Evidence Review Summary:

Key aspects of CBT and gamification to treat children with anxiety

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BfB LABS

Shift

Contents

Introduction

This deck summarises the learning from the literature review and expert consultation conducted as initial research for the BfB Labs and Shift anxiety and gaming project. The purpose of this deck is to outline the key aspects (mechanics) that a game developed to treat children with an anxiety disorder would need to include in order to be both effective and engaging.

Where available, evidence relating specifically to a) children and b) children with Generalised Anxiety Disorder has been captured. However it is important to note that the evidence is patchy when it comes to both child and anxiety disorder specificity.

Methodology

The literature review was conducted in August 2017. Sources were identified through a search of PubMed, Google scholar and references provided by Claire Hill, University of Reading.

The expert consultation involved 5 interviews with gaming experts. Interviews lasted between 30 minutes to 1 hour. Interviews were conducted with: John Hopkins (Senior User Research Manager, Blizzard), Tom Chatfield (author), Jesse Schell (games designer and author), Mariza Dima (lecturer in games design at Brunel University) and Alex Lambert (Creative Director at Inition).

1. The Problem Space

The Problem Space

Children's experiences of GAD and other Anxiety Disorders

What is an Generalised Anxiety Disorder?

- Anxiety disorders are characterised by **excessive, uncontrollable anxiety and worry about a wide variety of events and activities**.[1]
- The worry associated with anxiety is out of proportion to the feared event (i.e. distorted risk perception). However unlike adults with anxiety, children and teens with anxiety often do not realize that their anxiety is disproportionate to the situation.[2]
- Typically in children, worries are accompanied by at least one **physiological response** such as restlessness, muscle tension, irritability and difficulties sleeping.[3]
- Worry in children is often conceptualised as **repetitive thinking about threatening events** happening in the future and the negative outcomes associated with those events and their ability to cope.[4]
- DSM-5 has identified worries about **competence and performance** (e.g. at school) to be the most common worry among children with GAD (Generalised Anxiety Disorder).[5] However, children with GAD and other anxiety disorders worry about a diverse range of things and these worries can change over time.

Children with GAD have uncontrollable worries about ‘anything and everything’

Unlike other anxiety disorders, GAD is not attached to a specific threat (i.e. it is a free-floating condition). Examples of different worries in children with GAD include:[1]

Perfectionism

Some children with GAD are very perfectionistic. They might worry excessively about **being on time**. They adhere to **high standards** for themselves in academic and performance domains and worry greatly about not meeting those standards. They fear making mistakes.

Health / safety concerns

Other children with GAD may worry excessively about safety concerns, such as **war, crime, and natural disasters**. These children may become overly distressed by stories they hear on the news.
They may worry excessively over minor **illnesses** they have or be fearful of developing new illnesses.

Daily worries

Other children with GAD may exhibit a **“flavor of the day”** worry. They often worry but the focus of the worry may shift depending on what they hear or experience in a given a day.

Key features of GAD

These features identified by Dugas & Koerner (2005) have all been shown, particularly in the adult literature, to be important factors in GAD. Recent research is investigating the role of these factors in child GAD. Evidence suggests that these factors are also relevant to children.[1]

1. Intolerance of uncertainty

2. Positive / negative beliefs about worry

3. Negative problem orientation

4. Cognitive avoidance

Source: Dugas & Koerner (2005), Cognitive-Behavioural Treatment for Generalised Anxiety Disorder: Current Status and Future Directions, Journal of Cognitive Psychotherapy, vol.19(1)

Overview: key features of GAD[1]

