

IT'S **NOT** DANGEROUS TO GO ALONE!

The potential of digital media for treating panic disorder



TAKE THIS.

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Introduction

Serious games are being applied to more and more situations. They are used in healthcare, education, marketing and many other situations. Even though there are still some sceptics, enthusiasm for such games keeps on growing and some of these games have been proven to be effective. Serious games are said to improve the way people learn because they are doing something fun and interacting with the ideas instead of just, for example, reading about them. Besides this, well designed games are supposed to improve motivation. The idea of gamification is also very popular: the idea of turning something that might be boring or even annoying into a game is said to help people be more effective and enjoy themselves more while doing it.

According to the Dutch Trimbos Institute, about 20% of Dutch citizens will suffer from some form of anxiety disorder during their lives. This is a pretty significant group, and anxiety disorders that go untreated will get worse. (Kampman 2004). Anxiety disorders are on the rise. More people than ever suffer from them, and though there are some theories as to why this is, no conclusive evidence for this has been found.

The term anxiety disorder covers several other disorders, among which general anxiety disorder and panic disorder. The panic disorder is very prevalent and influences the lives of the patients to a high extent, as it often causes agoraphobia, causing patients to remain inside and avoid a variation of situations. For this reason, the paper mainly focuses on this disorder.

The healthcare sector has a problem. The amount of old people in comparison to the amount of young people is growing, leading not only to problems with social insurances, but also to a growing demand for healthcare. All the help that the healthcare sector can get is therefore more than welcome. Although the same might not necessarily be true for mental healthcare now, the growing rate of mental problems in society indicates that the demand might be rapidly growing. Serious games might therefore be here at the right time. Can we use serious games, gamification or mobile applications to help people deal with panic disorders?

I've chosen to use the term 'serious games' here. I'm very aware of the fact that this is a term that not everybody agrees with, because of its contradictory nature. After all, games and serious seem to necessarily exclude one another: games are fun, and played because they are fun, and when it's serious, and thus no longer fun, it's not a game any more. However, I think

serious and fun don't necessarily need to be mutually exclusive. Games have been made by now that were considered fun by the player, but still had a serious goal. There are other names being used. One of them is 'persuasive games' (Bogost 2007), which I don't use here because it's a term that is for games that persuade people (like marketing games or informational games). Another one is 'applied games', which is a term I like, but to a lot of people it is not that obvious what is meant by this. Serious games is a term that a lot of people know, people know the problems with the term, but it is still clear to everyone what is meant by it.

Serious games show some potential for the treatment of panic disorder, although it does not seem to work very well with the standard treatment options that are currently being used in mainstream psychotherapy. Gamification is the easier option for now, as it does not need a new method for treatment like serious games do. Mobile applications can be a help in treatment and an extension of gamification, while Virtual Reality has already proven its uses in treating panic disorder.

The first part of this paper consists of a description of what a panic disorder is, and how it relates to other mental issues. It is followed by an outline of how it is commonly treated. Cognitive Behavioural Therapy is most popular, but Mindfulness and Mindfulness Based Cognitive Therapy are growing as they are getting good results in research, so this is discussed here as well. In the next chapter, serious games and applications of game design ideas in gamification, virtual reality and mobile applications are discussed. Why do game developers, researchers and the public think they work? What ideas are behind this? What games do we have that actually work? And what are the downsides, for the treatment of panic disorder in particular? The last chapter consists of a conclusion and discussion, and suggestions for further research.

Panic Disorder

The term anxiety disorder is a very general one. In healthcare, anxiety disorders are a set of disorders: panic disorder (PD), obsessive compulsive disorder (OCD), social anxiety disorder (SanD), post-traumatic stress disorder (PTSD) and generalized anxiety disorder (GAD). What all these have in common is that the patient suffers from an anxiety for situations that would normally be perceived as threatening. This results in both cognitive and physical symptoms, the cognitive ones being a focus on the feelings of fear and danger (Nutt). Physical symptoms

might include hyperventilation, shortness of breath, choking and smothering sensations, nausea, light-headedness and many others. The patient responds to their cognitive symptoms by getting physical symptoms, which in turn results in an avoidance of certain situations that the patient knows might trigger their symptoms.

