we still found interesting relationships to explore between perceived effort and other experiential and self-efficacy outcomes which I will describe in the following sections.

4.8.2 Effort and Health Self-Efficacy

When post-test composite health self-efficacy is the dependent variable, we find a significant slope estimate on self-reported effort slope. This means that players who had increased self-reported effort also experienced increases in their post-test health self-efficacy. This could speak to the fact that quests were appropriately designed to test players' health knowledge and allowed them to practice the skills they felt parallel in their own life outside the game.

There was a significant correlation between self-reported effort and post-test health self-efficacy scores. This means that people who believed they were expending more effort in the game experienced higher levels of their post-test health self-efficacy. By putting more effort into the game, players reported in the post-test feeling more equipped to dealing with health related issues. This could be because they spent more effort in understanding the quests that they then felt like they were equipped to handle in their own life.

However, these increased levels of health self-efficacy did not persist at the follow-up period. These short-term effects could be because players only practiced these health related skills for a single character's arc. Had the players engaged with multiple characters they would have had more guided practice and the behavioral transformation may have persisted for a longer period of time.

One explanation is the fact that they put in effort is what is driving the self-efficacy change.

They put effort into the game, and saw that they successfully helped the character. Therefore, they may be more likely to believe that their own health problems are responsive to them putting in effort - e.g. self-efficacy increases.

This effect did not persist at follow-up. Perhaps at post-test, players were thinking abstractly about their ability to handle health-related challenges, but once they went back to their daily life, the concrete details of the specific challenges they faced were not in full alignment with the ones they encountered in the game. We could speculate that more NPC interaction would increase the likelihood that players would encounter challenges, identities, etc., that are more directly aligned with their own experience. Perhaps playing through multiple stories, the contrasting cases can induce the ability to contrast the effect of effort in different contexts and maybe help people transfer to their own lives for the longer term.

4.8.3 NPC Experience-taking and Self-efficacy

When post-test composite health self-efficacy is the dependent variable, we find a significant slope estimate in experience taking for non-player characters. This means that players who had increased levels of experience-taking with the non-player characters also tended to experience higher health-self efficacy. The more players embodied the NPCs, the more confident they felt in managing their own health outcomes by the time of the post-test.

When the followup composite health self-efficacy score is the dependent variable, the slope estimate on experience-taking for the non-player character is statistically significant. This means that players with increases in experience-taking with the NPC tended to experience not only increases in the post-test health self-efficacy but also the follow up health self-efficacy. This means that embodying the NPCs is effective in longer term transformation of the player.

Summary: Prior work on experience-taking [50] showed that participants internalize traits exhibited by characters, as well as persistent effects on behavior caused by experience-taking. This is what we see happening here - experience-taking is predicting self-efficacy.

However, the prior paper showed that the first person perspective, compared to a third person perspective, predicted higher experience-taking. Meaning, from prior work, we would expect to see that the experience taking with the PC - the character with the "first person perspective" - is what predicts change.

Instead, we see that the NPC experience taking predicts self-efficacy, which is different from prior work. Why might this be?

One explanation is the NPC was technically a third-person perspective, but the PC's role was to put themselves in the mind of the NPC. That is, experience-taking happened more with the NPCs. From a game design perspective, the PC had very little story or character development, compared to the NPCs. This was on purpose, so that players could bring their own experiences to that role, but it meant that they may not have felt any difference between the PC and themselves. Therefore, there was no separate experience to take.

Another explanation is that the player spends most of their time thinking about solving the NPC's problems, even though the PC is also solving the how to have a block party problem. Self-efficacy was better connected to the NPCs and their quests rather than the PC's goal to make it to the Block Party. That means that skills development and guided practice are connected to the NPC - and so engagement with the NPC may reinforce those aspects of the players' self-efficacy journey. The self-efficacy skills are tied to the health problems of the NPC rather than the PC's role - and you get the NPC reinforcement 4 times (1 per quest) rather than just at the end of each NPC story.

4.8.4 Effort and NPC Experience-taking

Perceived effort and NPC experience-taking both affected self-efficacy positively. So, I should look at the relationship between the two. Does effort predict NPC experience-taking and vice versa, or are they separate effects on self-efficacy?

We do not find any significant association between self-reported effort and experience-taking

for the non-player character slope=0.19, t(18)=1.03, p=0.32

This suggests that experience-taking and perceived effort both do affect self-efficacy outcomes, but that they do it through different mechanisms. For NPC ET, I think the mechanism is about the character and learning from the narrative. For perceived effort, I think this might be about them believing that their own effort helped someone. People value things more after they have put in effort [43]. It's almost a replacement for the "PC experience taking" role - THEY helped by putting in the work. What this suggests is that we could design for either or both of these pathways - they may not always have to be linked together as they are in this game.

Chapter 5

Qualitatively Understanding Bloomwood Stories' Transformative Impact on Players

5.1 Overview

In this chapter, I seek to build a deeper understanding of the type of connection between the player and the game characters in *Bloomwood Stories*. Given our findings that experience-taking with the central characters can affect self-efficacy, I want to further explore the impact of these in-game relationships and their effects outside the game.

In chapter 3, I described the design intentions for the player character (PC) and non-player characters (NPCs). The PC is a non-expert in health knowledge that the player learns alongside, and as a result can increase their own self-efficacy. In contrast to the PC, whose details are left intentionally sparse so that the player can bring their own life experiences to fill their shoes, each NPC comes with a rich narrative that offers a new perspective for the player to consider. Through learning about the different backgrounds, quests, and narrative arcs of the five NPCs, the player is able to take the perspective of many characters throughout play.

As discussed in chapter 4, I found that players who had increased levels of experience-taking with the NPCs also tended to experience higher health self-efficacy, meaning that embodying the NPCs led to increases in the player's own health self-efficacy. Given these results, I wanted to understand more deeply the relationship between the player and the NPCs.

Additionally, I found that players who reported that they spent more effort to understand the perspectives of the NPCs experienced an increase in post-test health self-efficacy. However, we did not see a similar increase in health self-efficacy scores for the follow up test. Given

these results, I wanted to more deeply explore the avenues by which players put effort towards interpreting the relationship with the NPCs. For example, do players have to resonate with Mrs. Lee in order to put effort towards understanding her perspective?

As described below, this study extends my previous work by helping me understand how players experience NPC relationships *from their perspective*. Doing so further helps me understand which aspects of the character design and related interactions are affecting players. Additionally, I learn how and why I might design self-efficacy games differently in the future.

5.2 Research Questions

RQ1: How do players relate to the PC, given our prior findings on experience taking?

In this question I seek to explore the connection between the player and the PC. The design of the PC was left intentionally abstract to allow for the player to step into the shoes of the PC however they desired, such as presenting as their authentic selves [71] or an idealized self [53]. Learning how players show up for an abstract PC role will give me insight in how to affectively design roles for players who have experience in the affected community.

RQ2: How do players relate to the NPCs, given that perspective taking was not a significant predictor of self-efficacy?

In this question I am interested in learning how the players are relating to the NPCs. The primary for of interaction in the game is conversations between the PC and the NPCs and given that social dialogue between a player and character builds trust [13] these conversations are important and required before the player can attempt to solve the quest. Our prior findings showed that players were experience-taking more effectively with the NPC rather than the PC, so finding information about the relationship between the player and the NPCs will be helpful to design for more opportunities to experience-take with characters in the game.

RQ3: How does playing Bloomwood Stories affect how participants perceive the resources in their communities?

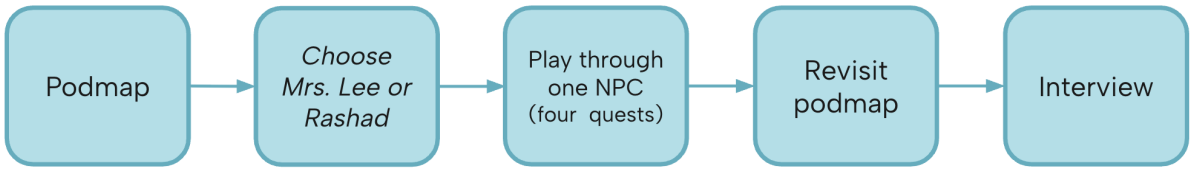


Figure 5.1: Study Procedure

The long-term goal of this research is to understand how single-player, narrative games can support players in making better use of the resources available to them in ways that increase equity and inclusion. Changes in self-efficacy are one way to measure players' capacity for future behavior change [55]. However, since we are specifically interested in the uptake of community resources, we also want to directly investigate how the game affects the way these resources are perceived and conceptualized. That is, players must be aware of the resources available to them before they are able to use these resources [2].

5.3 Study Design

To address these research questions, I designed a study as shown in Figure 5.1.

- RQ1: post-play interviews
- RQ2: post-play interviews
- RQ3: pre- and post-play pod mapping exercise

I use interviews for RQ1 and RQ2 in order to capture aspects of the player-PC and player-NPC relationship that may be unpredictable or unexpected, and to allow for players to provide their own deep, personal insights about their experience of the game.

To study RQ3, I used podmaps to more directly understand the game's effect on people's perception of their relationship to health-related community resources. Originally created for identifying supportive networks between people who experienced harm and violence [65], podmaps are now used in many contexts [91]. In this study, I used podmaps to identify support networks

within peoples' communities; by comparing pre-play and post-play podmaps, I can understand how the game impacted players' perception of what resources they can use to solve their own health problems.

5.3.1 Participants

Participants were selected to ensure our game is representative of the communities it intends to serve. However, there is a broad range of identities and health problems represented in *Bloomwood Stories*. We therefore asked players to choose one of two NPCs to help: Mrs. Lee (an elder Korean immigrant for whom English is a second language) or Rashad (a Black man struggling with mental health). To explore the relationship between the player's identity and the NPC they are helping, we recruited participants who share identity dimensions with one of those two characters.

We recruited participants who were 18 years or older through Carnegie Mellon University student networks. Remote participants were required to have an email address and access to a laptop or desktop computer (Mac or PC) in order to run the game. Remote attendees must have access to a video camera for identity verification during consent.

We ran sessions on campus at CMU as well as online via Zoom in sessions that ran 1-2 hours. Our final set of participants who fulfilled the screening requirements included eight participants to complete the study as shown in Table 5.1.

5.3.2 Procedure and Instruments

Prior to the session, participants chose to attend sessions in-person or remote via Zoom. Those attending via Zoom were required to turn on their cameras for identity verification.

At the beginning of the session, participants reviewed the consent form together with the researcher conducting the study. Before providing consent, they had the opportunity to ask questions about the study activities. Participants were also reminded not to reveal any private or

PID	Gender Identity	Race/Ethnicity	Primary Language	Character
H1	Male	East Asian	Chinese Mandarin	Mrs. Lee
L1	Female	Southeast Asian	Hindi	Mrs. Lee
D1	Female	South Asian	Tamil	Mrs. Lee
S1	Female	Hispanic or Latino	English	Mrs. Lee
M1	Male	Black or African American	English	Rashad
C1	Male	Hispanic or Latino, White or Caucasian	English	Mrs. Lee
E1	Male	Hispanic or Lationo	English	Mrs. Lee
Z1	Female	Middle Eastern or North African	English and Arabic	Mrs. Lee

Table 5.1: Participants from Qualitative Study

personally-identifiable information about themselves or others in their answers to open ended questions.

Participants who completed the entire study were paid $25 per hour, up to $75.

5.3.2.1 Initial Podmap

A podmap can identify the specific community elements that participants perceive as surrounding and supporting them [66]. It is composed of the participant at the center of the map, the pod in bold-lined circles, the moveable pod in dotted lines (individuals who are still close to the participant but need more work to be in the pod), and finally resources in the large outer circles, as shown in Figure 5.2

At the beginning of the exercise I prompted the player to think about a mental or physical health experience they have experienced during their life, as follows:

Before the next activity, please take a minute to think about a health problem that you have faced in your life. It can be mental health or physical health. You don't need to tell me what it is, but have it in mind as you complete the next activity.