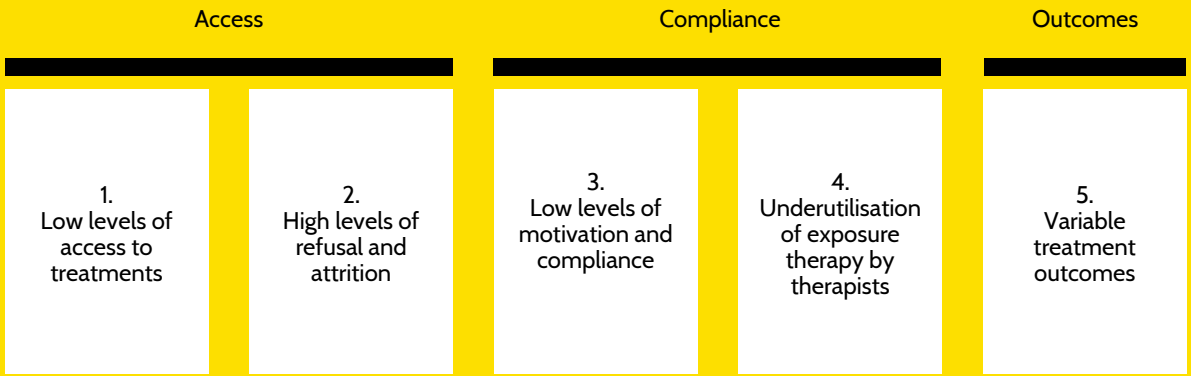
Intolerance of uncertainty	Child finds uncertainty threatening and stressful: they want know things 'for sure' (i.e. they desire 100% certainty). Will ask a lot of 'what if' questions to try and predict every scenario, seek a lot of information and avoid new situations.
Positive / negative beliefs about worry	Child views their worries as uncontrollable and harmful (negative beliefs about worry), but may also believe that worrying helps them to be prepared (positive beliefs about worry)
Negative problem orientation	Child lacks confidence in their own problem solving skills as problems are perceived to be difficult and threatening. They get caught up in negative self-talk which impedes their ability to effectively problem solve (e.g. take excessively long time to solve problems)
Cognitive avoidance	When child experiences worry and the unpleasant physiological symptoms associated with it, their strategy is to avoid thinking about it or to put it out of their mind through distraction - but this can make it worse.

The Problem Space

Issues with existing treatments

Issues with child anxiety treatment

The following issues have been identified in relation to the CBT treatment of children with anxiety disorders:



Overview: key issues with treatment

Low levels of access to treatment	Current estimates indicate that as many as 50% to 70% of children with disordered levels of anxiety have not received treatment[1]. Rates of seeking help for anxiety disorders appear to be lower than for other mental health problems.[2]
High levels of refusal and attrition	A number of adults refuse to being exposure therapy (25% to 30%) and of those who enter treatment, some fail to complete (15% to 30%).[3] Dropout rates are likely higher for children (rates of 23% to 47% have been observed in child anxiety treatment)[4]
Low levels of motivation & compliance	Unlike adults, anxious children do not typically seek treatment for themselves. Therefore their motivation to engage with treatment may be lower.[5] Data on child compliance levels are not available.

Overview: key issues with treatment

Under-utlisation of exposure therapy	The average clinician in community settings has a moderate degree of negative beliefs about exposure therapy.[1] Despite the efficacy of exposure therapy and CBT for child anxiety disorders, many therapists are hesitant to implement the treatment due to their beliefs regarding its ethicality.[2]
Variable treatment outcomes	Approximately 40% of children fail to benefit from exposure therapy.[3] Between 19% to 60% of patients (adult) experience a return of the target fear post treatment completion.[4]

