
ABOVE WATER: An Educational Game for Anxiety

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Abstract

We present Above Water - a digital/physical hybrid game to inform people about the available strategies to cope with two types of Anxiety Disorders - Generalized Anxiety Disorder and Panic Disorder. The game teaches players about existing treatments. This hybrid game is designed to inspire players to share their experiences and develop their own personal narrative. The document also outlines an assessment strategy to study the game and determine its effectiveness as a game for health. The game is designed to educate non-institutionalized individuals with clinical anxiety and panic disorder. Potential players may be diagnosed, seeking intervention information, or a supportive friend.

Author Keywords

Game for Health; Psychology; Mental Health.

ACM Classification Keywords

J.3 [Computer Applications]: Health; K.8 [Personal Computing]: Games.

Introduction

The game *Above Water* is designed to educate players about generalized anxiety disorders and panic disorders. Potential players could have a clinical diagnoses, be seeking information about a suspected problem, or playing a supportive role in another individual's journey to health.

The game is not designed to be a treatment itself, but instead provides information that may empower individuals to seek treatment by creating awareness about different options, and encourage conversation between players. The game acknowledges that the effectiveness of treatments is personal to each individual and focuses on treatments as pieces of a treatment plan that contribute to better overall health and wellness.

Understanding Mental Health

Anxiety Disorders, according to the Diagnostic and Statistical Manual of Mental Disorders IV (DSM-IV), refer to a few different disorders including Generalized Anxiety Disorder, Panic Disorder, Phobias, Social and Separation Anxiety Disorders. Disorders are pervasive and disrupt daily functioning; in other words, they are not the typical worry or anxiety faced by a healthy individual. Anxiety caused by Anxiety Disorders is often disproportionate to the cause, extends over a long period of time, and can disrupt daily functioning [1, 7].

Although all types of anxiety disorders are serious and worthy of treatment, our game will specifically focus on Generalized Anxiety Disorder and Panic Disorders.

Generalized Anxiety Disorder (GAD) causes the afflicted person to experience ongoing daily anxiety, which can be disruptive to their daily life. Anxieties revolves around everyday life experiences and responsibilities of the individual (e.g., appointments, homework, or domestic duties). Physical symptoms (e.g. muscle fatigue, sleeping irregularities, etc.) can also accompany the mental symptoms of feeling anxious, restlessness, or feeling on-edge [7].

Panic Disorders are characterized by the onset of panic attacks that can be triggered or appear randomly. Panic attacks are a combination of physical and mental symptoms

that overwhelm the person. Although experiences with the disorder vary, the attacks may be accompanied by any of: increased, irregular heart rate, sweating, fatigue, hopelessness, loss of control, and overwhelming fear [7].

Treatments Overview

The following types of treatments or strategies for dealing with anxiety will be presented to players on the treatment cards. We offer a brief conceptualization of each treatment or strategy and pointers for additional literature.

The game raises awareness of different available treatments, including Cognitive Behavioural Therapy (CBT) [2], Medications [7], Somatic Experiencing [5], and Cognitive Reappraising [3]. Additionally, everyday life changes such as the importance of exercise [4], avoiding caffeine [7], as well as relaxation techniques [6] are emphasized. Activities in the digital component of the game act as an introduction to self-help methods. Additionally, links are provided to online information from trusted resources on the accompanying mobile application.

Informing the players about possible treatments is only half the battle; access to therapies can often be the next big challenge. The digital part of the game is also designed to address this challenge by linking to online resources, e.g. the Centre for Addiction and Mental Health's (CAMH) Thought Spot application¹, which allow users to research places to obtain treatment from a trusted organizations.

Gameplay

Above Water is a game that players play with physical cards and digitally with personal devices (such as tablets or smartphones). The game is designed to be co-located, collaborative, and synchronous with other players.

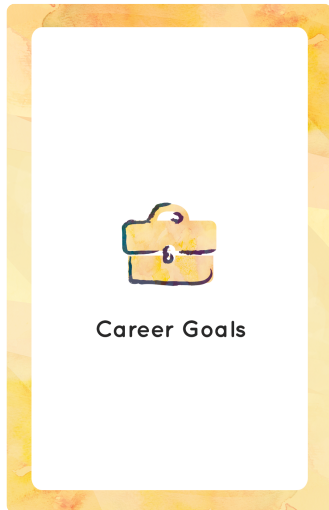


Figure 1: Life Goal cards represent some of the player's personal goals, reflected in their in-game goals.