In the case of the Panic Disorder (PD), the patient suffers from (usually unexpected) panic attacks, which results in longer periods of general feelings of anxiety because the patient is afraid of getting more panic attacks. A panic attack is a short period of intense fear or discomfort, which the patient usually perceives as being catastrophic. He or she is afraid of having a heart attack, suffocating, losing his/her mind, losing control of his/her self, vomiting, or looking ridiculous in front of others. A lot of the time this relates to a fear of being in a situation which the patient thinks he/she can't escape from if he/she should start to feel 'strange' again. This can result in avoidance, called agoraphobia. Common places and situations to be avoided are crowds, stores, bridges, air planes, cars, public transport, classrooms, and narrow places like tunnels. Other situations are for example the eating of spicy foods or drinking alcohol, but also avoidance of (intense) exercise. There are also some minor avoidance problems, like always sitting at the end of a row or checking where the nearest exits are. Even though there is a diagnosis of Panic Disorder without agoraphobia possible, in reality a Panic Disorder almost always results in some forms of avoidance (Kampman 2004).

The lifetime prevalence of Panic Disorders is 1.5% to 3.5%, meaning that 1.5% to 3.5% of people will have a Panic Disorder during their lifetime. Without treatment the disorder is usually chronic, meaning that treatment is very important (Kampman 2004).

Cognitive behavioural therapy (CBT)

Panic disorders are usually treated with cognitive behavioural therapy. It starts by explaining to the patient what happens when they encounter a panic attack, and why this happens to them and not others. People who suffer from panic attacks are more aware of the physical sensations in their body. If they should have a dry throat, for example, they will notice this much faster than other people, just because they are scared of having another panic attack.

A panic attack is built up out of three components: the patient feels something (like dizziness, light-headedness, nausea, etc.) and then responds to this by having a thought (like

“Oh no, not again”, “I'm going to pass out”, or “I have to get home right now before I lose control again”). The last component is where the patient acts: they go home, sit down, etc. The likeliness of this happening is bigger when the patient is tense or suffering from stress (Kampman 2004).

The next step is teaching the patient some relaxation exercises in order for them to learn how to stay calmer in difficult situations. The next step is *interoceptive exposure*. Here, the patient is exposed to internal stimuli, meaning that exercises are done where the feelings that the patient has while having a panic attack are purposely being triggered. The goal of this is for the patient to stop associating these feelings with something negative and to teach them how to handle them in a positive way. The patient will keep practising these things throughout the course of the treatment.

Cognitive therapy is the next step in the process. The goal here is to replace unrealistic thoughts with more positive, realistic ones. For example, when a patient is experiencing light-headedness, he or she might be afraid to faint, but this is not at all likely, as in a panic attack the blood pressure rises, while for fainting the blood pressure falls. The goal is to make the patient aware of their negative and unrealistic thoughts by having him or her write down what they think during anxiety or a panic attack, and replacing them with more realistic thoughts. If the patient does not have the negative thoughts in the process of having a panic attack, the panic might fade instead of increase. Part of this process is to test if the patient is right about certain things. They have to write down certain situations and the things that they are afraid that might happen, and the likeliness that they think it will happen. After this, they test their hypothesis by going to the situation and testing if their expectations are realistic.

The next step is exposure in vivo. The patient and therapist create a list of situations that are perceived as threatening by the patient, ranking them from least to most scary. Every situation gets its own amount of points. The patient can then earn points by doing things from the list, preferably starting with the easiest ones and working his or her way up to the hardest ones. The patient agrees on an amount of points that he or she needs to gather each day or each week with the therapist.

Another thing that can be used in the treatment of panic disorders is medication. Although medication has been found to be effective in about 60% of the cases, patients often relapse after they stop using the medication (the chances of this are smaller after using medication for a year or longer). Besides this, there are a lot of side effects such as cognitive

problems, dependency, and a feeling of being sedated. There are more side effects like hallucinations, but these are less common. Although medication is being used, it is deemed to be most effective in combination with psychotherapy, which is why psychotherapy is still very important for these patients. The chance of a relapse in the long run is much smaller with therapy than with medication (Kampman 2004).