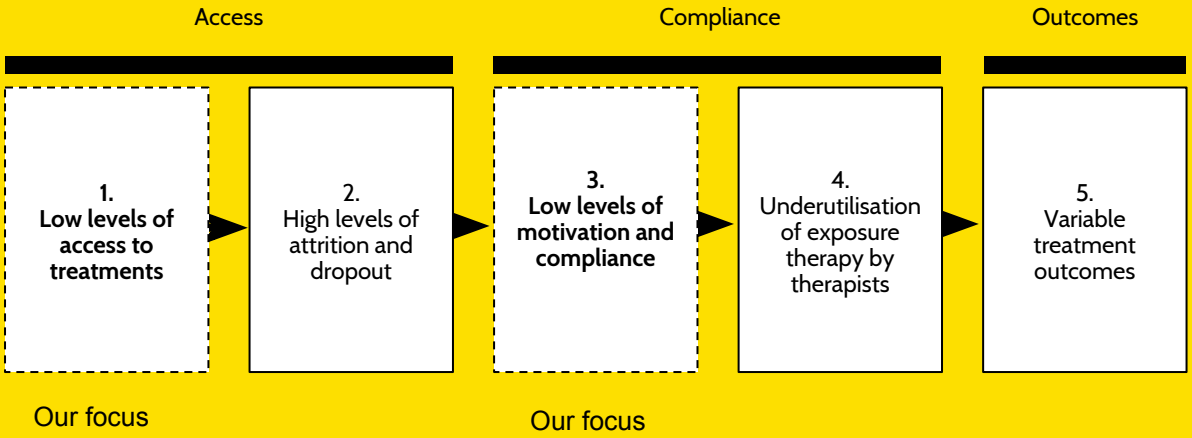
Tackling treatment issues through new modes of delivery

Based on the treatment issues identified in the section above, introducing a new mode of delivering treatment will have value if it can demonstrably:

1. **Improve children with anxiety disorders' access to CBT**
2. **Increase children's motivation, engagement and compliance with treatment**
3. **Decrease children's drop-out from treatment programmes**
4. **Increase therapists' usage of exposure therapy within CBT**
5. **Improve outcomes for children who do not respond to standard treatments and/or prevent return of fear post treatment completion**

Need for new treatment modalities

The game being considered in this feasibility study is focused on improving anxiety disorder treatment using new treatment modalities (e.g. gaming) to increase motivation and compliance; and to increase access to treatment.



Example of an online treatment: Camp Cope-A-Lot

- Camp Cope-A-Lot is a computer-assisted cognitive behavioral therapy (CBT) for anxiety in children aged 7 to 13.
- It is based on the Coping Cat programme, one of the most well known manualised programmes for children with anxiety (GAD, social anxiety and separation anxiety disorder).
- The Camp Cope-A-Lot programme involves:
  - 12-session interactive CD-ROM-assisted treatment
  - Child users advance on their own and at their own pace through the first 6 sessions, and through the last 6 sessions with therapist (coach) guidance.
  - Users complete fun and engaging interactivities that communicate skills for managing anxiety.

2. Possible Solutions: CBT Therapy

Aspects of treatment to include in possible solution:

Standard treatment for children with Anxiety Disorders

CBT components used to treat child anxiety disorders[1]

1. **Psychoeducation**: what is anxiety, how does anxiety develop, what keeps anxiety going, introduction to CBT model, goal setting for treatment.

2. **Cognitive restructuring**: identifying what the child's anxious thoughts are, helping the child evaluate evidence for anxious thoughts and consider alternatives, testing out the anxious thoughts (i.e. child predicts X will happen in Y situation, child carries out experiment to test if X does actually happen in Y situation)

3. **Exposure**: graded exposure to feared stimulus/situation through a fear hierarchy (least anxiety-provoking situation to most anxiety-provoking situation)

4. **Problem-solving**: skills in how to problem solve to encourage cognitive flexibility around problem situations and develop self-efficacy and confidence in managing situations for themselves.

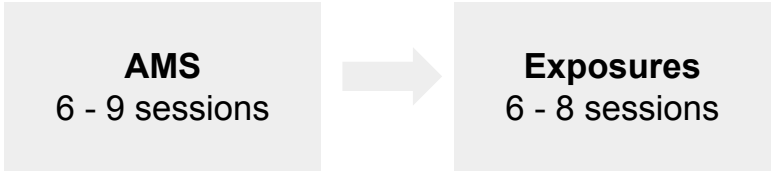
5. **Relaxation training**: progressive muscle relaxation training, diaphragmatic breathing