¹<http://mythoughtspot.ca/>

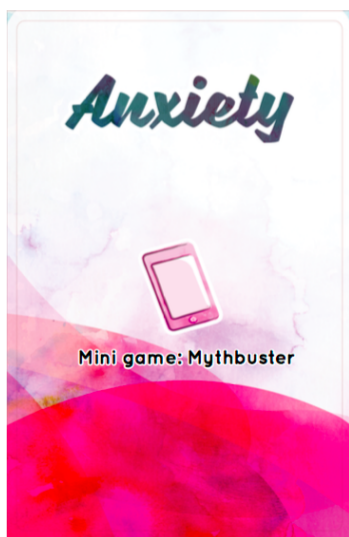


Figure 2: Anxiety cards represent the challenge imposed by anxiety disorders and can be countered by Treatment cards.

Materials

The game is played using the Above Water card deck and players' personal devices. In the deck there are four card types: life goals, anxiety, treatment, and share cards. There are 61 cards in the deck: 24 Life Goal cards, 20 Anxiety cards, 12 Treatment cards, and 5 Share cards.² The game is designed to be played with four players.

Objectives

The objective of the game is for players to achieve all of their life goals while managing anxiety. In this game, goals take the form of six collectible cards (e.g. Career, Education, Health, Self Improvement, Financial Stability, and Relationship goals). Before starting the game, each player must select four Life Goals on their smart phone or tablet, which will make their objective for that particular play session. The objective cannot be changed once the game has started.

End of game

The game ends when the winning condition is met. A player wins when they have achieved their goals (i.e., they have collected their chosen Life Goal cards that represent their objective) and their anxiety counter is at zero (i.e., the player has no anxiety cards in hand).

Game Mechanics

On each players' turn they will draw one card from the deck, which they will then place on the table face up, play or discard. Anxiety cards that the player has in hand can also be discarded by using treatment cards.

Life Goal Cards

Life goal cards were designed to encourage players to think or talk about their personal life goals. These cards

²The online browser game available is at: <http://play.hcigames.com/abovewater/>

(Figure 1) represent some of the player's personal goals. Before the game starts, each player chooses three goals to collect during gameplay. The player will announce to the team which goal cards they are pursuing and tell the team what they are trying to accomplish (e.g., "I will collect an Education card to represent my goal to do well in my Games for Health class, and one social card that represents my goal to make friends with the other students"). Life goal categories are broad to cover most areas of life goals, but still give guidance to help formulate their goals. Since goals in life are often diverse and multifaceted, players must choose four different life goals from the eight different options provided. This mechanic in the game facilitates open communication and asks players to develop their own personal narrative.

Anxiety Cards

While the players are collecting cards they may unfortunately pick up an Anxiety card (Figure 2). The player's goal is to discard all anxiety cards, but they cannot be discarded without a treatment strategy. If the player's anxiety counter goes up it will inhibit their gameplay strategy. For each turn the player has a full anxiety card counter (5), they will have a panic attack, where they must discard one card (other than an anxiety card) and lose a turn. The player's anxiety card count will be reduced to four cards following the missed turn, allowing them to play again. This mechanic was designed to teach players about the dangers of not dealing with their anxiety and allowing it to progress. It also is a metaphor for life with an anxiety disorder because it is pervasive and disrupts everyday functioning.

Debunking Mental Health Myths

This game is meant to inform players about common mental health myths, as well as helpful facts. The game is triggered by picking up an Anxiety card with an app icon on

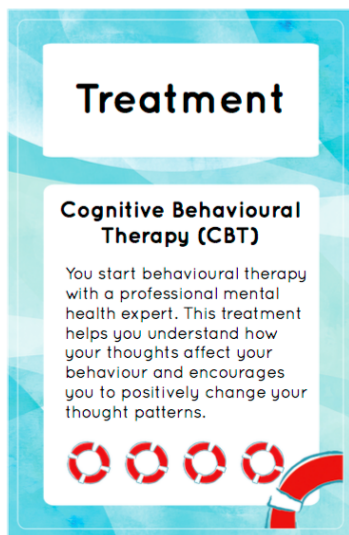


Figure 3: Treatment cards counter Anxiety cards, some by completing an activity on the player's personal device.

it. When players proceed to the app, they will have to determine whether the presented 'fact' is true within the time limit.