Treatment for a panic disorder can often be very confronting. The patient has to face those situations which he or she is most afraid of, and this can be very hard for them. This leads to about 20 – 25% of patients refusing treatment (Martin 2005). For this reason it would be very helpful if some digital technologies could support standard therapy or replace it with something that is less frightening for them.

Mindfulness

Mindfulness is a practice based on meditation. Its goal is to become more neutrally aware of all sensations. The idea behind it is that by giving neutral attention to thoughts and the body and everything it is experiencing, we can discover thought processes that are unhelpful and thoughts that might not necessarily be true. By giving sensations more neutral attention, the patient can discover that something that can be seen as alarming by someone with anxiety or panic disorder, might not necessarily be a threatening sensation at all. Patients become more aware of uncomfortable sensations in their body, but they learn to accept these and stop worrying about them (Farb et al. 2012).

Although mindfulness is still often seen as somewhat unscientific and new “New Age”, its effects have actually been proven in multiple randomized controlled trials. Mindfulness works for treating depression, panic disorder, social phobias, sleep problems and even borderline personality disorder. Meditation techniques that are used in mindfulness have actually been shown to change the structure of the brain, and make parts of the brain that are associated with stress and anxiety more resilient. After as little as eight weeks of practise, patients reported a decline in stress. Mindfulness Based Stress Reduction has been shown to have beneficial long-term effects on anxiety related disorders, and Mindfulness Based Cognitive Therapy has been shown to reduce anxiety and panic among patients with panic disorder. One year after a treatment period of eight weeks, 15 out of 17 patients were not diagnosed with panic disorder any more (Kim 2009). This seems to make mindfulness based therapy a valuable addition to or replacement of CBT.

Serious games

So, what is a serious game? A serious game is a game that has some other, more serious, goal than the game itself. Johan Huizinga described games as being voluntary, separate from reality, with voluntarily accepted set rules and with play itself as only goal (Huizinga, 1950). This, so it seems, would exclude the possibility of a 'serious' game. If we want to learn something from a game, the game would have a goal outside of itself, and therefore it would not be a game any more. This is one of the reasons that the idea of serious games has been criticized: if you add a goal to the game, is it still a game? And does it still possess the good qualities of a game that we see as benefiting the learning process? Salen and Zimmerman (2004) define the word 'game' as follows: "A game is a system in which players engage in an artificial conflict, defined by rules, that results in a quantifiable outcome". This seems to offer a lot more space for serious games. Can we bend games to teach something?

Serious games, persuasive games and other appliances of game mechanics have nonetheless become increasingly popular over the last couple of years. So why are developers, scientists and the public so convinced that they work, in spite of Huizinga's definition? And better yet, why are they in some cases being preferred over 'traditional' methods of learning or persuasion? I will discuss some influences on games and serious games here to analyse where this idea comes from, and how they might be useful or not useful in the treatment of panic disorder.

I have chosen to discuss several authors who are being referenced a lot in texts about serious games, because they have established certain ideas about serious games that are now thought of as common. Aside from those authors, I've also chosen Clark C. Abt because he was the first to use the term serious games and has therefore established part of the paradigm, and Mark Griffiths because he wrote specifically about the role of serious games in treating mental disorders.

Clark C. Abt

Clark C. Abt was the first person to coin the concept of serious games in 1970. Abt saw games as a good way for learning. He felt that one of the reasons that students were not motivated to learn was because of the dissociation between thought and action. The things that students were learning for were too far in the future, and students could no longer see how the

knowledge that they were gaining would benefit them. He felt that much of this was because the knowledge was too abstract, especially for those students who did not come into regular contact with adults who had jobs that required higher education (Abt 1970, 4). Abt says:

“(…) games offer expanded possibilities for action in a mode that, while chiefly mental, includes the felt freedom, intuitive speed, and reactive responses of physical movements.” (Abt 1970, 5).

Even though games do not necessarily need to include a lot of actual physical movements (some games, sports and digital exercise games excluded), Abt saw games as a way to include the physical environments in which games were played back into the field of learning. With the advanced state of games and especially video games today, we can see this happening quite easily. Games like CarKit (GATE 2010) let the student experience how something works instead of just offering up a set of rules to be followed. More literal experiences like for example the Wii games made for medical students (Boyle 2011) can also be made quite easily.