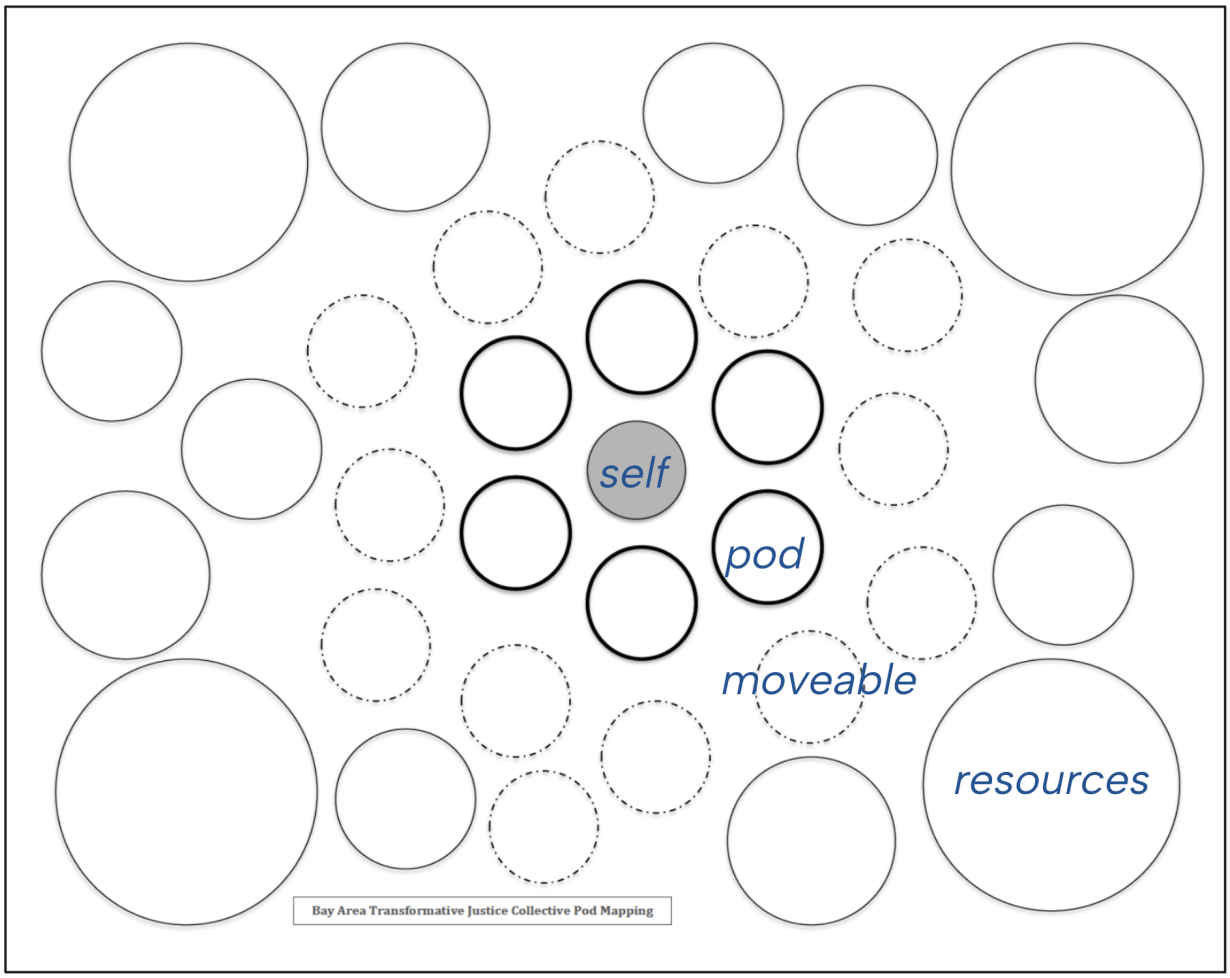


Figure 5.2: Podmap exercise with labels

Participants were then provided a copy of the podmap and the following instructions:

1. Write your name in the middle grey circle.
2. The surrounding bold-outlined circles are your pod. Write the names of the people who are in your pod.
3. The dotted lines surrounding your pod are people who are "movable." They are people that could be moved in to your pod, but need a little more work. Write the names of the people who are "moveable."
4. The larger circles at the edge of the page are for networks, communities or groups that could be resources for you. Write the names of resources or institutions in the larger circles.

When this activity was complete, the researcher collected the podmap documents for later use.

5.3.2.2 Game Session

Participants played through the game, *Bloomwood Stories: Block Party* choosing one of two characters, Mrs. Lee or Rashad, to help through the week. To choose a character, they looked at their character cards at the beginning of the game and once they made a decision on who they wanted to help, I had them explain why they chose that character.They played the original version of the game rather than the research version of the game, meaning they will not fill out the evaluation questions before solving quests, as described in Chapter 4. By the end of play, they would have completed four quests in total.

5.3.2.3 Podmap Revisted

Following play, participants were given back their initial podmap, and were offered the opportunity to make changes. Any changes were marked in a different color to differentiate pre- and post-game elements. Participants were asked to think aloud during this activity, which would

allow them to explain any changes they made to their pod map and allow the researcher to ask follow-up questions.

Regardless of whether or not they chose to make changes, participants were then asked to give ”a tour” of their map, which included verbally describing their relationships to those listed on the map and any other details the participants wished to include.

5.3.2.4 Interviews

I then administered a semi-structured, post-play interview:

- How did the game make you feel?
- Can you please tell me the most interesting thing about [MRSLEE or RASHAD'S] story? What is one specific detail about them that stood out to you?
- Can you briefly describe your community, for example your current neighborhood or a community that is important to you The name of the community, what life is like there, what the people are like, etc. What are the similarities or differences between Bloomwood and your community?
- Can you tell us what you think about [MRSLEE or RASHAD] What did you think about the problems they faced? What did you think about them as a character?
- How did you feel about stepping into the shoes of your own character in the game?
- Describe your process for giving advice to [MRSLEE or RASHAD] Did you feel like you were able to put yourself in [MRSLEE or RASHAD]'s shoes? Can you describe the feeling? Can you describe the way you were thinking?
- Imagine you are [MRSLEE or RASHAD], what advice would you give yourself? What steps or methods would you use?
- Did you learn anything from the game? Is there anything you feel like you will take away from this game? Strategies for you own health?

5.3.2.5 Data Analysis

Podmaps

To analyze the podmap data, I conducted both within-participant and cross-participant comparisons of the maps created before and after gameplay. For each participant, I documented all named entities on their podmap and their placement across the three layers (pod, movable, and outer). For entities on the podmap that were the names of people, I used the session recording to identify the relationship that person represented. For example, *Sarah* would be *sister/Sarah*. I then conducted a comparative analysis between pre- and post-gameplay maps, noting whether entities were added, removed, or repositioned across layers. These changes were treated as indications of shifts in how participants perceived different forms of support after playing *Bloomwood Stories*.

Across participants, I compared how different individuals populated the same podmap layers to identify patterns and variation in how the layers were interpreted. This included examining which types of entities were consistently placed in particular layers, in addition to any instances where participants diverged from the intended structure of the exercise. This comparative analysis allowed me to characterize how participants understood and used the podmap categories, and to assess the extent to which the podmap elicited comparable representations of support networks across participants.

Interviews

I developed an initial codebook, working in parallel with another member of the research team. Each codebook contained preliminary codes, definitions, and expectations of themes anticipated to emerge from the data. Following this individual step, we reconvened to compare and contrast our codebooks. Through discussion and consensus-building, we synthesized these into a shared codebook that served as the foundation for systematic coding. We used a constructivist approach to open coding [21], meaning that all responses by the participants are valid. Codes

cease to be added to the codebook when we reached saturation and we did not find any new codes in the data.

To maintain transparency and comparability, each code entry was linked to transcript sentence numbers. We assigned sentence numbers directly within the codebook, thereby creating an at-a-glance record of where codes applied. This approach allowed immediate identification of overlaps, discrepancies, and areas of divergence between coders without requiring repeated reference back to the raw transcripts. In addition, we highlighted and annotated the transcripts themselves, which provided an accessible reference point for examining disagreements in context.

As an initial reliability check, we both coded a subset of the transcripts independently using the finalized codebook. Each of us applied codes to the same numbered sentences from a single participant's transcript, then reconvened to compare results. This process enabled identification of inconsistencies in interpretation, as well as opportunities to refine the scope, definitions, or granularity of particular codes. During this phase, some codes were merged, expanded, or eliminated to improve conceptual clarity and ensure alignment with the data.

Once consensus was achieved, we proceeded to code the remaining interviews individually. By grounding the analysis in a shared and tested codebook, while also referencing sentence-level numbering, the process balanced interpretive flexibility with methodological rigor. This structured, collaborative approach increased the reliability of coding decisions and facilitated nuanced insights into how participants experienced and reflected on the game scenarios.

5.4 Findings

5.4.1 RQ1: How do players relate to the PC, given our prior findings on experience taking?

5.4.1.1 They chose dialogue that reflects desired social behaviors.

S1 emphasized how the PC role provided a safe space to practice aspirational behaviors, reflecting on how she could try acting in ways she normally would not: "*It was good to choose things that I know I don't usually do, but I want to do... So at the beginning, I was like, yeah, yeah, to be an active listener and whatnot. I'm not really good at doing it right now, but I want to do it, and I can do it through my character. It was a mix of how I really talk and how I would like to talk or how I would like to be.*" Similarly, Z1 wanted to exercise a personality of the PC that encouraged NPCs to provide details to the conversation: *I tried to make sure before I gave her advice I had a chance to actually just talk to her and stuff and listen and make sure I just don't come to her and tell her 'here's what to do...' my process was not being too direct.*" Players also highlighted the cognitive engagement when solving the NPC's quests. C1 reflected on how the multiple options available when solving the quest encouraged careful consideration of choices: "*When you step into the shoes of the character...the character becomes you. The many different options made me really consider how I would go about answering questions.*"

5.4.1.2 They felt a sense of obligation when NPCs used their name.

M1 described how the ability to choose the name of the PC, and make it your own, added to the immersion: "*Having people say my name in response... made me feel like I had more stake in the game. I felt more aware of the actions I was taking and I feel like I thought more about the responses I would give. Since it was coming from 'M1' coming from me I felt like I had to really respond in a way that felt like something I would respond with. So I think that kind of made me just think more about how I interacted in the game*." Additionally, elements like the in-game

dictionary supported payers' confidence. E1 said '*I didn't feel dumb for not knowing certain stuff' because there were elements like the dictionary*."

5.4.1.3 They merged the PC role with their existing identities.

Players' real-life experiences and identities shaped how they approached their role as the PC and engaged with NPCs. Life experience influenced how natural the PC role felt, how effectively players took others' perspectives, and how they interpreted scenarios. Some participants drew on skills or habits aligned with their identity, while others drew on family experience to anticipate NPC needs. Players' beliefs and values further shaped their interpretations of both the game material and character experiences, demonstrating the importance of personal context.

Participants reported that inhabiting the PC role felt natural when it aligned with their real-life identities, skills, or experiences. L1 described the community advocate role as "just doing what I do in real life," noting that the game prompted them to think more actively about the health and well-being of older adults in their life: "*[The game made L1 feel] like I helped a grandma or my mom or someone like that age... There are many people now, aunts and mom and, you know, mother-in-law and all those people, it made me actively think about their health and how little time they spend taking care of it*." C1 similarly drew on their own experiences with their grandmother to engage with Mrs. Lee, using personal insight to navigate the NPC's challenges: "*It took so long, and honestly, there's so many processes that have to do with it...[I] could fully help her figure a routine that works for her*." Thinking about the similarities between their grandmother and Mrs. Lee elicited both empathy and satisfaction: "*It made me sad, but I found satisfaction in helping Mrs. Lee navigate it all*." E1 also leveraged personal experience to guide interactions, noting that the game provided a space to practice conversations that would be difficult in real life: *Health conversations are really hard to have with my own parents... this is how maybe a conversation could go with my mom.*

E1 went on to describe the how these connections made the PC role especially immersive

and seamless, sometimes blurring the line between in-game and real-life roles reflecting: *I keep confusing the community advocate with the grandson because I keep thinking that the grandson is the community advocate... when I thought of Mrs. Lee I thought about my mom or how I would try to interact with her... I kind of feel like her grandson too. Like I understand that relationship, so I feel like it was very easy for me to embed myself into that relationship*.

5.4.2 RQ2: How do players relate to the NPCs, given that perspective-taking was not a significant predictor of self-efficacy?

5.4.2.1 They engaged deeply with NPC problems.

Participants described strong emotional and cognitive connections with NPCs, frequently engaging in perspective-taking that combined empathy with careful reasoning. This resonance shaped how they interpreted the game scenarios and guided their decisions within the role.

When solving Mrs. Lee's quests, participants described actively reasoning through the her problems, reflecting both cognitive engagement and perspective-taking. E1, for example, reported asking himself: "*Am I asking too much of her? Or is this too hard for her? When I was looking at the questions, like would it even help her?*" C1 also emphasized the importance of understanding the NPC's perspective in detail, reflecting on Mrs. Lee's fears, knowing she has headaches and is worried about going to the doctor, "*but why is she scared of going?*" C1 further considered the potential underlying causes for her anxiety, noting that addressing these deeper issues might make Mrs. Lee more open to help: "*Even though she knows people all over town who could help, she might be afraid to ask*."