The standard transdiagnostic CBT programme for children with anxiety

- Most treatment protocols for anxious children do not differentiate among anxiety conditions, especially among social anxiety, separation anxiety and GAD (i.e. they are transdiagnostic treatments)

- CBT for children with anxiety disorders traditionally:[1]
  - Begins with 6-9 sessions of anxiety management strategies (AMS) - e.g. emotion identification, skills and relaxation training, cognitive strategies
  - Followed by 6-8 sessions of exposure to feared stimuli

Anxiety management strategies followed by exposure (AMS-Ex) model



- This AMS followed by exposure model (AMS-Ex) has dominated the children with anxiety disorder literature since the mid-1990s to the extent that 93% of studies in a recent meta-analysis used this approach.[2]

The evidence that exposure is the most effective component of CBT is growing

- Despite its dominance, the AMS-Ex model versus each component alone has received little examination, with the ordering of exposure after AMS reflecting **untested assumptions** that children require AMS to change maladaptive cognitions or to tolerate exposure.[1]

- Existing data suggests that AMS may not be clinically necessary. There is instead growing consensus that **exposure is the 'active ingredients' of CBT**[2], supported by the link between more exposure practice and better outcomes.[3]

- Therefore efforts to expand CBT may have greater success by **removing less important components** rather than including abbreviated versions of all treatment strategies.[4]

Most effective components

Exposure - CBT protocols introducing exposure earlier in treatment are effective, and delaying exposure because of AMS may contribute to the underperformance of CBT[5][6]

Cognitive restructuring (changing children's self-talk) - also been suggested as a key ingredient, but less evidence than exposure[7]

Least effective components

AMS and relaxation - adding relaxation and delaying exposures until after the introduction of other AMS does not increase the efficacy of exposure-based treatment. Children can tolerate exposures without initial AMS.[8][9]

Use of exposure therapy to treat anxiety disorders

- Treatment can include both imaginal exposure (e.g. imagining the worst-case scenario associated with their worries) and in vivo exposures (e.g. being exposed to real situations).[1]

- **Examples of exposures for children with GAD[2]**

    - Imaginal exposures: target abstract worries and fears of harm such as a death in the family, or family financial problems. An imaginal exposure would involve the child describing the potential situation in detail.

    - In-vivo exposures: can target perfectionism (e.g. handing in homework half completed), dealing with uncertainty (e.g. changing family's plans), breaking rules/getting into trouble (e.g. running in the halls).

- Allowing children to experience the consequences of these minor infractions lets them realise that they are not as catastrophic as they often assume.[3]

Aspects of treatment to include in possible solution:

Key aspects of exposure therapy

Key aspects of exposure therapy

1.
General Aspects

- Parent involvement
- Adapt exposures to individuals

2.
Inhibitory Learning Mechanisms

- Violate expectancies
- Variability of stimulus
- Occasional reinforced extinction
- Multiple contexts
- Removal of safety behaviours
- Deepened extinction
- Retrieval cues
- Re-consolidation

3.
Post-Exposure Processing

- Reward effort
- Assign homework

Overview: General aspects

Parent involvement	There is strong consensus that parents should be involved in treatment[1] and that ideally there should be a 'transfer of control' from therapist to parent by the end of treatment[2]. Role of parents in treatment varies (e.g. consultants vs. collaborators)[3]
Adapt exposures to individuals	An important emphasis within the manual-based treatment is therapist flexibility.[4] The most important part of treatment plans to personalise is the selection of exposure tasks.[5]

Overview: Inhibitory model of extinction[1]

Over the last few decades, the theory underpinning exposure therapy has shifted away from Emotional Processing Theory (EPT) and its emphasis on habituation towards a newer theory called the inhibitory model of extinction. This theory emphasises inhibitory learning (learning which inhibits previous learning about the feared stimulus).

Previously, under EPT, the purpose of exposure therapy was to habituate people to their fear, as measured by a reduction in fear level within and between sessions (i.e. 'stay in the situation until the fear declines'). Clinicians were trained to continue an exposure until the patient's fear level had declined by at least 50%.