The treatment for panic disorder already consists of mainly physical experiences, so in this way a game would not necessarily add to it. What a game can add to is perhaps helping the patient experience how their thoughts and fears are not necessarily true. The cognitive therapy part might thus be enhanced by a game if we assume that Abt is right.

Further, Abt stated that games offer you another chance. If you fail once, they let you try again until you get it right. They offer a more positive way of learning than books and more abstract teaching do. Games teach an ethic of beating the odds and of trying to win, they reward you for trying and teach personal responsibility in this. They show that the only person who is responsible for winning is the player (Abt 1970, 6).

This is something that can be very useful for patients with panic disorder. It is likely that patients will have a panic disorder at some point. Or that they will be too afraid to do something. It is an important lesson that failing once is not bad, as long as they keep trying. If a game can encourage them to keep trying, that is good. However, perhaps there is more of a role for gamification here than for games, as going outside and trying things these people are afraid of is something that the patient needs to do in real life and not try in a game. However, these are a helpful part of games.

Another thing that Abt emphasizes is that games offer an “imaginative life of games”, where children and students can have experiences beyond those of their own. Games are a safe testing ground for experiencing certain things. It allows the player to experiment with reality in a safe way (Abt 1970, 7). Huizinga wrote the same thing in his *Homo Ludens*. He stated that games were what people, children and animals do to learn about, for example, social conventions without them already being exposed to a situation in which they can hurt anybody (Huizinga 1950).

It is very hard to recreate a situation that will teach patients with panic disorder something about their own situation. Perhaps a simulation could help, but that is not necessarily a game and it will be very hard to recreate the situation that this particular patient is in. Experimenting with reality in a safe way, as Abt says, is therefore not possible for simulating situations where the patient might otherwise get frightened, except perhaps in virtual reality, which I will discuss later.

Marc Prensky

Marc Prensky argues that today's students think and process information differently than the generations before them did. Prensky says:

“ “Different kinds of experiences lead to different brain structures,” says Dr. Bruce D. Berry of Baylor College of Medicine. It is very likely that our students' brains have physically changed – and are different from those of their parents – as a result of how they grew up. But whether or not this is literally true, we can say with certainty that their thinking patterns have changed.” (Prensky 2005, 98)

Prensky refers to today's students as 'Digital Natives', while others are at most Digital Immigrants. Digital Natives have grown up with computers and video games, and their brains are, according to Prensky, not as used to linear thinking as those of their parents. Besides that, their brains work at 'twitch speed', they process information much faster and they are much more comfortable with visuals than with text based learning. Active learning would suit this generation better than passive learning, like reading and lectures. They are used to getting immediate pay-offs. Because of this, conventional ways of learning (which are more linear and slow) are ill suited to them.

This might make games especially suitable for young people, for Digital Natives, but the common cognitive behavioural therapy is not a 'slow' one like normal education. A game would not add anything essential to this.

Prensky thinks that games are suited for learning because games are inherently motivating because they are fun, we can win at them, which is more gratifying and it sparks our problem solving abilities. Above all of this though is the fact that play has a biological, evolutionarily important function, which has to do specifically with learning. "It's nature's way of making it engaging for both humans and animal children to learn". (Prensky 2005, 102).

Prensky does acknowledge that some people find that learning should not be all fun, because it is not supposed to be, and learning should be 'hard work'. He counters this by saying that games are 'hard fun': it's still hard work, games are hard to master, but the fun makes it so that it doesn't feel like hard work. We could wonder whether this is the right way of setting people up for life: some things are just hard, and not learning how to handle this in school might not set people up properly for real life. We can wonder the same things about a game to help people recover from a panic disorder: it might not all be fun, and it probably will be hard work. Going out into a scary situation will not be fun. But maybe a game can make some parts of treatment more like 'hard fun' instead of just 'hard work'.