Similarly, M1 described carefully considering Rashad's situation: "*I... had to think back to specifically the problems and what aspect of the problem he presented, what he was struggling most with. 'I don't know how to get started...' So I was just trying to think about which suggestion is more most applicable. Just not for the general problem, but specifically how he was phrasing the problem*." M1 also reflected on the emotional weight of Rashad's challenges, noting that

while he felt some of Rashad's stress: "*I felt a little stressed but not too much stress since I know it's just a game. But I was thinking about the things Rashad is thinking about and there were a lot of different issues: trying to keep the library up and running, handling the different programs, dealing with the ideas at the library but not having support. I found myself asking questions like, 'what do you do next? How do you move forward?'*"

In some cases, players had to reframe their initial expectations. H1 initially assumed helping Mrs. Lee would be straightforward: "*googling it and going to the pharmacist*," However, after interacting with her, H1 realized that every individual has unique, layered concerns, noting that what seems simple to the player may not be so for the NPC: "*many, many layers*" and "*many, many worries*" that can be unique: "*something that I think is simple is not for them*" or vice versa.

5.4.2.2 They used their own lived experiences & values to understand NPCs.

Participants frequently drew on personal family experiences to interpret NPC needs and inform their decisions in the game. Z1 described framing game choices through the lens of their own familial relationships: *Whenever I was making those decisions I literally was just thinking about what I would do with my mom.* E1 similarly leveraged their experiences with older adults to anticipate behaviors and responses, noting *I have older adults as parents so I know how slow it can feel or how boring it can feel, but I'm just so used to being at a slower pace.* This familiarity also shaped E1's judgment of NPC problems, helping them maintain perspective: "*All her problems were valid... I wasn't getting mad... I wasn't getting stressed out for her... I was just like, 'oh these are completely reasonable problems that I know an older adult would ask.*"' L1 compared Mrs. Lee to their own mother and mother-in-law, who are non-native English speakers, which facilitated empathetic understanding and perspective-taking: "*[The game made L1 feel] like I helped a grandma or my mom or someone like that age... There are many people now, aunts and mom and, you know, mother-in-law and all those people, it made me actively think about their health and how little time they spend taking care of it.*"

Across these examples, players relied on family-derived schemas and lived experience to anticipate NPC needs, interpret behavior, and make in-role decisions. Drawing parallels between NPCs and their own relatives supported empathic reasoning and deepened their engagement with the game, highlighting the interplay between real-world experience and in-game perspective-taking.

Players' interpretations of the game and the behaviors of the PC and NPCs were shaped by their personal beliefs, values, and mindset, influencing both decision-making and perspective-taking. S1, for example, reflected on how her approach to supporting Mrs. Lee's independence and collaboration shaped her strategy: *At the beginning I thought what we wanted was the independence of doing things by herself, but through the game I noticed she is also comfortable having other people by her side helping her do those things or supporting her learning experience to be independent.* Gender and social perspective also shaped interpretation. E1 noted "*as a male, I thought it was interesting that Mrs. Lee was excited about it being a woman doctor*" Mrs. Lee's excitement about seeing a woman doctor provided insight into how personal identity affects characters' experiences. Z1 described how assumptions about gender norms guided her in-game interactions: "*At first I was trying my best not to just give her advice on what to do right away. I was trying to pick the ones where I can have her just talk... because some people don't like that... especially I think for women, we like it when people just listen... maybe she just wants someone to listen and talk to her before being like, 'okay how can I help you.*"'

5.4.2.3 They trusted other NPCs to be experts when they themselves were not.

Participants also emphasized how the design of the PC role and game mechanics reinforced their connection and engagement. M1 reflected on how playing a character who was in a role of support took the pressure off: "*It was nice... you don't really have to think about 'what do I need to do?' I can just ask my community.*"

D1 emphasized the importance of expertise and credibility which reflected their value of

evidence-based guidance "*Because I wasn't a health expert, I wanted to make sure any input I'm giving is backed up with proper evidence or comes from the right source... characters like Mr. Calindas had the right information and the right input. I felt like I was just conveying whatever other people told me, and she trusted me with my advice*."

5.4.3 RQ3: How does playing affect participants' perceptions of resources in their communities?

5.4.3.1 Their baseline podmaps emphasized their close relationships

Before playing the game, participants' podmaps showed that their closest networks primarily comprised family members and intimate friendships. Most participants placed their parents at the center of their support systems, often accompanied by siblings or a partner. Seven out of eight participants included their mothers as members of their pod. Nearly all participants included at least one close friend or best friend, frequently specifying undergraduate or long-term friends who had shared meaningful life experiences, such as a former housemate. Some participants specified friends who come from a similar background, who "are great at listening", or a cousin who has "gone through a lot of stuff." One participant included their cat, highlighting the emotional significance of companionship during health challenges. Overall, the baseline maps depict a tight-knit but predominantly personal support network, centered around emotional familiarity and long-standing trust.

The second layer is the "moveable" category which represents relationships that were meaningful but less central, including acquaintances, academic advisors, mentors, and extended family who could provide support with some effort or under specific circumstances. Several participants included friends with less frequent contact, such as former classmates or distant college friends. Mentors and academic figures (e.g., professors, advisors, lab cohorts) appeared frequently among participants in higher education, reflecting professional forms of support. Certain familial relationships required greater effort: one participant included their mom with whom "some things

can be difficult to talk about" and another participant included their dad "who could be moved into the pod if really needed." These connections suggest an awareness of available help beyond the immediate circle, yet also a reluctance or barrier to calling on that support regularly.

In the outer layer, participants included a mix of formal institutions, community organizations, digital resources, and broader social networks. While the exercise framed this outer layer as "resources and institutions," participants interpreted it flexibly, listing anything from online platforms (e.g., TikTok, YouTube, Discord, AI tools) to fitness or health-related services (e.g., physiotherapy centers, student health centers, gyms) to professional networks (e.g., university cohorts, professors, fellowship leadership). Some participants emphasized cultural or identity-based communities, such as cultural student groups, LGBTQ+ organizations, and church groups as resources they could rely on for guidance or support. Participants also included past or distant social communities, such as high school or undergraduate networks, as potential resources, as well as family or extended social contacts not placed in inner or middle layers. Some responded to this layer of the podmap more abstract, representing platforms or sources of information (e.g., social media, YouTube, Google) rather than specific people or institutions.

5.4.3.2 They increased recognition of formal health resources & community supports and reorganized personal networks

After playing the game, participants revisited their podmaps. Most made adjustments reflecting a heightened awareness of health and community resources and a reconsideration of how different kinds of support fit into their networks. Out of eight participants, seven opted to make changes to their podmaps while one person did not make any changes from their original map. Four participants made changes related to health resources after playing the game. D1 added "doctors and friends who work in the health sector" to the outer layer. S1 added medical providers to the outer layer. C1 added a primary healthcare provider to the outer layer. E1 added a primary doctor and health clinics to the pod layer. Three participants made changes related to community and



Figure 5.3: E1's podmap with original responses in blue and post-play edits in red

information resources. E1 added a community center and library to the outer layer. Z1 added information sessions to the outer layer. L1 notably moved "Reddit threads" from the outer layer into the pod, suggesting a shift in how digital platforms were conceptualized from distant, impersonal sources of information to integral, trusted components of one's personal health support system. This move highlights how the game may have blurred the distinction between formal and informal help, validating community-generated knowledge as meaningful support. Several participants reconfigured their interpersonal relationships, moving family members or friends between layers to better reflect their perceived accessibility or emotional reliability. For example, S1 and M1 repositioned close friends and cousins.

One of the most striking individual changes came from E1, who moved both parents into the

very center of the podmap, placing their names directly beside his own as seen in Figure 5.3. This act blurred the distinction between individual and familial identity, illustrating how E1 viewed health and wellbeing as relational rather than independent. His revision suggests that the game may have prompted a recognition of interdependence where care is something shared rather than simply received. By visually re-centering his parents within his sense of self, E1 reframed health support as a collective endeavor embedded within family ties.

Overall, participants' podmap revisions reveal that gameplay prompted an expanded and more nuanced understanding of support systems. Some drew health resources closer, others included previously overlooked relationships, and a few reorganized their interpersonal circles to better reflect who actually feel dependable.

5.4.3.3 They reflected on systemic issues

In addition to the podmap data, participants responded to interview questions about their resources and communities. Participants reflected on the broader social and systemic context surrounding NPCs' challenges, noting that the game encouraged them to consider both structural barriers and community support networks.

Several participants connected the NPCs' challenges to real-world systemic issues. C1 observed the complexity of healthcare in the United States: *The sadder reality of our healthcare system in America is... how complex it is... how it was made to be difficult for healthcare providers... trying to help older people*. C1 believes that Mrs. Lee's problems reflect deep-rooted issues within the healthcare system, which are addressed more effectively in other countries, highlighting inequities in accessibility and care. Similarly, M1 considered how community structures shape access to support: "*I was thinking about the elders... how are we setting up our communities so that these people have access to what they need and can offer any help that they feel they can offer?*" These reflections demonstrate that the game encouraged players to think critically about systemic barriers, resource distribution, and the role of social and institutional

structures in real-life problem-solving.

Participants also reflected on how the game's community-oriented design reinforced social engagement. M1 described a strong sense of reciprocity and mutual support: *I felt good about community and putting into your community and being able to rely on your community for issues you're having as well as being able to be there for other members of your community who might have issues*. E1 similarly appreciated the networked nature of the community within the game: "*You're able to get... the community... like they know people, they're able to go to these people*." Because E1 did not have all the answers personally, the connectedness of the in-game community supported decision-making and reinforced collaboration, highlighting how social mechanics encourage both engagement and the sharing of expertise.

5.5 Discussion

Experience-taking occurred with the PC role because it was often easily integrated with participants' existing identities and lived experiences. Many participants drew on familiar roles as a caregiver or advocate to guide their interactions with NPCs. The parallel role in their real lives made the PC role feel intuitive and emotionally grounded.

The participants' life experiences that made the PC role resonant similarly made the NPCs relatable. Participants were often able to draw on relationships with their grandparents or elder parents when helping Mrs. Lee. As compared to the participant who chose Rashad, who stated that fact Rashad had a family and kids made him less relatable. I did not collect participant's age information (besides asking people if they were over the age of 18,) but given that I recruited students or recently graduated students (graduate level) my sample might have been skewed for younger participants. Perhaps the majority had parents or grandparents who were still alive and relationally close to participants, making Mrs. Lee more relatable. Perhaps the majority of my participants did not have children of their own, making Rashad's context less relatable.

I found that players who have relevant lived experience to the game do use their experience

as leverage in the game. For example, I found that many players transferred their personal values to their PC because the scenario in the game was similar to a scenario they had experienced in their real life. Due to this resonance, it was natural for them to show up as their authentic selves [71]. Some players exercised behaviors of an idealized self [53], which was shown in Hacked Time to create unwanted distance between the players and the PC [22]. In the case of Bloomwood, I think the behaviors of the idealized self was close enough to the behaviors of lived experience of the players that it would be feasible to transfer a behavior outside the game, rather than an expert identity, which was in the case of Hacked Time.

After playing Bloomwood Stories, participants shifted how they conceptualized resources within their communities. Over half of the participants who revisited their maps added at least one health-related resource, suggesting that gameplay got players thinking about formal health-care resources that had been previously overlooked. Beyond simply adding new entities to the map, some participants reconsidered the relational structure of their networks. One participant made a change by moving his parents to the center of the podmap, framing health as relational rather than individual and a recognizing care as shared work.

Players confirmed that social support is a key component of Bandura's self-efficacy framework [8] in defining and analyzing their podmaps. In single player experiences I think it is important to design for opportunities for players' to recollect their community resources or practice skills for supporting social connections. Whether this is modeled in game as conversations with other characters or suggestions for post-play social activities, game designers should prioritize opportunities where players can reflect against their real communities and feel empowered by social support outside of play.

Chapter 6

INTENT: Game Design and Autistic Players' Perspectives

In previous chapters I described my experience designing and evaluating *Bloomwood Stories*, a game created to transform players who are members of the communities represented in the game's narrative. During the DEI review described in Chapter 3, reviewers found it challenging to resonate with characters from backgrounds they were unfamiliar with. Although Mrs. Lee's story was grounded in my own family's experiences, using speech patterns and language identical to my grandmother's, the DEI reviewers flagged her diction as problematic. After reflection, my team and I interpreted this feedback from a mismatch between the reviewers' lived experiences and those of the game's intended audience. This experience inspired a broader design question that extends beyond *Bloomwood Stories:* ***How can designers authentically represent lived experience when the player is not a member of the affected group?***

To explore this question, I introduce the design of *INTENT*: a transformational workplace simulation game that teaches players how to cultivate inclusive environments for their autistic peers. *INTENT* is similar to *Bloomwood Stories* in several ways. *INTENT* is a single-player game that teaches players how they might relate to their community differently outside of the game; it seeks to increase the self-efficacy of the player by providing knowledge to the player and then guiding them through practice with these newly acquired skills; and it relies on a rich narrative design that fosters a relationship between the player and the NPCs in the game. In *Bloomwood Stories*, this is the relationship between the PC and an NPC whose problems you are helping to solve. In *INTENT*, this is the relationship between the PC and an NPC who is your autistic coworker.