However growing evidence suggests that fear reduction during/between exposures does not actually predict improved treatment outcomes (i.e. long term improvements in anxiety).

The inhibitory model of extinction therefore focuses instead on optimising patient learning to enhance treatment efficacy. The goal of exposure is now to help patients learn they are able to tolerate distress when in an anxiety-provoking situation, through being exposed to the repeated non-occurrence of the feared event (i.e. the thing they fear will occur not actually happening).

Within the theory, exposures should therefore be designed to optimise learning, aiding the formation of new secondary associations (i.e. that the feared stimulus no longer predicts a negative outcome)

Overview: Inhibitory model of extinction[1]

Emotional processing theory

Has your fear reduced by at least 50% since the exposure started?

Inhibitory model of extinction

Did the negative outcome you expected occur in the exposure? Was it as bad as you expected?

What did you learn about the non-occurrence of the feared outcome?

Overview: Inhibitory model of extinction

Caveat!

The following strategies for optimising the effectiveness of exposure by enhancing inhibitory learning have not been considered from a developmental perspective. Therefore, their applicability to younger children with anxiety disorders remains unclear.

However there is suggestion that some of these strategies may be relevant for the treatment of childhood anxiety disorders.

Overview: inhibitory learning strategies for optimising learning during exposure therapy (1/2)[1]

Violate expectancies	Design exposures that maximally violate expectations regarding frequency or intensity of aversive outcomes. Do not use cognitive interventions designed to lessen the probability or overestimation of threat prior to or during training (use afterwards to consolidate learning)
Removal of safety behaviours	Treatment should phase out safety behaviours of the course of exposure (immediate removal is best)
Variability of stimulus	Exposure is conducted to items from the fear hierarchy in random order, without regard to fear levels or fear reduction, although it's best to start with the least anxious to avoid treatment refusal
Deepened extinction	Combine multiple cues during exposure, after initially conducting exposure to each cue in isolation (both stimuli must predict the same bad thing happening)

Overview: inhibitory learning strategies for optimising learning during exposure therapy (2/2)

Occasional reinforced extinction	Involves occasionally having the bad thing that they think will happen in exposure, actually happen.
Retrieval cues	Idea is that client carries a cue (e.g. wristband) with them to remind them of what they learned during exposure or they are prompted to remind themselves of what they learnt in exposure treatment each time they encounter a previously feared situation.
Multiple contexts	Conduct a range of exposure (e.g imaginal, in vivo) exposures in multiple different contexts (e.g. when alone, in unfamiliar places, varying days/times).
Re-consolidation	Briefly exposure the person to the feared stimulus 30 minutes before a prolonged exposure period.

Overview: Post exposure processing

There are 4 components (steps) of an exposure: preparation, conducting exposure, post-exposure processing and planning next exposure.

Studies examining which of these steps are most associated with improved treatment outcomes in children with anxiety have found post exposure processing of the exposure task is the most important step.[1]

The specific post exposure activities of receiving a reward and being assigned a homework task were also associated with better treatment outcomes.

Preparation for exposure was not significantly related to treatment outcome

Overview: Post exposure processing

Reward effort	Responders to treatment are more likely than non responders to be rewarded for their efforts in session, with rewards increasing child's engagement (and potentially therefore compliance in task) [1]
Assign homework	Treatment responders were more likely to be assigned between-session exposure tasks as 'homework'. Homework helps to generalise the effects of exposure to contexts outside of the therapy session[2]

Aspects of treatment to include in possible solution:

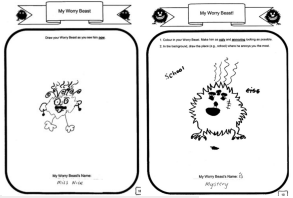
Existing programmes for treating children with anxiety disorders

Example of a transdiagnostic CBT programme involving exposure: Coping Cat

Philip Kendall's Coping Cat programme, designed for anxious children aged 9-13 is perhaps the most well known and frequently used CBT protocol for childhood anxiety.[1]