There are a lot of different ways in which games can supplement or replace normal education, like helping with practice, learning by doing, learning from mistakes (in a safe environment to make mistakes), coaching and intelligent tutors, some of which can definitely be useful for helping patients with panic disorder. There is a difference between intrinsic and extrinsic serious games, where in intrinsic games the content is an integral part of the game structure, but with extrinsic games the content and the structure are less tightly linked. In treating panic disorder it seems important that the patient can translate what they practice and learn directly to the real world, with intrinsic games having a more direct link between content and context. On the other hand, a game for helping patients with panic disorder might be a coach or support mechanism of sorts which might have a more extrinsic structure. As Prensky recognises in his article, each of the ways have their value in different situations (Prensky 2005, 116).

Mark Griffiths

Mark Griffiths is a psychologist who studies, amongst other things, game addiction. In his text *The therapeutic value of video games* he discusses how video games can help people, for example when recovering from a brain injury, but also as a distraction from pain. The reason for this is that video games are likely to engage much of a person's cognitive and motor activity, leaving less room for attention to pain. This might be very useful to patients suffering from panic attacks, as they often suffer from negative thinking patterns. Part of the treatment of panic disorder is the 'reprogramming' of negative thought patterns. The patient learns to confront his or her own negative thoughts and learns new, more realistic thought patterns. But for a patient who suffers from panic disorder games in general might be very useful to just distract their thoughts for a while to prevent them from going into a negative thinking pattern. As Griffiths mentions, a lot of the positive results in these studies were reached with special designed video games (Griffiths 2005). Which games would work and which will not is not easy to say, but we can imagine that some games might result in higher stress levels than others, which might not be beneficial to the patient. There is however a danger here that playing games might lead to even more avoidance. One of the things that a therapist tries to teach a patient with CBT, is to avoid things less, because the feelings they are having will not harm them. However, sometimes this might become a little too much for the patient, and then a distracting game might be helpful.

James Paul Gee

James Paul Gee's *What Video Games Have To Teach Us About Learning and Literacy* asks the question what we can learn about learning from video games. Gee argues that games can help people learn to view things from a different perspective: they help the player see that there are multiple vantage points from which to see a problem. This can be very useful in the treatment of PD, because a lot of the parts of the treatment are aimed at helping the patient to be less afraid of the things their feeling and interpreting feelings and situations differently so that they won't be afraid of them any more. A role playing game placing the patient in someone who sees certain things not as scary but as a challenge, for example, might help the patient see that there are more vantage points from which to see certain situations and might help him or her interpret their own situation from a more reasonable perspective.

Another thing that might be useful to people with a panic disorder is what Gee calls the “Psychosocial Moratorium” Principle. Gee talks about Erikson's idea of the psychosocial moratorium: a break that a person can take from “real life” to find out which identity suits him or her best. Though commonly referred to as an 'identity crisis', Erikson says that this time was needed for a person to finalize the shaping of their identity, and that not having such a moment might result in problems later. Gee sees the video game as the ideal learning space for taking risks, and where real-world consequences are lowered (Gee 2010, 59). Although patients with PD might not suffer from an identity crisis, they are quite often unsure about their own capabilities to do something (like go outside, or go to confined spaces, or go to a place that they can't easily escape from). Trying on a 'new identity' in which they dare to do all these things might be beneficial to them. Besides that, there are a lot of patients with PD that get these feelings of anxiety because they have very high expectations of themselves. The fear of disappointing someone might result in more anxiety. Trying on a different identity might help them to realize that all these expectations aren't useful or necessary. Gee says that because the learner has a lot of time and opportunities to think about the relationship between new identities and old ones. The game gives them time to think about the relationship between their real-world identities, virtual identity/identities and projective identity.

A projective identity is the identity we project upon our virtual persona. This can be an in-game persona, but also the identity of someone we want to become, for instance, when studying science, the kind of scientist we want to be, the kind of person we want the virtual persona to be. It is the interface between the real-world identity and the virtual identity. With a projective identity, the player/patient can “transcend the limitations both of the virtual identity and the learner's own real-world identity” (Gee 2010, 63). This is important for players because they need to realize what the connections between their virtual, real-world and projected identities are in order for them to be useful for their treatment. They could, for instance, make a virtual identity that is not scared (not scared being the projected identity) and use it for their real-world identity. Gee writes:

“If learners in classrooms carry learning so far as to take on a projective identity, something magical happens. The learner comes to know that he or she has the capacity, at some level, to take on the virtual identity as a real-world identity. (...) Learners do not, of course, have to

realize this capacity in actuality and become scientists. (...) Often it is enough that they have sensed new powers in themselves.” (Gee 2010, 63).