The difference between *Bloomwood* and *INTENT* is that the target player in each game occupies different social positions. That is, the target player in *Bloomwood* is a member of one or more of the marginalized groups represented in the game. On the other hand, the target player in *INTENT* is an allistic (non-autistic) person, rather than a member of the autistic community. In other words, *Bloomwood Stories* is designed for players as *insiders*, while *INTENT* is designed for players who are *outsiders*. We therefore need to ensure that this outsider perspective does not further marginalize autistic individuals in the workplace, for example by reproducing stereotypes. As a first step in examining our design of *INTENT*, we therefore seek to understand the perspective of autistic individuals on the characters and narrative elements of the game.

6.1 Game Overview

INTENT is a single player visual novel game set in Betaverse. The player takes the role of a team lead who can explore their environment and have interactive conversations with NPCs. The game has three episodes and takes about 20 minutes to complete. *INTENT* was built in Unity for WebGL deployment, i.e., running within desktop browsers. To accommodate future updates to the narrative text, the game uses Yarn Spinner, an open-source narrative system plugin in Unity that allows both customization and expandability.

The transformational goal of the game is to improve autistic people's (AP) experiences at work, by rallying their allistic co-workers to support them in common workplace scenarios. The mechanisms of change we integrated in the design are self-efficacy [9] and social simulation [6]. With self-efficacy, we hope that players will increase their knowledge of how to handle situations in the workplace, and through guided practice in the game, get familiar with appropriate behaviors in relevant situations [8]. To explore social simulation through play, we aim for players to observe the social consequences of behaviors in play such that players are able to set new norms outside of the game [34].

The game design process began with pre-production, where I collaborated with our team of

subject matter expert leadership to narrow the scope of the design. To develop our first prototype, we worked with a student team from CMU's Entertainment Technology Center (ETC), including a producer, a 3D artist, a UI/UX designer, a game designer, and a programmer. Additionally, there were two ETC instructors.

To augment our pre-production work, the students conducted interviews with AP to gain insights into effective strategies for workplace inclusivity, which helped with the authenticity of the episodes and narrative in our game. Subject matter experts (SMEs) and educational specialists kept the weekly iterations on track with respect to these goals. My role in the development process was to be a bridge between research and design, carrying the vision of the design while consistently pointing back to the research. As design leadership, I provided consistent feedback to the student team on research-backed design and narrative choices.

6.2 Game Design

In this section, I describe the core game design of *INTENT*, a visual novel in which players navigate an interactive narrative through branching storylines determined by their choices at key decision points [20]. The visual novel format was selected for its emphasis on narrative and character relationships, making it well suited to INTENT's transformational goals.

6.2.1 Player Character (PC)

At the opening of the game the player first encounters their character in the opening scene. As shown in Figure 6.1, the PC balances humanoid representation with abstraction, designed to help players feel connected to the character without evoking specific markers around the character's identity.

Before starting the game, the player enters a name for their character. They are assigned the role of "Team Lead."

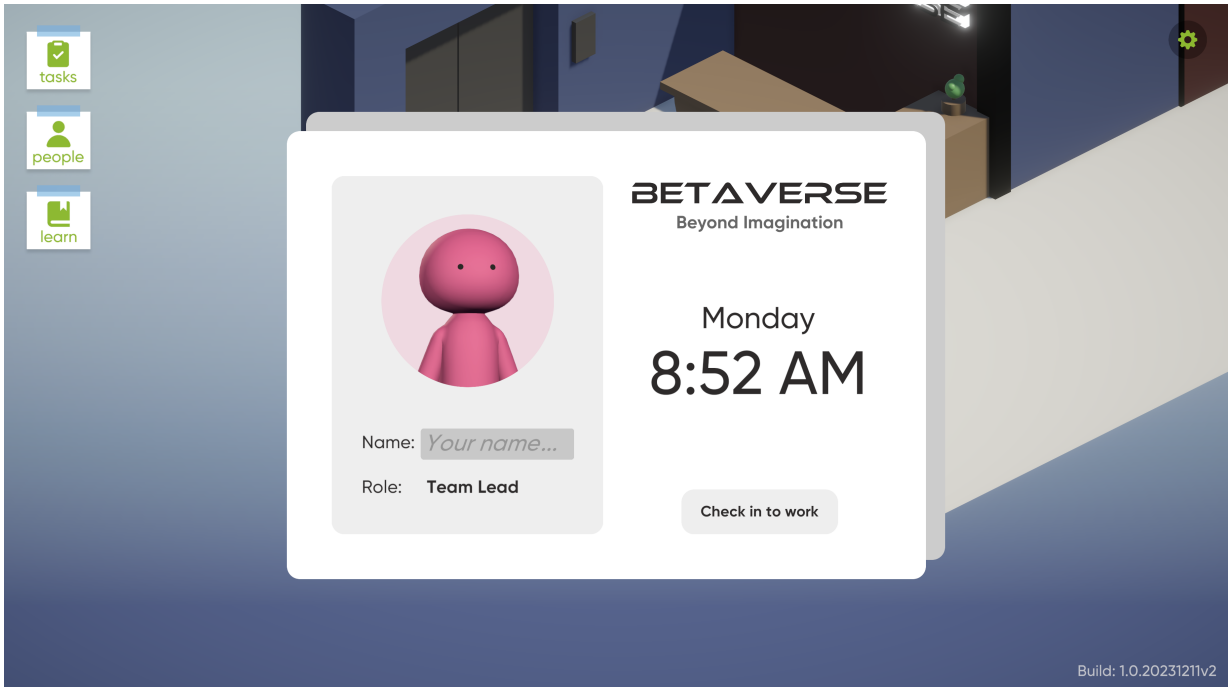


Figure 6.1: Beginning the game

As Team Lead at Betaverse, it is the PC's job to help the team operate successfully as a unit, including facilitating productive group meetings. The player engages with other characters in the game through conversations. While some of the dialogue does not affect the story, responses to key moments in the game will impact the health of the team.

6.2.2 The Environment

During the game, the player can explore the Betaverse office, including a break room with a coffee and vending machine, a main office space with everyone's desks, and two meeting rooms: one larger room with windows and a TV, and one smaller room with no windows and a projector.

Some objects in the environment are interactive. For example, the player must make coffee early in the game to help them learn the user interface. Other environmental interactions are relevant to the game's transformational goals, such as changing the noise level of a whirring



Figure 6.2: Office Environment

projector. Finally, the game includes "Easter Egg" objects to make the environment more interesting, such as a working interactive vending machine in the breakroom that empties as you play.

6.2.3 Non-Player Characters (NPCs)

Non-player characters are present in the game environment. The player can interact with these NPCs, even outside the flow of the main game narrative. These interactions change future dialogue options.

There are four NPCs in the game:

- Tony (he/him): autistic technical engineer
- Ming (they/them): allistic financial engineer
- Ash (she/her): autistic designer
- Ali (he/him): allistic client outreach lead

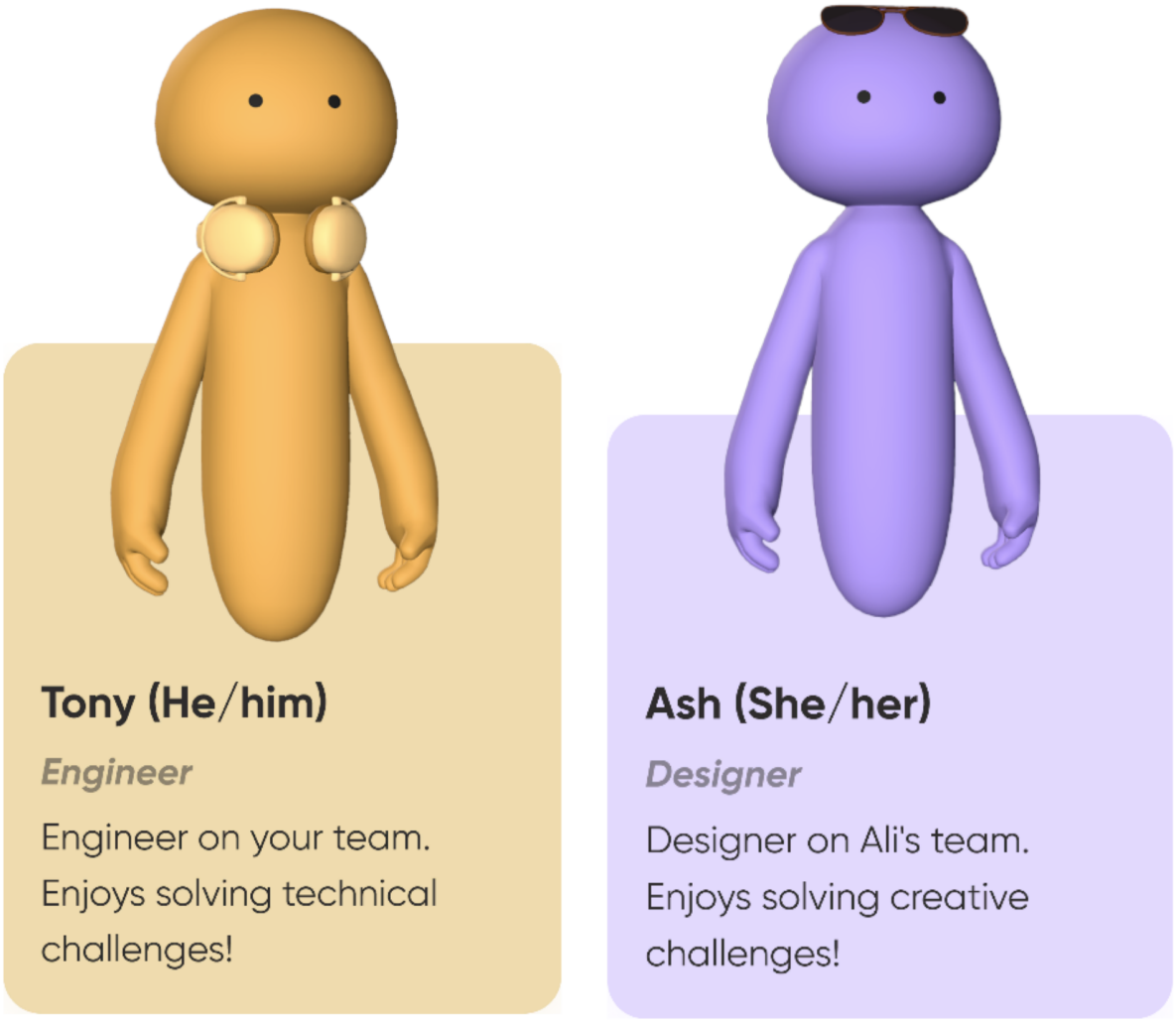


Figure 6.3: Autistic Characters

In creating our autistic NPCs, we aimed to highlight APs' professional expertise and emphasize they are an asset to their employer and colleagues. Tony demonstrates technical expertise in a brainstorming meeting. Ash demonstrates design professionalism in dialogue. Their capabilities are also demonstrated in various interactions. For instance, in an agenda-making task, Tony shows his professionalism and organization skills. During the work distribution interaction, Tony leads the discussion.

6.2.4 Core Gameplay

The central game narrative is framed through "tasks," which are work responsibilities that the player must complete during their day. When a new task is introduced, the player is shown where to go by a glowing circle highlighting the location on the map. The task list on the left sidebar of the display has a cue for the new task. One example task is a "catch up meeting," where the player must go to one of the meeting rooms to talk to their team. This task triggers the first long interactive narrative scene with coworkers. Another task is "check in with Ali," which leads the player to meet Ash for the first time. Throughout the game, the player makes dialogue choices in conversations with characters. These choices change how characters react in future interactions.

The game ends when the player has completed all of the tasks.

6.2.5 Main Narrative

For the central narrative, we chose four common scenarios based on interviews with autistic individuals conducted by the design team.

The first scenario is when a coworker takes a joke that was meant to be sarcastic as a serious statement. At this point the PC does not know the coworker is autistic, so the miscommunication confuses the PC and the other coworkers in the room.

In our second scenario, an autistic coworker experiences auditory overload (being over-

whelmed in an environment with overlapping auditory stimuli) and has to leave the room. The player makes choices such as whether to allow them to leave the room, and whether to check on them after the experience. The goal of this interaction is to learn how to support people who experience this type of sensitivity, and who respond by needing space.

The third scenario we chose to include is a situation where the player learns the personal information that another NPC is autistic. Here the player learns how to advocate for autistic individuals without disclosing their personal information.

In the final scenario, Tony is overwhelmed with a new, ill-defined project that is being forced onto him by a manager who does not understand the scope of the project. While unpleasant for anyone, ambiguity is particularly challenging for autistic individuals who rely on structure to regulate feelings around uncertainty. The player learns how to be an ally for the AP by working together to decide next steps, including structuring the team such that it does not fall entirely on the AP to be completed.