- Coping Cat is a 16-session manualized (structured) treatment for children, aged 7 to 13, who meet criteria for generalized anxiety disorder (GAD), social phobia (SP) and/or separation anxiety disorder (SAD)
- It has shown efficacy across a number of clinical trials (between 50% to 72% of children with anxiety disorders who receive the programme no longer meet criteria for their presenting disorder following treatment)
- Coping Cat has two sections:
    - Psychoeducation (8 sessions): Anxiety management strategies - including identifying bodily arousal, engaging in relaxation, recognising anxious thoughts, and problem solving. These strategies are presented to children as a 4-step tool set, known as the FEAR plan which the child can carry with them and draw from when they are feeling anxious
    - Exposure to anxiety provoking situations (8 sessions): The exposure process begins with an imaginal, in-office exposure to a non-stressful situation. Situations presented to each child are individually designed based on the child's particular fears and worries. Subsequent sessions involve exposure to situations that cause gradually increasing levels of stress in the child, again first in imaginal settings and once these are mastered, in in-vivo situations.

Example of a GAD specific CBT programme: No Worries!



No Worries! is a cognitive-behavioral programme for children aged 7 to 12 with anxiety, developed by Griffith University in Australia. It was specifically developed to target Dugas' four features of child GAD.[1]

- It is the only identified example of a programme specifically designed for children with GAD
- It is group based and consists of 10 weekly sessions (each is 90 minutes) and 2 booster sessions conducted 1 and 3 months after completion. Parents concurrently complete 7 sessions.
- The programme uses narrative therapy and frames pathological worry as a child's 'Worry Beast' which is controlling and demanding of children. The goal of each session is to understand the demands of their Worry Beast, how this impacts their lives and explore alternative strategies to tame their Worry Beast.
- At the start of the programme, children are given time to draw their own Worry Beast, giving it a name and drawing the situations where it annoys them the most. The goal of the programme is not to get rid of the Worry Beast but rather to tame it and make it more manageable and less scary.
- The programme does not include an exposure component.

3. Possible Solutions: Gaming

Possible Solutions: Gaming

Children and games

Notable characteristics of children's gaming behaviours

- **Children's play sessions & flow experiences are shorter**
  - Children's attentions spans are shorter, which translates into shorter play sessions[1]
  - There is also evidence that when playing games, children experience flow states that typically only last for 1 - 2 minutes at a time (experience flow states 3 or 4 times over the course of a play session)[2].
  - This suggests that play sessions should be kept brief to minimise risk of disruption to the exposure

- **Children play games more literally**
  - During the ages of 7 to 11 years, children go through the 'concrete operational' stage of cognitive development (the third stage of Piaget's theory of cognitive development in children).
  - At this stage, abstract, hypothetical thinking is not yet developed in the child so children can only solve problems that apply to concrete objects of events.[3]

- **Children do unexpected things in games - in-game behaviour is emergent**
  - Children will often do things the designers did not expect/intend for them to do - e.g. forming emotional attachments to non-essential game elements (e.g. a background rabbit character)[4]

- **Gaming preferences are influenced by gender**
  - In one study of 33 children aged 7 to 9 years, it was found that girls have a preference for games with strong narratology (story), whereas boys emphasised the importance of challenge and complexity[5]

Possible Solutions: Gaming

Drivers of an engaging game

Key drivers of player enjoyment

The GameFlow model for evaluating player enjoyment in games: 8 elements (Sweetser & Wyeth, 2005)[1]

Concentration	Challenge	Skills	Control	Clear goals	Feedback	Immersion	Social interaction

Overview: the GameFlow elements of player enjoyment (1/2)[1]

Concentration	Games should require concentration and the player should be able to concentrate on the game. Players should not be burdened with tasks that don't feel important
Challenge	Games should be sufficiently challenging and match the player's skill level. Games should provide different levels of challenge for different players, and the level of challenge should increase as the player progresses through the game
Player skills	Games must support player skill development and mastery. Players should be rewarded appropriately for their effort and skill development
Control	Players should feel a sense of control over their actions in the game, and that they are free to play the game that they want