The patient might then, while playing someone that is not afraid of panic attacks, start to realize their potential for having this identity of someone who is less afraid, and use this for their real-world identity.

Gee repeats some of the things that Abt (1970) wrote about as well, writing that games make for more embodied learning, rather than learning that is dissociated from experience. He writes that the disconnected learning in schools isn't working for a lot of students, and that games offer an opportunity for more embodied learning, in which the learner can 'probe the world', reflect on their actions and form a hypothesis, and then test this hypothesis in the game, accepting or rethinking after that. It can also offer the learner the option to try multiple ways to achieve something. The game offers a safe environment for this embodied learning (Gee 2010, 105). This argues in the favour of role playing games where a player can play someone who is more confident so as to experience how this is.

Another thing that Gee finds to be a good thing that helps people learn in games is the fact that the people who play the game are part of the same affinity group. They don't have to share gender, race, age, etc., but they can bond over the fact that they share an interest in the game or the subject of the game. Gee finds that playing games is a social endeavour, not just because people physically play together, but also because they form communities, guilds, set up game websites, etc (Gee 2010, 206). This could be useful for patients with PD as a game for them could be backed up by a community (perhaps one monitored by therapists), so that they could bond over their problems, the game, and the ways they deal with their problems in everyday life. They could be a support group of sorts, helping each other use the game and offering support when the patient goes and uses what they've learned and practised in the game.

Mihály Csikszentmihalyi

Games are 'pleasantly frustrating': they are hard for the learner, but still doable. This keeps the player in a state of *flow*, a concept coined by Mihály Csikszentmihalyi (1990). The state of flow is a state of completely focused motivation. It means that the person who is performing

the activity is immersed in this activity and completely focused on it. Games are well-known to possess the capability to help players reach a state of flow (Gee 2010).

A state of flow helps people forget about all of their emotions and feelings, it will make them completely focused on their task. It makes the rest of the world 'disappear' (Csikszentmihalyi 1990). This can also be helpful to patients with PD, as it can help them break through negative thought processes. Although we could speak of avoidance, something that patients with PD suffer from (they avoid certain places and situations to avoid panic attacks), games could help patients become more generally relaxed. Especially a game geared towards patients with PD in particular might help them realize what things are unrealistic in their thought processes. A state of flow could contribute to this greatly.

The downsides of using games for treating panic disorder

We have to keep in mind, however, that games are not motivating to everyone. Not everyone is motivated when they see a game, and not everyone is motivated to start playing (Juul 2010). There are some games, like casual games, that aim to attract a larger audience, but they might in turn exclude an audience of people who already play games and are more 'hardcore' (Juul 2010). We can try to find a common denominator between these games that appeal to everyone, but this way we might end up with a game that nobody likes. It is important that the option of 'normal' treatment stays open. A lot of young people play games, but the same might not be true for all older groups. A game that is made for the treatment of Panic Disorder should be tested on all age groups to see if the results are equally good in different age groups, or whether some patients might find it less motivating, less interesting or whether some people might not recover as well with the game as with traditional treatment. Making a game for treatment just because it's new and innovative should be avoided. We have to keep in mind that different groups might respond very differently to games on the basis on their social and cultural background. Games work for a certain subset of people, who self-select in this, just because games work for them. Not everyone enjoys them and it doesn't work for everyone (Hung 2011, 4).

A danger of games is that sometimes the player doesn't quite 'get' the game, yet can continue to play without a lot of impediments (Hung 2011). Each player has their own reading of the game, due to their background and experiences. This can be a danger for serious games because in this case we need to be sure that the right message is communicated to the user. A

solution here could be to offer good instruction and support, and/or extensive play testing to see if players are learning the right thing. For this reason, I would see a video game to help the treatment of patients with panic disorder as a support material, which could help therapy but probably not replace it. It is simply too risky to leave a patient to their own resorts and let them play the game without any support. This might not just be due to the nature of games as a medium, but also because patients need to be very clear on what the use of each part of the treatment is. Treatment for panic disorder requires quite some effort on the part of the patient, as they need to do exercises that they will probably not like, such as the exposure parts of the treatment (Kampman et al. 2004), and if the patient does not see the use for the exercises, he or she probably will not invest in them enough. The support of the therapist will still be necessary.