There are two endings depending on how the player responded to the final scenario. If the player was able to navigate the conversation about the new project back to a conversation that engaged Tony, the new project was a success along with the original project. If however the player chose to keep Tony removed from the conversation about his own capabilities and agency on the new project, that project was a failure and Tony gets moved to another team.

6.2.6 Learning Panel

The learning panel in the game allows players to reflect on pivotal moments in the game. Lessons appear in the learning panel as the player progresses through the game. Each lesson is connected to a specific scene, allowing players to reflect on the choices they made during that scene. The first scenario corresponds with *Take Things Literally*, the second scenario corresponds with *Audio Stimuli* and *Environment Matters*, the third scenario corresponds with *Privacy Matters* and the last scene is the *Being An Ally* panel. If the player did not make the optimal choice in a given

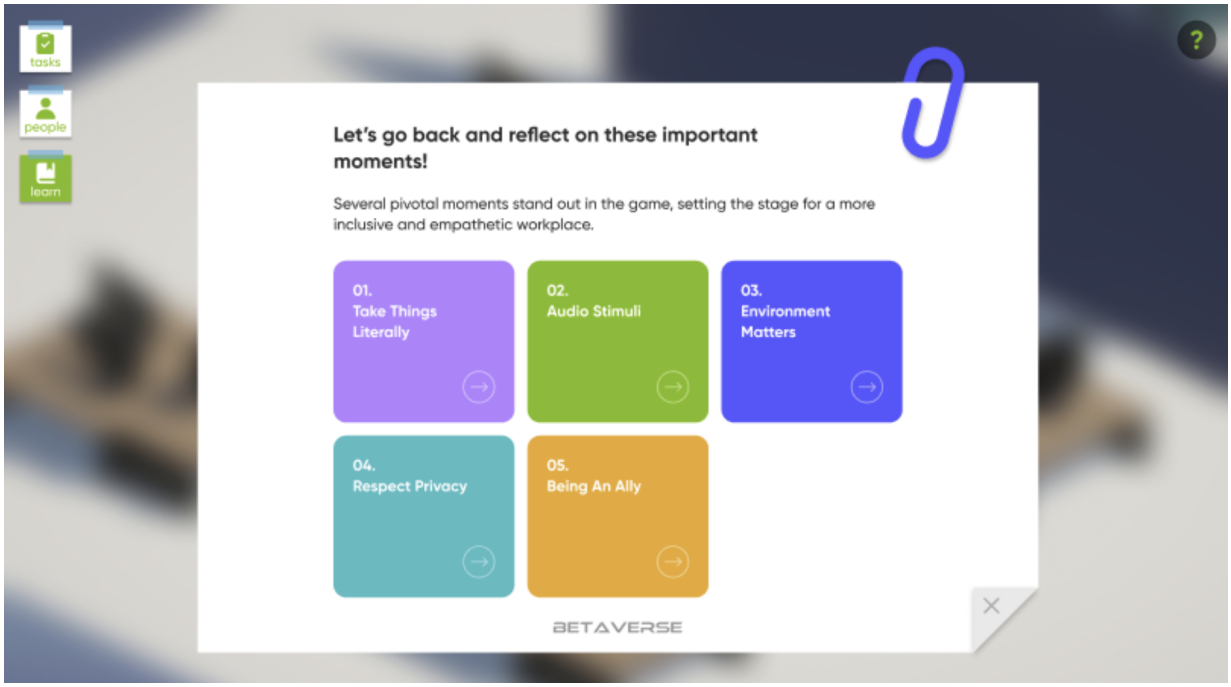


Figure 6.4: Learning Panel

scene, a suggestion for a better choice is described.

6.2.7 Transformational Goals

In the following sections I will describe the main game narrative scenes in the order in which they occur, as well as the transformational goals embedded in the scenes. Lessons build on one another as the game progresses.

6.2.7.1 Encountering a Colleague with a Different Communication Style

The transformational goal of the first scene is to help players recognize and respond to different communication styles. The design aims to teach players that some people interpret language differently due to distinct cognitive processing patterns, such as those that can be common among autistic individuals. Developing awareness of these differences can foster clearer and more empathetic communication in workplace interactions [64].



Figure 6.5: PC thought bubble with confused response to Tony

In this scene, the PC meets Tony in the coffee room. During casual conversation, another colleague jokes about having seen both the sunset and sunrise from the office, implying that they have been working excessively long hours. Tony responds matter-of-factly, saying, "That's not possible." A thought bubble then appears above the PC, expressing confusion about Tony's literal interpretation of the remark.

Players are presented with three dialogue options in response to Tony's comment:

1. "Oh, it's just a joke. Don't worry."
2. "You seriously didn't get that?"
3. Remaining silent.

At this early point in the game, none of these responses are ideal. Option 1 appears friendly on the surface, but subtly invalidates Tony's reaction by minimizing it. This suggests that his interpretation is unimportant and that the social norm of "getting the joke" takes precedence over understanding his perspective [80]. Option 2 is overtly critical, expressing disbelief and



Figure 6.6: Options for PC responses for Scene 1

reinforcing a normative expectation of shared figurative understanding. The use of "seriously" conveys irritation, signaling that Tony's literal response is socially different rather than simply different . Option 3, in contrast, reflects avoidance [102]. This is a strategy that protects the PC from potential awkwardness but leaves the misunderstanding unresolved. This silence offers no clarification or repair, modeling how inaction can perpetuate discomfort and misunderstanding in real workplace interactions.

This intentional design limitation sets up the game's learning trajectory. Early missteps are part of how players later come to recognize more inclusive communication strategies. At this early stage of the game, players are not yet equipped with the communicative tools to respond effectively, underscoring the game's central pedagogical premise: learning emerges through imperfect practice. The moment of discomfort invites reflection on habitual, often unexamined ways of responding to neurodivergent communication.

In the post-scene learning panel, players are explicitly reminded that autistic individuals

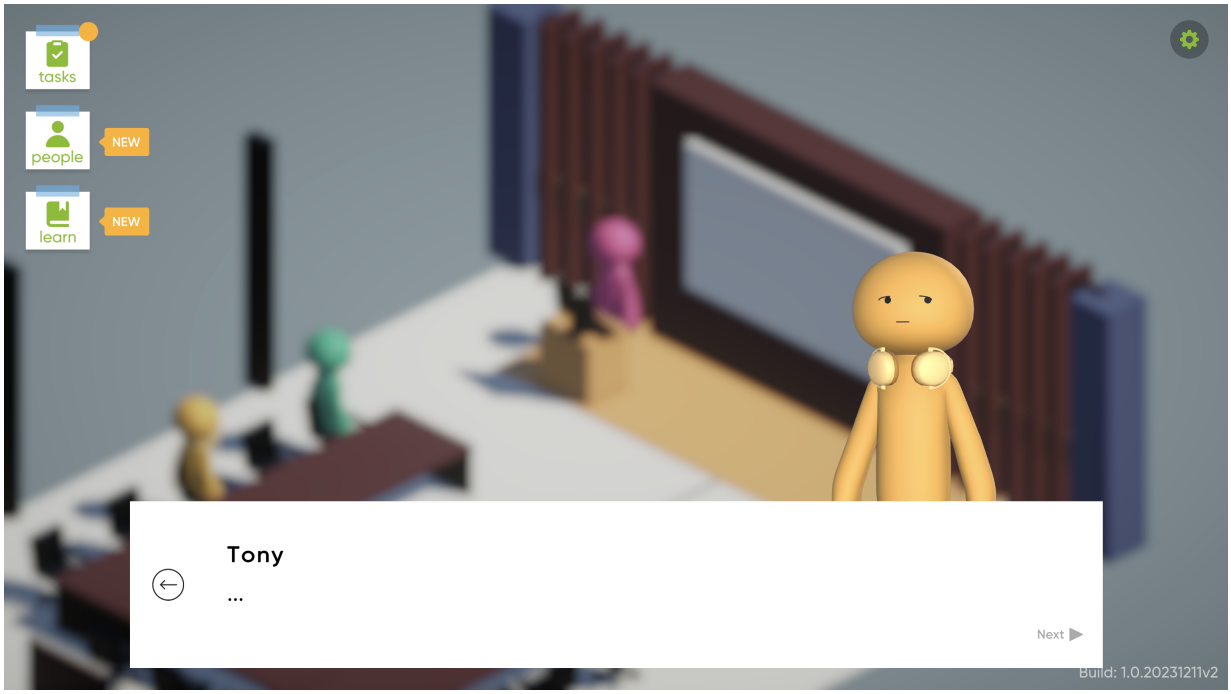


Figure 6.7: Tony expresses discomfort as the projector begins to make noise

may exhibit unique communication patterns, such as literal interpretation of language [67]. This reflection reinforces the lesson that effective workplace communication requires recognizing and adapting to such differences rather than pathologizing them.

6.2.7.2 Supporting a Colleague in a Moment of Discomfort

Following the initial encounter in the coffee room, the PC is tasked with onboarding two new team members, Tony and Ming. During the session, the PC turns on a projector to begin a slide presentation, and it begins making loud noises. Tony's changing facial expressions indicate growing discomfort. Ellipses in the dialogue box convey hesitation and unease. Eventually, Tony puts on his headphones, prompting Ming to question his behavior in a way that suggests frustration rather than concern. The tension escalates until Tony, appearing overwhelmed, excuses himself and leaves the room.

The transformational goal of this scene is to increase players' knowledge of sensory sen-



Figure 6.8: Options for PC responses after Tony puts on his headphones to block the noise

sitivities and how such experiences can influence behavior. Specifically, it teaches that autistic individuals may become overstimulated by auditory stimuli, and that these sensory differences are genuine, embodied experiences rather than matters of attitude or preference [12] When Ming confronts Tony about his headphones, the PC is presented with three immediate response options:

1. Double down by asking, "Um, yeah, what are you doing?"
2. Ask Tony to remove the headphones.
3. Remaining silent.

Each choice highlights a different kind of social misstep. Option 1 aligns the PC with Ming's skepticism, reinforcing group pressure and implicitly questioning the legitimacy of Tony's discomfort. Option 2, though less overtly mocking, still centers normative expectations of workplace behavior that wearing headphones during a meeting is inappropriate, rather than seeking to understand the cause. Option 3, remaining silent, avoids immediate confrontation but also withdraws empathy, leaving Tony unsupported in a moment of visible distress. None of these

choices models a productive response; instead, they reflect how bystander inaction or subtle social alignment can perpetuate exclusionary dynamics in professional settings [102].

When Tony verbalizes his discomfort saying that he is not feeling well and needs to take a break, the PC faces a second decision:

1. to allow Tony to take a break
2. to encourage him to stay by saying, "We're almost done. Just a few minutes more."

This secondary choice invites the player to reflect on accommodation versus productivity pressures [56]. Option 1 affirms Tony's self-advocacy and models supportive leadership that respects individual needs. Option 2, though seemingly practical, reproduces a common managerial response that prioritizes task completion over wellbeing, implicitly discouraging open communication about sensory overload.

The lesson reinforced in this scene is that autistic individuals may process sensory environments differently, and that understanding and respecting these differences is crucial for building supportive and inclusive workplaces [30]. In the post-scene learning panel, players are reminded that environmental factors such as background noise or flickering light can significantly impact autistic individuals' capacity to participate. By framing these moments as opportunities for awareness rather than judgment, INTENT guides players toward recognizing that inclusive leadership requires flexibility, empathy, and a willingness to adjust norms around comfort and engagement.

6.2.7.3 Helping a Known Autistic Person Advocate for Themselves

One month after the previous events, the player character (PC) meets Ash, another autistic team member. Early in their conversation, Ash discloses that she is autistic and experiences sensitivity to bright light. She usually manages this by wearing sunglasses indoors but has forgotten them today. During a subsequent brainstorming meeting in a sunlit conference room, Ash closes the blinds upon entering, visibly seeking relief from the glare. Moments later, Ming, who is unaware



Figure 6.9: Ash needs to close the blinds

of Ash's sensitivity, reopens the blinds, commenting cheerfully that it's "perfect weather." The scene presents the PC with a subtle but significant social dilemma: whether and how to intervene in a moment of inadvertent harm, while respecting Ash's privacy and agency.

The transformational goal of this scene is to develop the player's skill in allyship behaviors, particularly in situations where neurodivergent needs have been disclosed privately. Whereas earlier scenes focused on building awareness and understanding, this one challenges the player to translate that awareness into action to demonstrate support through socially attuned, respectful behavior. The intended transformation is behavioral: to move the player from recognition of difference to active, ethical engagement.

When the blinds are reopened, the PC is offered three possible responses:

1. to silently adjust the blinds in support of Ash,
2. to remain silent and take no action, or
3. to inform Ming of Ash's light sensitivity and then adjust the blinds.