Treatment Cards

Various treatments and strategies are available for individuals with anxiety disorders. Treatments on these cards are based on the literature for treatment of anxiety and panic attacks. In reality, treatments do not all have the same effectiveness level for everyone. The goal is not to prioritize different treatments, but to raise awareness of different options.

Within the game, we have based the effectiveness of the game on the degree of assistance needed from a professional for each treatment. To symbolize this, each Treatment card (Figure 3) will have an associated number that defines how many Anxiety cards it is capable of removing (from 1 to 4). For example, an exercise session may be capable of treating only one Anxiety card, while a session of therapy requiring a therapist may be able to treat two or three anxiety cards. Treatment cards can be used at any moment during a player's turn. When a Treatment card is used, it is discarded by the player together with one or more Anxiety cards.

The maximum amount of Anxiety cards that can be discarded is equivalent to the potential of the Treatment card. The player can use more than one different type of Treatment cards in the same turn to discard more Anxiety cards. For example, the player can use an Exercise Treatment card and a Therapy Treatment card in the same turn. However, only one card of the each Treatment type can be used per turn, thus the player cannot use two cards of the same type of therapy on the same turn.

Some treatment cards will activate an interactive experience using the application. The interactive experiences allow the game to have educational moments that all players can participate in.

Deep Breathing Application

The deep breathing game walks players through a breathing exercise. It demonstrates how heart rate can be controlled by fast and slow breathing to promote deep breathing relaxation techniques.

Yoga and Stretching Application

The mobile app is used to show a yoga or guided meditation pose (Figure 4). Players take a moment to stand and stretch while trying the exercise. The phone assesses the player's balance by using accelerometer data. This allows players to assess how successful they were at the activity and enables some in-game competition between players.

Share Cards

If a player picks up a Share card (Figure 5) they will be referred to the app. The app will randomly pick a question for the players to answer. There are three categories: Tip, Share, and Create. Players may be asked to 'share' a strategy that helps them deal with anxiety, give advice or 'tips' on how they personally deal with anxiety, or 'create' a question to be answered by the group. Create Share cards will also give players the opportunity to discuss a strategy of their own. This encourages conversation and personalization of the game. These cards are meant to facilitate dialogue between players and help them relate their experiences with the information being presented by the game.

The application anonymizes the answers, and hides player identity. More information is conveyed about privacy and sensitivity of the game in an upcoming section.

Discarded cards and the Pile

Players will draw cards from the top of the deck and discard them into a separate pile face up. Once all of the cards are discarded, they should be reshuffled and made into a new pile. The game can then resume and progress normally. In addition, the Group Therapy treatment card will ask players to reshuffle the deck immediately after being drawn.

Privacy and Sensitivity

For privacy and sensitivity, the application has been designed to assist players in creating a more anonymous, open environment for play. The app randomizes answers and employs partial presentation of group responses to protect player identity. Each player is able to answer individually on their mobile device; unlike other games, players do not hand-write answers and cannot be identified by their writing. Furthermore, questions are designed to be indirect and non-threatening. Additionally, players can also role-play as a character of their choosing. This is a helpful option because the player can discuss the feelings and challenges of the disorder without disclosing personal information, thus supporting privacy.

Art

The game is designed to be a card game with an approachable water-colour art style. The design is simplistic and meant to avoid provoking anxiety. Colours like blue and green are used heavily. Additionally, life goal cards are made to look like rewards to encourage positive thoughts about players' end goals. Consequently, it encourages players to separate their goals from their anxieties.

The game's name, Above Water, is meant to inspire the metaphor of "keeping your head above water". This reflects the game's goal to teach coping methods, educate players about the treatments for the disorder, provide motivation,

and encourage to pursue academic and career goals. This is especially important because many sufferers of anxiety do not seek help or understand their disorder as curable with the adequate treatments [7].