As Hung emphasizes in his book as well, most of the research that has been done are just theories. Most of what authors like James Paul Gee and Jane McGonigal say are just theories about life and theories about games. There is very little empirical evidence out there on whether games actually help people learn better, faster, or make them have more fun (Hung 2011, 7). Depending on the affiliations of the researcher, games can either make you violent or very smart. People like Mark Prensky, Ian Bogost, Raph Koster and James Paul Gee all love games and write from a place where they would very much like for games to be useful. Emerging media have always aroused suspicion. The first books that were more publicly sold weren't loved, they were seen as a threat to the order of things, and the same goes for every other medium since. With games this has happened as well, arcades were seen as bad places, (Fisher 1995) and video games still take a lot of heat for allegedly making people violent. Perhaps we can see the need to use games for good as a counter movement against this. However, as Hung states, the beliefs that are popular in academics about serious games are based on “incomplete and selective evidence” (Hung 2011, 7).

Kurt Squire (2002) argues that there is not enough evidence to suggest that players can transfer what they have learned to other contexts. Training the brain to do one thing rarely trains it to do something similar as well. Transferring thinking across contexts is very hard for people. Squire uses the example of mathematics training in school, which is in part meant to teach people skills to use in their everyday lives, but which actually rarely gets used after school. The skills trained in a game will therefore have to resemble the skills that need to be learned quite closely. Shooting in a game will probably teach you how to shoot in an another

game, but it will not teach you tactical thinking in real life (Squire 2002). A game made for the treatment of panic disorder will have to resemble what it is that this person needs to learn in real life quite closely.

It is very hard to design a good game. It's even harder to design a good game that teaches people something at the same time. The game has to be engaging to be able to benefit from the advantages of video games, but at the same time it needs to teach something. At the moment, we know hardly anything about how people learn from games, and what exactly it is in games that make them learn so well. Is it the explanations between the levels? Or the mechanics? Does one work better than the other? Some games have been developed that work, but that does not prove that we can make games to relieve stress, anxiety or panic. We also have to be wary of creating 'chocolate covered broccoli': games that actually offer the same, boring, content, but cover them with the 'chocolate' so as to disguise that they are still the same 'broccoli' assignments (Prensky 2005, 109).

Another thing to be wary of when creating games to distract people from pain or stress, is the danger of addiction and even of more avoidance. Especially in the case of panic disorder, where the patient already tries to avoid reality, this could be a very real danger. The last thing we want for these patients is for them to just play games to hide from reality. This way they will never learn to deal with their problems, and instead make them worse.

One of the downsides of using a video game for therapy is, as discussed below with the example of SPARX, that there is no face-to-face contact with the therapist. The player lacks this support, and in the case of panic disorder where the disorder can get worse if it goes untreated, leaving people to do this on their own might be dangerous. The idea of a game like SPARX is good, but perhaps a combination of normal therapy and something like SPARX would be even better. Also due to the fact that we can never know what message the player is taking away from the game. Regular check-ups with a therapist might help to make sure that the patient is getting the right treatment and that they understand what they are learning. It might also help if they doubt the effectiveness of certain parts of the treatment. If the patient doesn't believe that the treatment will work, they will be less motivated. Regular contact with a therapist or doctor might help prevent this.

Case studies: SPARX

SPARX (Smart, Positive, Active, Realistic, X-Factor thoughts) is a video game developed by a team of researchers at the University of Auckland. Its goal is to help teenagers (12-19) recover from depressive symptoms. Results of the game as treatment were compared to results of normal treatment and adolescents treated with the game were doing as good or even better after treatment and after three months than adolescents who received normal treatment (Merry et al. 2012).