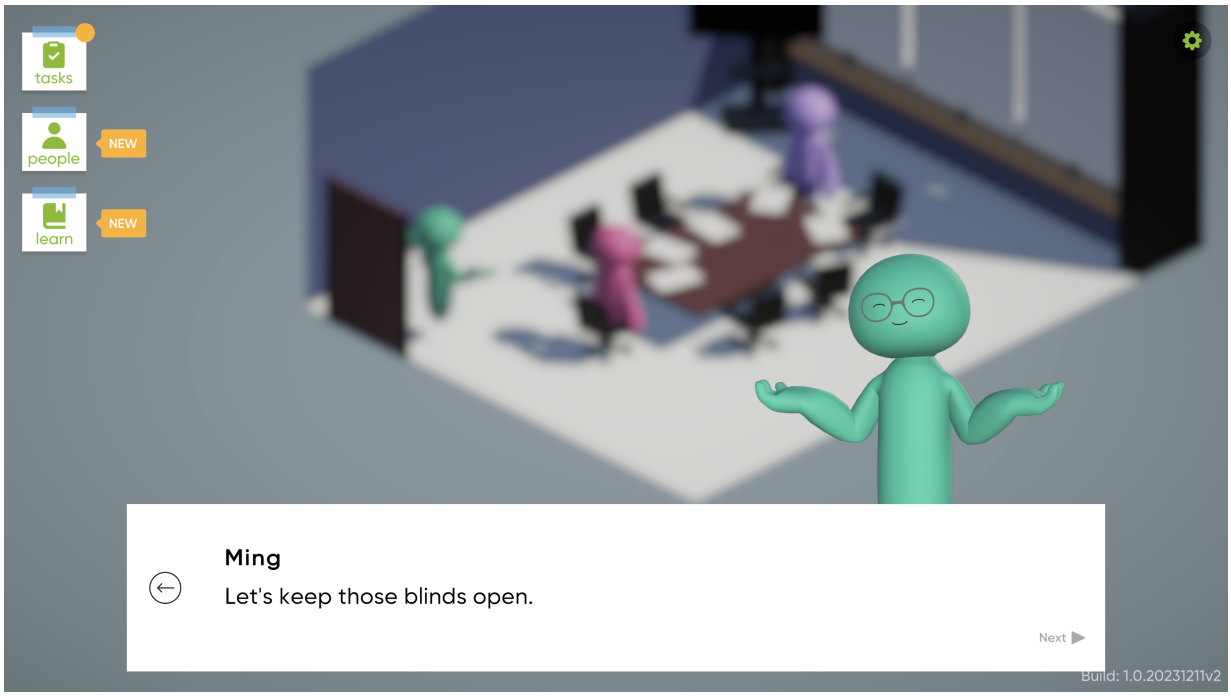


Figure 6.10: Ming opens the blinds, not knowing about Ash's sensitivity



Figure 6.11: PC options in response to Ming's actions

Each option reflects a distinct allyship stance with varying degrees of agency and risk. Option 1 demonstrates solidarity through nonverbal, situational support which is a subtle action that restores Ash's comfort without drawing attention to her disclosure. Option 2, silence, avoids social conflict but fails to provide support, illustrating how passivity can reinforce marginalization even in seemingly minor moments. Option 3, in contrast, risks violating confidentiality by naming Ash's sensitivity to others without her consent. Though well-intentioned, it models a common allyship misstep: prioritizing resolution or advocacy over the autonomy of the person being supported [61].

The central lesson in this scene is that effective allyship involves balancing action with discretion, enabling the autistic individual to self-advocate without being exposed or spoken for. The player learns that advocacy is not only about intervening but also about reading context, respecting privacy, and taking cues from the individual's expressed needs [61].

In the post-scene learning panel, the player is reminded that disclosure is an ongoing and context-dependent process [79]. Supporting autistic colleagues requires attunement to both environmental accommodations and interpersonal boundaries. By practicing this balance, players internalize that allyship is most effective when it is responsive, informed, and guided by the preferences of those it aims to support.

6.2.7.4 Helping Tony Organize His Thoughts

In a later team meeting, Tony is asked to take on a new project in addition to his current responsibilities. The project's parameters are vague, and the lack of structure makes Tony visibly uncomfortable. His hesitation is portrayed through capital letters and exclamations describing his uncertainty about expectations. The situation challenges the player to determine how best to support Tony without undermining his autonomy.

The transformational goal of this scene is to change the player's behavior, moving from protective impulse toward collaborative, inclusive problem-solving. Whereas earlier scenes empha-



Figure 6.12: Ali pushes a new project onto Tony's workload



Figure 6.13: Tony responds emotionally in a discussion about new project

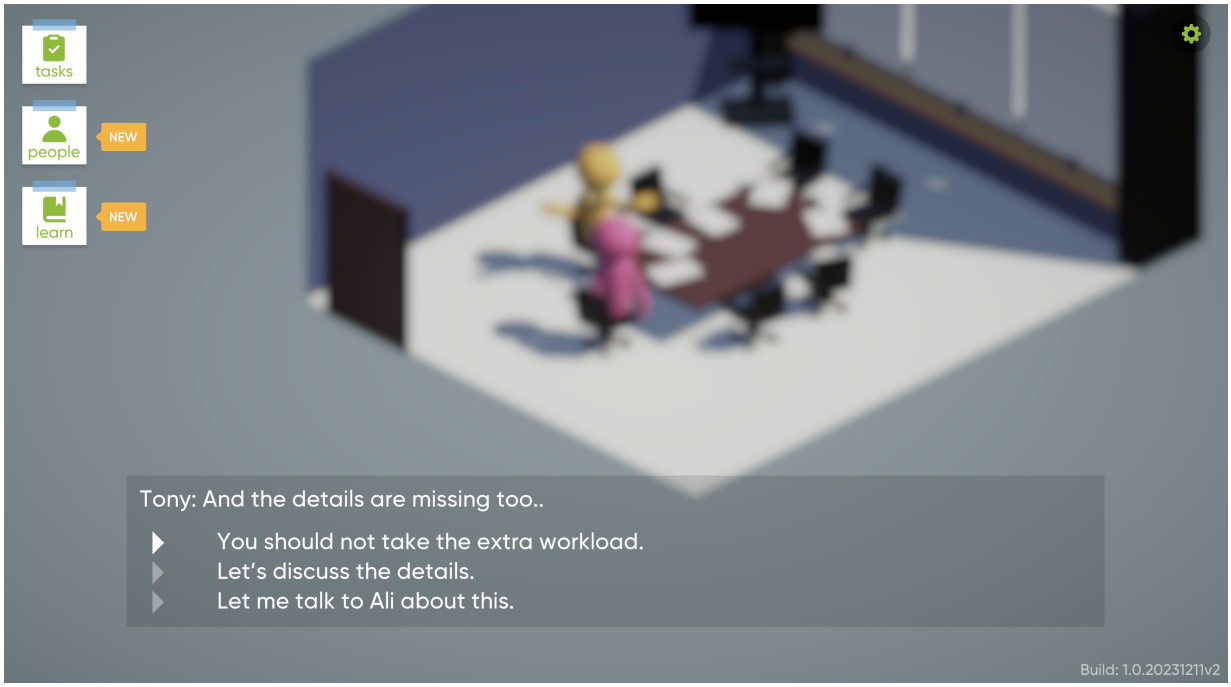


Figure 6.14: PC responses to Tony's new project

sized awareness and advocacy, this scene focuses on how workplace allies can create conditions that empower neurodivergent colleagues to contribute meaningfully.

The player is given three initial response options:

1. "You should not take the workload."
2. "Let's discuss the details."
3. "Let me talk to Ali about this."

Each response represents a different approach to perceived vulnerability. Option 1 expresses overprotection, discouraging Tony from accepting the task in an effort to shield him from discomfort. While seemingly supportive, this option removes Tony's agency and reinforces the stereotype that autistic individuals cannot handle complex assignments [99]. Choosing this path results in Tony's exclusion from the project and a weaker overall team outcome.

Option 2 demonstrates collaborative engagement. By inviting Tony to discuss the project details, the PC opens a dialogue that acknowledges Tony's discomfort without assuming inca-

pacity. Through this exchange, Tony shares a framework he has already developed for organizing project components which is a structured approach that highlights his analytical strengths. This path leads to a successful collaboration in which the team benefits from Tony's methods and the PC's facilitation. It models inclusive teamwork built on respect for diverse cognitive styles.

Option 3 reflects delegated problem-solving where the PC avoids addressing the issue directly by consulting Ali, a manager. This conversation presents two further choices: telling Ali that Tony may not be suitable for the project, or explaining that the project should not fall to a single person. The former silences Tony's perspective and gives Tony an out from the opportunity all together. The latter provides context to Tony's discomfort and ultimately allows Tony to describe his framework, engaging him in the conversation, which leads to the team's success.

The key lesson reinforced in this scene is that inclusive leadership involves co-creating supportive environments rather than making unilateral decisions on behalf of others [61]. Empowerment emerges not from removing challenges but from providing clarity, structure, and dialogue that enable all team members to contribute their strengths. The post-scene learning panel underscores that fostering successful collaboration means balancing empathy with respect for autonomy, recognizing that genuine inclusion requires trust in colleagues' competence as well as sensitivity to their needs.

6.2.8 Transformational Mechanisms

In this section, I describe how self-efficacy principles are embodied in the game.

Self-efficacy: risk information. As a narrative game, *INTENT* presents realistic scenarios that autistic workers may experience in the workplace, from the perspective of an allistic colleague. These scenarios include everyday situations that allistic people may not perceive as problems, such as bright lights or the noise from a projector fan. In other words, the game narrative helps players reframe their understanding of daily office activities to include the problems that their autistic colleagues face.

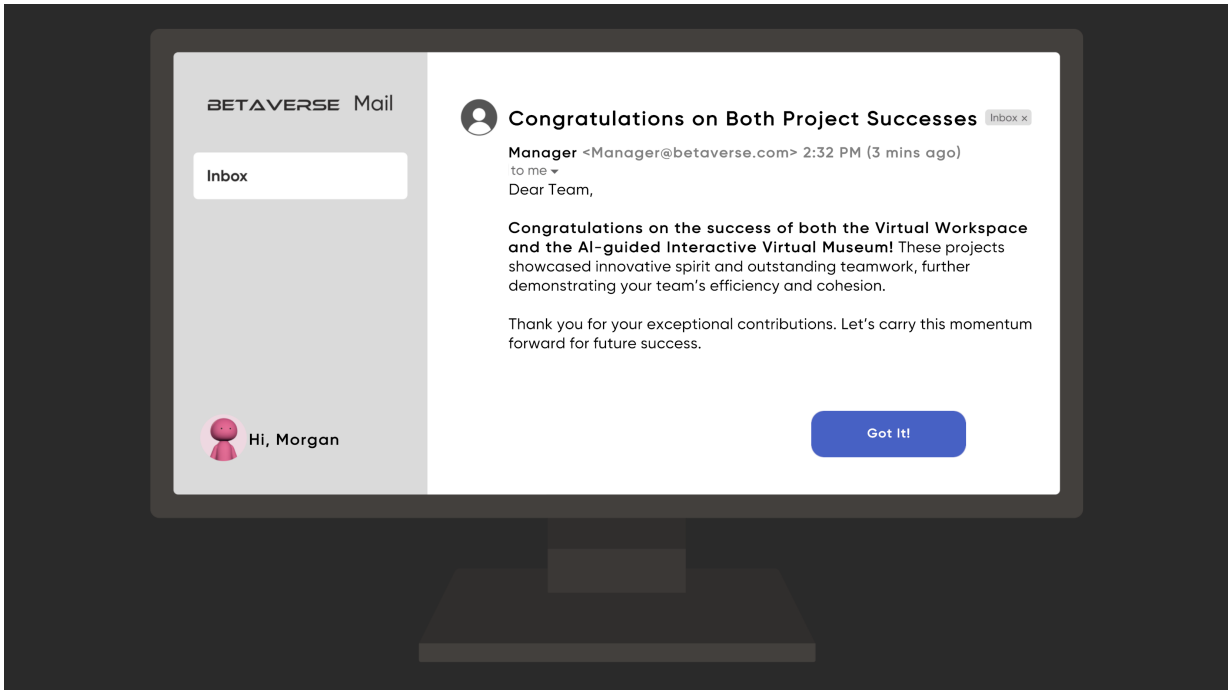


Figure 6.15: Successful completion of both projects

The challenges faced by autistic individuals vary because ASD is a spectrum, and each autistic individual will have their own abilities [84]. We therefore designed two autistic characters with different challenges. Comparing and contrasting their experiences from the perspective of the PC, the player experiences two different points on the spectrum of ASD.

Self-efficacy: skill development and guided practice. The player decides where to move and can trigger actions in the environment, from trivial (making coffee) to consequential (deciding to change window blinds to reduce the bright light in the room). The player also makes decisions through dialogue choices, with consequences for their social actions. By allowing the player to make choices that impact the story, the game aims to influence the player's behavior towards autistic individuals in a more understanding manner.