Overview: the GameFlow elements of player enjoyment (2/2)

Clear goals	Games should provide the player with clear goals at appropriate times
Feedback	Players must receive appropriate feedback at appropriate times, including feedback on their progress and immediate feedback on their actions. Players should always know their status or score
Immersion	Players should experience deep but effortless involvement in the game. Players should become less aware of their surroundings, less self-aware and less worried about everyday life. Players should feel emotionally and viscerally involved in the game
Social interaction	Games should support and create opportunities for social interaction such as competition or collaboration. Games should support social communities inside and outside the game

Aspects of gaming to include in possible solution:

Game based solutions to increase compliance

Therapeutic games to increase treatment compliance in children

- A literature review of new developments in the area of video games and psychotherapy of children and adolescents found that while there were some examples of therapeutic games, development in the sector has been relatively slow.[1]

- Three examples of existing games designed to increase compliance have been identified:
  - Re-Mission 2 - medication adherence in child and adolescent cancer patients
  - Changamoto - homework compliance in adolescents receiving CBT for cannabis addiction
  - Ricky and the Spider - integration of exposure homework exercises into game for children with OCD

- These games use a limited range of mechanics to increase compliance into the game:
  - **Increasing patient's awareness** of the consequences of non-compliance (Re-Mission 2)
  - **Rewarding homework completion** by unlocking game elements e.g. extra power (Changamoto)

Examples of games designed to increase treatment compliance

Re-mission 2: treating young people with cancer

- Re-Mission 2 is a collection of online games created by the nonprofit HopeLab to help young people with cancer.[1]
- The goal is to motivate young cancer patients to stick to their treatments by boosting self efficacy, fostering positive emotions and shifting attitudes about chemotherapy.
- To increase medication adherence, several game levels were designed where the player must contend with the consequences of non-adherence to treatment; for example, in one level the in-game patient has skipped his chemotherapy doses, and as a consequence, the chemo-concentrating blaster misfires periodically, allowing cancer cells to escape and become drug resistant
- An evaluation of the game found that those who played Re-Mission took their medication more consistently, increased their knowledge of the disease and generally played a more active role in their treatment[2]

Examples of games designed to increase treatment compliance

Changamoto: increasing homework adherence for young people being treated for cannabis addiction[1]

- Changamoto is a strategic, turn based game developed with the main goal to increase the adherence of young adolescents who are treated for cannabis addiction
- The application includes a data linkage between a CBT based diary and an attractive game. To achieve a link between the game and real life situations, players get rewarded for diary entries. Diary completing unlocks the strategic SWAP power, that allows players to swap two droids positions in a turn-taking cue.
- It was crucial to design game rewards that provide sufficient incentives for therapy adherence, but do not allow players to be successful in the game regardless of their own skills.
- The effectiveness of the game and the user experience will be evaluated in a large randomized controlled trial

Examples of games designed to increase treatment compliance

Ricky and the Spider:

- In order to enhance dissemination of empirically supported treatments, the therapeutic video game Ricky and the Spider was developed for children between the ages of 6 and 12 who suffer from obsessive compulsive disorder. The game is not a self-help game and should be played under the guidance of a therapist.
- In its first year, the game was purchased by 56 child psychiatric institutions or practitioners in Switzerland, Germany and Austria.
- It incorporates the following CBT elements: psycho-education, the cognitive model of obsessive compulsive disorder, creating a symptom hierarchy, the use of externalizing techniques to cope with anxiety and unpleasant feelings, and exposure.
- The therapeutic homework consists of carrying out individual exposure tasks, called 'courage tasks' in the game. How and when to approach this part of the therapeutic homework can only be determined by the therapist in collaboration with the parents.
- However it remains the task of the therapist to encourage the child to practice his / her exposure exercises regularly.