Technology

Above Water is a physical/digital hybrid that uses physical cards and personal digital devices to enable interactive experiences. The digital implementation does not require players to download an app, instead it uses a simple HTML5 enabled website. This allows the game to access accelerometer data from the personal devices, and be compatible with most modern devices without needing to be developed for multiple platforms. To start the game, one player must create a game instance that provides a code for the other players, allowing the game to be synchronized across all devices. When an interactive experience is triggered, the game master (the player who created the game instance) selects the interactive experience, and all players will participate.

Discussion

Collaboration and Narrative Gameplay

The game is designed to be collaborative and foster communication between players. Discussing about mental health is important to everyone, even those taking a supportive role.

The digital activities are designed to get players to interact and achieve goals together. The application allows for anonymization of comments allowing for a more open environment for players who may not want to disclose personal information.

Share cards are part of the collaborative nature of the game and compliment the narrative game mechanics. Further-

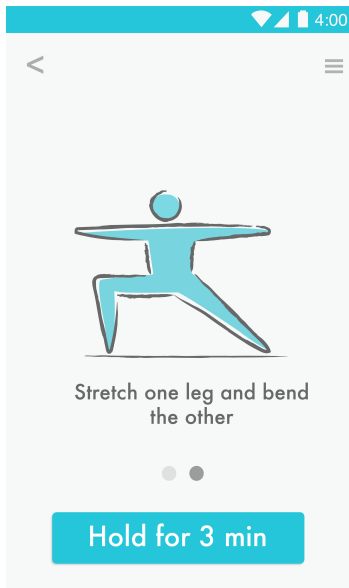


Figure 4: The companion mobile application is used to guide players through a yoga pose exercise.

more, Share cards allow for customization and personalization through by allowing players the opportunity to create questions when prompted by the application.

Built-in Learning

The mechanics of the game are designed to teach people in a natural way by allowing the association of information. Cards for managing in-game anxiety provide information for techniques that may be used to help the player manage their own anxiety in real life, ultimately tying the excitement of an in-game treatment card with information about a possible treatment strategy. By accessing the application, players can find additional resources and information.

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REFERENCES

1. Gavin Andrews, Megan J. Hobbs, Thomas D. Borkovec, Katja Beesdo, Michelle G. Craske, Richard G. Heimberg, Ronald M. Rapee, Ayelet Meron Ruscio, and Melinda A. Stanley. 2010. Generalized worry disorder: a review of DSM-IV generalized anxiety

disorder and options for DSM-V. *Depression and Anxiety* 27, 2 (2010), 134–147. DOI : <http://dx.doi.org/10.1002/da.20658>

2. TD Borkovec and E Costello. 1993. Efficacy of applied relaxation and cognitive-behavioral therapy in the treatment of generalized anxiety disorder. *Journal of Consulting and Clinical Psychology* 61, 4 (August 1993), 611–619. DOI : <http://dx.doi.org/10.1037//0022-006x.61.4.611>
3. Alison Wood Brooks. 2014. Get excited: reappraising pre-performance anxiety as excitement. *Journal of Experimental Psychology. General* 143, 3 (June 2014), 1144–1158. DOI : <http://dx.doi.org/10.1037/a0035325>
4. JD Brown and JM Siegel. 1988. Exercise as a buffer of life stress: a prospective study of adolescent health. *Health Psychology : Official Journal of the Division of Health Psychology, American Psychological Association* 7, 4 (1988), 341–353. DOI : <http://dx.doi.org/10.1037//0278-6133.7.4.341>
5. Peter A Levine. 1997. *Waking the tiger: Healing trauma: The innate capacity to transform overwhelming experiences*. North Atlantic Books.
6. Lars-Göran Öst and Bengt E Westling. 1995. Applied relaxation vs cognitive behavior therapy in the treatment of panic disorder. *Behaviour Research and Therapy* 33, 2 (1995), 145–158.
7. R. Parekh. 2015. What are Anxiety Disorders? American Psychiatric Association. (2015). <http://www.psychiatry.org/patients-families/anxiety-disorders/what-are-anxiety-disorders> Accessed: 2015-12-15.



Figure 5: Share cards allow players to progress their own narratives or share personal experiences.