Decisions are not always simple or binary; for example, the decision regarding the blinds also brings up the option to disclose Ash's autism to co-worker Ming, which Ash did not grant permission to do. If the player supports Ash by adjusting the blinds, Ash will have a positive

reaction. If they choose to disclose for Ash, then Ash will react negatively. Not only will the player's choice be reflected in the character's reaction, but it will also be visible in the dynamic Learning Panel to reinforce positive behaviors. Under "Respecting Privacy", the player will see "you did a good job!" praise along with an explanation of this scenario if the player does not disclose for Ash.

To improve clarity, there are self-thought bubbles, simplifying the differentiation between a player's internal thoughts and actual conversations; in other words, the game is designed for the player to not only act in the world, but also reflect on why they are acting, which is important for learning [62].

Self-efficacy: social support. While *INTENT* is a single-player game, we provide *simulated social support* by showing how the characters react to the player's choices. Building a positive relationship between the player and the co-workers Tony, Ming, Ali, and Ash is a gradual process achieved through three primary episodes with a number of interactions within them: (1) awareness; (2) active allyship; (3) result. *INTENT* takes players on a journey from awareness to active allyship where they learn to adapt their behaviors, communicate effectively, and build positive relationships with autistic individuals, ultimately creating a more inclusive and supportive social environment within the game and, ideally, in real-life interactions as well.

Over the course of the game, the level of interaction escalates from basic awareness to taking supportive action, e.g., one narrative sequence has Tony requesting details and Ali then being obstructive. The player can choose to intervene or hold back, with results shared in the Learning Panel, in how the episodes play out, and in the different ending states for the game. As discussed with our SMEs, this progression mirrors the real-world process of building relationships and understanding, reinforcing the idea that transformation in social interactions is a gradual and evolving journey [74].

6.3 A Qualitative Study of Autistic Players' Perspectives on INTENT

How did designers authentically represent lived experience when the player is not a member of the affected group? This challenge motivated the study presented in this chapter, which treats the experiential knowledge of autistic players as the primary insight into whether and how *INTENT*'s design achieves authentic representation.

6.3.1 Research Questions

RQ1: How do autistic players relate to autistic characters in the game?

This research question explores how autistic players relate to the autistic characters in INTENT, focusing on how players interpret the similarities and differences between their own lived autistic experiences and the traits, behaviors, and challenges depicted in the game. This question aims to surface how autistic players evaluate character authenticity.

RQ2: How do players anticipate the allistic response to the game?

This question probes the gap between design intent and anticipated audience interpretation. For example, autistic players' expectations about how allistic players might misread the game provide a lens on the risks of stereotyping. Exploring these anticipations allows us to reason about the efficacy of the game in real workplace contexts.

RQ3: What lessons do autistic players see in the game?

This question explores the impact of the game. If the allistic player responded in the real world to scenarios like those portrayed in the game, would it be positively impactful? Are these the right behaviors to encourage?

6.3.2 Recruitment

We recruited autistic individuals through mailing lists provided by the autism research community.

We used a screening survey to evaluate whether or not participants were eligible for our study. The main purpose for the screener was to discern whether or not participants were autistic. While they did not need to provide documentation they did need to disclose whether or not they were diagnosed. They were invited to also include comorbidities such as generalized anxiety, depression, etc. Finally, we asked them whether or not they were able to communicate verbally. If they passed the screener, we would reach out with a request to schedule a session.

6.3.3 Procedure and Instruments

Each session was conducted remotely and lasted between one and two hours. Participants played through the entirety of INTENT, thinking aloud when they felt comfortable doing so.

Following gameplay, a semi-structured interview was conducted with each participant. Interview questions were organized around four topic areas: play experience, specific game content, autistic representation, and perceived impact.

The first topic area addressed participants' general play experience, including memorable moments, emotional responses, favorite aspects, and perceived mental effort. These questions were included to establish a baseline understanding of how participants engaged with the game as a whole before moving into more specific content. Questions about mental effort were included to assess cognitive load, which has implications for the accessibility and usability of the game for autistic players.

The second topic area focused on specific game content, particularly the autistic characters Tony and Ash, as well as the pivotal decision points in which the player character offered help to Tony. These questions were included to elicit participants' reactions to the specific narrative and character design choices made by the team, and to understand whether those choices resonated

with or diverged from participants' own experiences.

The third topic area addressed autistic representation directly, asking participants to reflect on how the game represented both their individual experience and the autistic experience more broadly, as well as the lessons designed for allistic players. These questions were included because autistic players are the primary evaluative authority on the authenticity of the game's representation, and their perspectives are essential to understanding whether the design achieved its transformational goals.

The fourth topic area explored perceived impact, asking participants to reflect on how they believed the game would affect allistic colleagues' awareness and behavior. These questions were included to understand whether autistic players saw the game as a viable tool for workplace inclusion, and to gather their expectations and hopes for the game's transformational potential.

6.3.4 Data Analysis

We analyzed the interview data using a collaborative, iterative coding process designed to ensure both reliability and depth of interpretation. Data collection consisted of audio recordings and verbatim transcripts of participant interviews. Prior to coding, all transcripts were segmented into numbered sentences to facilitate precise referencing across coders and to streamline later analysis.

A research assistant and I independently developed initial versions of the codebook. Each version contained preliminary codes, definitions, and expectations of themes anticipated to emerge from the data. Following this individual step, we reconvened to compare and contrast our codebooks. Through discussion and consensus-building, we synthesized these into a shared codebook that served as the foundation for systematic coding. We used a constructivist approach using open coding, meaning that all responses by the participants are valid [21].

To maintain transparency and comparability, each code entry was linked to transcript sentence numbers. We assigned sentence numbers directly within the codebook, thereby creating

an at-a-glance record of where codes applied. This approach allowed immediate identification of overlaps, discrepancies, and areas of divergence between coders without requiring repeated reference back to the raw transcripts. In addition, we highlighted and annotated the transcripts themselves, which provided an accessible reference point for examining disagreements in context.

As an initial reliability check, we both coded the same interview transcript independently using the finalized codebook. Each of us applied codes to the same numbered sentences from a single participant's transcript, then reconvened to compare results. This process enabled identification of inconsistencies in interpretation, as well as opportunities to refine the scope, definitions, or granularity of particular codes. During this phase, some codes were merged, expanded, or eliminated to improve conceptual clarity and ensure alignment with the data.

Once consensus was achieved, we proceeded to code the remaining interviews individually. By grounding the analysis in a shared and tested codebook, while also referencing sentence-level numbering, the process balanced interpretive flexibility with methodological rigor. This structured, collaborative approach increased the reliability of coding decisions and facilitated nuanced insights into how participants experienced and reflected on the game scenarios.

6.3.5 Results

6.3.5.1 RQ1: How do autistic players relate to autistic characters in the game?

Participants identified cognitive, emotional, and social resonances with the NPCs

Overall, participants felt that the game authentically represented aspects of their daily lives. Some participants drew connections to specific scenes. For instance, CJ referenced light sensitivity as "a daily experience that I deal with," and appreciated that it was included in the game. Another pointed to noise as a challenging stimulus: "I did personally feel that the noise was overwhelming at a certain point" (BB 224). Like the character in the game, this player used headphones to manage their sensitivity and saw it as a "similarity" between themselves and the

character.

For other players, the character identification was holistic: "to me like I could see obvious similarities between me and him, like both being autistic" (Astraea 172). Some players related more generally to one character and not the other: "I recognize all autistic people are really different in the way that we present autism... I think I would approach [situations] much more similarly to how Ash did. I think [Tony] had a hard time conveying his emotions, and he was very rigid which scared people off." (Byleth). This broader way of seeing the connections included emotional and social aspects of the characters. One participant emphasized that the scenario of needing additional clarity before beginning tasks made them feel "very... seen in a lot of those examples" (BB 223). Challenges around emotional regulation were also familiar: "when Tony was shouting... when I get worked up I can shout too" (CJ 68). Finally, one participant noted that their own experience of "rigid conversational styles" was sometimes off-putting to people they talked to, and found that was reflected effectively in the game (Byleth 242).

Several participants emphasized the realism of how the game depicted neurotypical interactions with autistic colleagues. Mad Dog said, "Heightening that interaction a little bit, or maybe like having it later in the game. So that you're already kind of like learning the lessons. And then there's this really big one that a lot of people experience like." Similarly, Therence described the scene where Tony encounters Ming's rudeness by noting that they could "relate," signaling the resonance of the game's workplace dynamics with lived experience.

Participants appreciated the representation of autistic diversity

Participants consistently praised the inclusion of more than one autistic character, describing it as a strength of the design. One remarked: "good thing...you had two autistic characters that are very diff[erent]" (Socrates 153). The differences between characters in sensory sensitivities (light, sound) were particularly salient to Mickey, who cited it as an example of how the game "represented [the characters'] qualities quite well." This player also found that other differences between characters were less easy to describe, and suggested that the contrast between light

and sound sensitivity could be "extended" to other aspects of difference between the characters. Astraea noted that the characters had different "needs and preferences and personalities," and described seeing herself in both of them. Overall, hellokittytennessee observed, "I would say the game represented most aspects of the spectrum. The different personalities and issues that each character face."

Beyond multiplicity, participants valued the presence of characters who broadened the representation of autistic professionals. Ashe (who selected their pseudonym prior to playing the game) noted two dimensions in which Ash, a UI/UX professional, challenged typical portrayals. First, they described UI/UX as being on "more of the creative side," in contrast to typical portrayals of autistic professionals as being in highly technical or quantitative roles. Second, they noted that Ash's role was "more public-facing," but that the narrative made clear that they were not known to be autistic at work. Ashe pointed out that this supported the idea that autistic people can be successful at work without outing themselves, even if their job involves dealing with many allistic people. Again, Ashe felt that this contrasted with stereotypical representations of autistic professionals in their interactions with the public.

Taken together, these perspectives indicate that participants not only resonated with the characters on a personal level, but also appreciated the game's broader representational strategies. Participants highlighted the value of seeing multiple, varied autistic individuals navigating the same workplace environment.

6.3.5.2 RQ2: How do players anticipate the allistic response to the game?

They considered multiple allistic interpretations, including stereotyping

The above findings describe how autistic players felt about the game's representation of autistic characters *from the autistic point of view*. However, players were aware that the ultimate target audience for the game is allistic co-workers of autistic professionals. They therefore also considered how allistic players might experience the same game, but with a different interpreta-

tion.

One example of the imagined allistic audience is Ashe's discussion of counter-stereotyping, with the autistic character Ash who has both a creative and public-facing role. Ash's character challenges stereotypes for how autistic people typically see themselves represented, but by the same token, the character also challenges how *allistic* players react to the same stereotypes.

Other participants were concerned about moments where allistic players might impose their pre-existing stereotypes on the game. Socrates was concerned that allistic players might overgeneralize from the two autistic characters, pointing out that "not all people with autism necessarily have problems socializing." Pfizer and Sam2 both noted that when Tony is first introduced, it could evoke "that stereotype that autistic people speak robotically all the time" (Sam2). "[Allistic] people" are gonna see him," added Pfizer, "and be like, oh, yeah, all autistic people are like that."

Participants felt that the biggest concern with allistic stereotyping was early in the game, when characters were first introduced. Pfizer noted that having multiple autistic characters helped challenge allistic players' expectations, and that the highest risk of stereotyping was during the period between meeting Tony and then later meeting Ash. Even without the contrasting cases, Sam2 felt that Tony became less easy to stereotype as the game continued, because the player had a wider variety of interactions with the character.

They questioned the allistic ability to transfer knowledge

Participants also raised concerns about whether allistic players would feel that the challenge of autistic inclusion was relevant to them. Ashe thought that allistic players might only consider the game relevant if they, like the PC, were a manager. Otherwise, Ashe hypothesized, "[the player] would probably walk away from the experience being like, that's good skills for me to keep in mind if I ever make it to manager." Sam3 suggested that if neurotypical characters in the game *also* requested accommodations, it could have framed support for autistic co-workers as "an accommodation workplace [issue]" rather than "an autistic thing." In other words, Sam3 suggests

that allistic players might not be willing to take action based on their in-game experiences unless it was also relevant to them.

They resonated with an allistic behavior

Interestingly, one participant also found themselves mirrored in the allistic PC. They recognized that the character was unintentionally oversharing private information, and connected that experience to "certain situations of experience before, when I unintentionally overshared other people's private information" (Pfizer 281–283). In other words, at least one player did not see a bright dividing line between traits represented by allistic and autistic characters. We see this as an opportunity to help both allistic and autistic players to see ways they might be similar, as well as to understand differences between the groups.

6.3.5.3 RQ3: What lessons do autistic players see in the game?

Participants generally agreed that the core lessons embedded in the scenarios such as providing accommodations, advocating for autistic colleagues, and demonstrating allyship were valuable. Participants divided the lessons into three categories. *Environmental* lessons were about changing the physical space of the office, but also included improving office culture. *Interpersonal* lessons could reshape office relationships, while *structural* lessons were aimed at helping allistic players understand the underlying factors driving individual challenges.