Examples of games designed to increase treatment compliance

Personal Investigator: detective game to engage with mental health services[1]

- Personal Investigator is an online 3D detective game that implements a model of Brief Solution Focused Therapy. It aims to help teenagers overcome mental health problems and engage with traditional mental health care services
- In PI teenagers play the role of a Solution Detective and move around the Detective Academy. As they journey through the academy they meet several characters and are set a series of tasks. Rewards are given as each task is achieved and if the teenager succeeds at all the tasks they are able to graduate from the academy and become a Master Detective.
- By achieving the goals set by the game, teenagers learn to clarify their problem, convert their problem to a goal and identify the resources they have to help them achieve this goal.
- The game asks the teenager what problem they would like to solve and is designed to be flexible enough to help solve whatever problem they define. Therapists surveyed have indicated that they would like to be able to easily modify the dialogue in the game to address specific issues on a case by-case basis.

Strategies used by games to drive repeat play (opportunities/threats for compliance)

The areas of challenge, skills, control and social interaction appear to have the greatest opportunities for increasing compliance

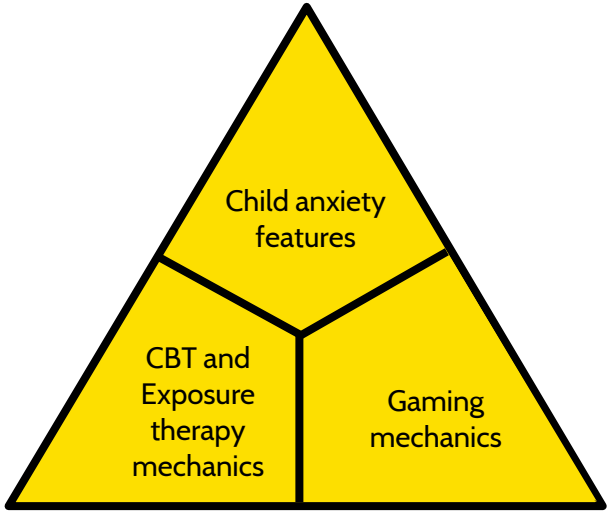
	Concentration	Challenge	Skills	Control	Clear goals	Feedback	Immersion	Social interaction
Barriers to retention		**Gating** e.g. confining players to a certain area until they learn a new skill/ complete a certain task.[1]	**Skills lower than game challenge** e.g. if skills don't match challenge[2] **Poor onboarding** e.g. players don't understand/not excited by onboarding[4]	**Punishing players** for not playing[4]				
Facilitators of retention		**Adaptive difficulty** e.g. if a player is struggling, the game reduces the difficulty of a level[1] **Challenge ramps** - gradual progression of difficulty[1] **Daily quests**[4] **Incentivising** players to try new challenges[4]	**Generous rewards** e.g. consolation prizes for players who have not won[2], being generous with rewards **Variable reward schedule** - don't reward behaviour every time, unpredictable rewards[35]	**Customisation** e.g. customising avatars to look like you[6] **'Compatible with real life'** e.g. player can choose a type of challenge that suits their mood that day[4]	**Demonstrating/ recording progress** to a long-term goal[5]	**Daily log-in 'streaks'** to encourage frequent log-ins[4]		**Integrating family/friends into game** e.g. allowing players to invite friends to join game[2] **Collaboration/ competition** e.g. leaderboards **Empathy** - looking after others[5]

Note: This is unlikely to be a full list of the strategies used to drive repeat play

Summary:

Key mechanics for an effective and engaging game to treat childhood anxiety disorders

The three components to be integrated in a gaming solution



Key features of GAD and other Anxiety Disorders

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Key aspects of exposure therapy

1.
General Aspects

- Parent involvement
- Adapt exposures to individuals

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Key drivers of player enjoyment

The GameFlow model for evaluating player enjoyment in games: 8 elements (Sweetser & Wyeth, 2005)

Concentration	Challenge	Skills	Control	Clear goals	Feedback	Immersion	Social interaction

For more information about this research, and the project, get in touch:

Hello@bfb-labs.com

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Shift