They identified environmental lessons

In the environmental category, Bernadette noted the importance of designing for flexibility, saying, "Meetings for me are sometimes easier because I get to control, like there's more options of seating." Sam3 shared that while he is "not sensitive to light," changing the office lights would be an inclusive choice in ways that would "benefit everyone," since "[most] people hate harsh, white lighting and prefer lamps." Similarly, "mak[ing] the office quieter .. would benefit everyone."

They identified interpersonal lessons

Interpersonally, participants considered how the game might make space for conversations about access needs. Sam was "glad that the character just stated their access needs," but thought that "'in a traditional office environment," autistic workers might not feel comfortable doing so. They suggested adding more social structure for the allistic player to ask about access needs, for example by adding more PC dialogue probing for Ash and Tony's needs.

They identified structural lessons

Finally, Mad Dog emphasized allyship through structural support, explaining, "The scenario is centered around like sticking up for Tony and this like specific choice around, like it's not a job for one person. That choice specifically. Yes, I see that it's about being an ally. But what I also see is like the need for context and details." This perspective frames allyship as support in the form of addressing ambiguity on teams by defining workload distribution. Mad Dog highlights that meaningful support requires changing the system and not simply the interactions that happen within those systems.

In summary, participants affirmed that the game effectively modeled allyship and environmental supports. They also identified ways that the game's lessons could be applied more broadly (e.g. designing for environmental flexibility) and suggested changes to the game that they felt would help accomplish these goals.

6.3.6 Discussion

The autistic players resonated with the autistic characters in the game cognitively, emotionally, and socially. Many participants described their sensitivity to light and sound, similar to Ash and Tony, respectively. Some players were concerned with Tony's stereotypical social behaviors even though the same behaviors were also experienced by participants. The sequence of character introductions emerges as a design consideration: introducing less-stereotypical autistic characters may help allistic players develop more flexible schemas before encountering behaviors they might otherwise over-generalize. Overall players appreciated the diversity among the

characteristics across both autistic characters.

The appreciation for diversity across autistic characters aligns with contrasting cases theory, which says that encountering varied instances of a concept enables learners to develop more differentiated and flexible understanding than a single instance affords [81]. In this sense, variation across characters creates the conditions for players to experience the spectrum rather than simply being told about it. Representing multiple autistic characters is not only a matter of inclusion but a pedagogical design strategy.

For future iterations of *INTENT* I would recommend more representation of autistic people on the design team. If that is not possible, maximizing the number and diversity of autistic characteristics and behaviors across as many characters as possible would reduce the risk of stereotype anchoring.

Neurotypical players may also resonate with traits commonly associated with autism, such as a preference for soft lighting or discomfort with eye contact. This aligns with principles of universal design: designing for the needs of marginalized users tends to produce solutions that benefit a broader audience [92]. Autistic character design that is specific and grounded may create unexpected points of connection for neurotypical players. More broadly, designing all characters to be distinct and richly contextualized, with unique backgrounds, traits, and behaviors, may reduce the degree to which autistic characters are perceived as outliers. When complexity is the norm across a cast of characters, autistic traits become one expression of human variation rather than a marker of difference.

Autistic players anticipated where allistic players might struggle to apply the lessons from *INTENT* in their own workplaces. Specifically, participants expressed concern that allistic players might not see themselves as responsible for supporting autistic colleagues if their workplace role did not mirror the team lead role of the player character. However, the behaviors modeled in *INTENT* (navigating communication differences, noticing a colleague's discomfort, supporting them in a difficult moment, or helping them advocate for themselves) do not require formal

authority to enact. This aligns with bystander intervention theory, which identifies diffusion of responsibility as a primary barrier to action: people in groups tend to assume that intervention is someone else's responsibility, particularly someone with more authority [25]. *INTENT* works against this tendency by modeling allyship as a peer-level practice, grounded in empathy and observation rather than hierarchy. If allistic players still find it difficult to identify opportunities for transfer, deploying the game in a setting that incorporates structured reflection may help. Research in game studies suggests that reflection after play supports meaningful learning [62], and facilitated discussion could provide allistic players the opportunity to identify specific actions they might take in their own workplaces.

Chapter 7

Conclusion

My dissertation work introduces two novel transformational games designed to empower members of historically marginalized communities as well as allies of marginalized individuals. I pair these games with evaluation studies investigating the games' impact on players from marginalized communities. I will now describe the summary of the contributions of this work, discuss deeper themes that emerged from the empirical findings for both *Bloomwood Stories* and *INTENT*, offer design implications for self-efficacy game designers to consider when designing for marginalized communities and/or their allies, and conclude with my vision for the future.

7.1 Summary of Contributions

- In Chapter 1, I introduce transformational games as an informal resource for individuals and allies combating systemic and interpersonal inequality, with implications for both learning and empowerment.
- In Chapter 2, I provide context for the challenge of behavior change. I use prior work to explain why providing knowledge is not enough to inspire action, and to show why game-based approaches are a particularly powerful means to increase self-efficacy.
- In Chapter 3, I introduce the design of my game *Bloomwood Stories: Block Party*. This digital game was used as the intervention for Chapters 4 and 5, and provides a potential study platform for future researchers seeking to learn about self-efficacy in games.
- In Chapter 4, I show how experience-taking with NPCs and perceived effort independently impact self-efficacy in *Bloomwood Stories*. These findings provide a theoretical grounding for how and why game narratives are important for player transformation.

- In Chapter 5, I illustrate how playing *Bloomwood Stories* impacts players perceptions of resources in their communities. I link specific game design decisions to players' ability to transfer their knowledge, with implications for both game-based learning and self-efficacy games.
- In Chapter 6, I describe the design of *INTENT* and a study on how autistic players perceive the game. This chapter can help guide future designers in creating self-efficacy games aimed at allies of marginalized groups.

7.1.1 Narrative Roles as a Mechanism for Perspective-Taking and Self-Efficacy

Across both *Bloomwood* studies, narrative roles were a key mechanism for players' ability to perspective-take and build self-efficacy. The quantitative study of *Bloomwood* (Chapter 4) showed that increases in self-efficacy could be traced to two distinct pathways: the self-reported effort players made in understanding Mrs. Lee's perspective, and the degree to which players were able to experience-take with the game's NPCs. In the qualitative study of *Bloomwood* (Chapter 5), I found that many players interpreted the player character through the lens of their own identities, which allowed them to engage with NPCs at a more personal level and draw parallels to their own support networks. Some mapped familial ideas onto characters, while another described blurred boundaries such as feeling "like [Mrs. Lee's] grandson too" illustrating how the interpretation of roles and experience-taking intertwined.

In the *INTENT* study (Chapter 6), I recruited autistic individuals to play the game, inviting them to step into the role of an allistic coworker, evaluating scenarios by drawing on their own workplace histories, pressures, and identities. While the autism spectrum cannot be comprehensively represented with two characters in a digital game (to that end, the NPCs were not necessarily designed to mirror all players' experiences), I found that participants resonated with the range of characteristics represented and used their own lived experience to assess how an

allistic employee might effectively respond to Tony's needs. Here, perspective-taking shifted from adopting the NPCs' experiences to projecting themselves into the PC's role and evaluating realistic strategies for advocacy.

Taken together, the studies demonstrate how players in both *Bloomwood* and *INTENT* draw on lived experience to deepen in-game reasoning. By taking on narrative roles that invite reflection of relationships and decision-making, players used the games to rehearse behaviors they hope to or hope others will practice in real-world contexts.

7.1.2 Interdependence and Support Structures Become Visible Through Play

I found that playing *Bloomwood* and *INTENT* made the dynamics of support and access more visible to participants. In *Bloomwood*, this was most clear in the post-play podmaps produced by players. Many participants explicitly reconfigured their support systems by adding resources they had overlooked, repositioning existing relationships, or reconsidering where informal resources such as Reddit threads belonged. These shifts reflected a growing awareness of both available support as well as structural gaps.

In *INTENT*, players similarly described a sense of the social and organizational scaffolding surrounding the workplace. As they reflected against Tony's experiences, they identified the support they relied on in their own jobs, the barriers that constrained them, and the environmental conditions that would enable effective advocacy. These findings show how narrative games can reveal players' understanding of their support structures including clarifying where they feel resourced, where they feel vulnerable, and how these insights inform the confidence to act.

7.1.3 Narratives Encourage Systems Thinking

Participants from both games consistently expanded their thinking beyond individual characters to question the broader systems shaping the narrative circumstances. In *Bloomwood*, players

linked NPC challenges to structural problems such as healthcare inequities, limited community resources, and cultural barriers. They treated personal problems as embedded in larger ecosystems rather than isolated events. In *INTENT*, players similarly questioned systemic dimensions of the workplace including organizational hierarchies and ambiguous roles. Participants interpreted Tony's situation through these structural lenses and highlighted how workplace environment and institutional norms can constrain or enable effective collaboration. The findings from both studies suggest that narrative play can inspire systems thinking by encouraging players to contextualize individual choices within the wider social, cultural, and organizational patterns.

7.2 Design Implications

I will now describe a set of questions designers can consider when approaching a self-efficacy game design for members of historically marginalized communities or allies of marginalized communities.

7.2.1 When: Under what circumstances do you want to make a self-efficacy game?

Designers should consider whether increasing players' self-efficacy and sense of agency is an appropriate response to the problem the game seeks to address, rather than placing responsibility on those already marginalized. For example, *INTENT* was designed to educate and empower allistic coworkers to support autistic colleagues, to shift some of the labor of navigating workplace inequality away from autistic people. Self-efficacy games are most appropriate when the goal is to redistribute responsibility and enable action by those who are most positioned to make change.

7.2.2 Who: What is the composition of your team?

Designers should reflect on who is represented within the team and how that shapes the game's perspective. When members of the target audience are part of the team, personal experience can inform narrative authenticity and design decisions. When the team does not include members of the target audience, it becomes increasingly important to engage directly with people who have the relevant lived experience. In both cases, designers should be explicit about whose knowledge is shaping the game and where additional perspectives are needed to avoid narrow or stereotyped representations.

7.2.3 What: What kind of connection do you want to enable between the player and characters in the game, including the PC and NPCs?

Designers should carefully consider the relationships between players and characters in the game.

- Resonance: Players could have resonance between themselves and the characters in the game, which would enable them to more naturally step into the role or try on the perspective. In Chapter 5, I found that many of my participants filled a similar role in their lives as the community advocate in *Bloomwood Stories*.
- Contrast: Players could experience a contrast between themselves and the characters in the game, which might make them feel surprised, or pause and reflect. This is how I would expect allistic players to react to the autistic characters experience in *INTENT*.

Designing characters for resonance or contrast, or designing characters with resonance and contrast allow for players to have multiple avenues to interpret roles or relationships with characters in the game.

7.2.4 Where: Where will players engage in effort taking action, making choices, or thinking about what to do?

Designers should consider where players are asked to actively think, interpret, and make decisions in the game. In Chapter 4, I found that perceived effort was a significant contributor to increasing self-efficacy. This raises important design questions: Where does the game slow players down enough to require reflection? Is there a part of the game where players wrestle with ambiguity? Designers should also consider whether and how the game reflects the results of their effort, for example through narrative feedback or branching dialogue, so that players recognize their own effort as meaningful.

7.2.5 How: How will the game intervene at the systems level?

Designers should consider how the game makes larger social, organizational, or institutional systems visible to players. For example, including narrative elements that position players' decisions within a broader ecosystem to highlight how constraints and supports affect outcomes. Designers should also consider whether the game extends beyond play through additional learning supports. One context for *Bloomwood Stories* was librarian-facilitated group sessions where a room full of players would discuss the options that the librarian, who was controlling the player character, should choose. Providing discussion prompts for these mid-game moments of pause might elicit discussions about how players reflect on lived or future experiences in the world.

7.2.6 Concluding Thoughts

This thesis was completed during a period of profound political uncertainty. In the United States, marginalized communities are facing active and targeted harm under the current administration. In this context, waiting for systemic change is not a viable strategy.

My vision for the future is one in which every person gets what they need regardless of

whether they belong to a marginalized group. I believe transformational games have a role to play in making that vision real, not because games can replace systemic change, but because they can do something systems often cannot: meet people where they are, build awareness and empathy, and empower individuals to support one another without waiting for institutions to lead the way.

The two games introduced in this dissertation, *Bloomwood Stories* and *INTENT*, are steps toward that vision. They are informal resources designed to spread awareness, build self-efficacy, and cultivate allyship at the interpersonal level. They cannot dismantle structural inequality on their own. But they can change how one person sees another. They can help someone recognize a resource they didn't know existed, or intervene in a moment they might otherwise have let pass. They can make someone feel seen.

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