SPARX is a fantasy game that delivers Cognitive Behavioural Therapy. The instructions are given first person and face to face, and the game is three-dimensional. The player chooses an avatar and faces challenges to restore the balance in a world dominated by GNATs (Gloomy Negative Automatic Thoughts). The game consists of seven modules which each represent a part of the treatment for depression, like relaxation exercises, activity rescheduling and cognitive restructuring. At the beginning and end of each module, the user interacts with a 'guide' that put what they are going to play and have played into context. This guide also checks how the player's mood is doing and sets and monitors challenges outside of the game, which are like homework. If the patient is not improving, they are asked to seek other help as well. The game comes with a paper notebook with summaries of each module.

During the testing period of SPARX, patients were checked up on throughout the treatment period to see how they were doing, but they did not receive any treatment aside from the game. Patients reported that they liked SPARX because they could do it at their own pace and where they wanted (although for now the game was only played at the clinic). The other group, however, reported that they liked normal treatment because they felt like they had someone to talk to and that they could rely on and ask questions (Merry et al. 2012).

SPARX works well for New Zealand, where it is hard for a lot of people to go and see a therapist as they can live quite far away from populated areas. Although it is not aimed at patients with panic disorder, I think the game shows that games can be used towards such goals, and that players can, at least in this case, translate what they learn in the game to their own situation. However, perhaps a combination of normal treatment and a game might offer the best of both worlds: face to face support and being able to work from home. SPARX alone works just as well as normal therapy, perhaps a combination might work even better. It might also help solve the problem that patients might not all take away the same message from the game by giving them additional support from a therapist. It might save therapists and patients

time and costs, especially where patients can live far away from their therapists. Panic disorders are different from depression in that the treatment requires a lot of exposure, something that is less simple to do in a game.

Case studies: Re-Mission

Re-Mission is one of the most famous examples of a serious game that 'works'. The game was made for adolescents and young adults with cancer, and its goal is to make the adherence to their self-administered medications higher. In the game, patients play Roxxi, a nanobot that travels inside the body of the player. Roxxi needs to destroy cancer cells and manage treatment related adverse effects, such as nausea and stress.

Re-Mission has been shown to increase adherence to self-administered medications, and patients showed increased cancer-related self-efficacy and knowledge. This shows that if presented well, patients can indeed translate content from the context of the game to a real-life context, so that they can actually use it in their lives. This is promising for the development of other serious games (Kato 2008).

Both SPARX and Re-Mission are games made for adolescents and young adults. These are also the primary target groups for most games, but the average gamer is getting older as young gamers are growing up. Perhaps more trials will be done for different age groups as well in the future.

Using serious games for treating panic disorder

Some of the main reasons for using games in stead of normal learning are not applicable to games: the treatment is not slow or boring, and treatment should be motivating to the patient without the help of a game as well, as the player can very clearly see where treatment would benefit him or her, as their goal is not as far away as it is in most education.

Big parts of CBT for panic disorder do not seem to fit well in a game. Interoceptive exposure and exposure in vivo cannot be replaced by or practised in a game. Perhaps alternative ways of treating panic disorder or supporting exercises might be put into a game, as could perhaps the cognitive therapy part. Things like mindfulness, relaxation or meditation can perhaps be taught with a game. Besides this, big parts of games seem to offer options for alternative treatments. Perhaps we do not need to fit CBT or mindfulness into a game. Games offer a high learning potential according to many of these sources, and the things that are said

to make them so fit for learning seem to match up to some degree with the things that patients with panic disorder need to learn. However, keeping in mind that it is very difficult for people to translate learning content from one context to another (Squire 2002), this is not as straightforward as it might seem. If James Paul Gee was right that people can quite easily connect their different identities into one another, then this might offer some possibilities. In any case, we are probably still quite far away from coming up with any games that can help replace parts of the currently standard treatments for panic disorder.

Some options for games to help with the treatment of panic disorder are perhaps related to things that might not be very easy to practise outside of a game. The option to explore an alternative identity that is not afraid in for example a roleplaying game might add to the normal treatment of patients with panic disorder. This is not something that can be easily practised otherwise, but games might offer the option for this, supporting patients going through normal treatment.

Another option is to use serious games to help give patients a break from their symptoms. Patients often suffer from anticipation anxiety, meaning that they might not feel well for days or weeks in a row. Although we could see this as avoidance, perhaps the patient might need a break sometimes. This does pose a risk however; more avoidance or even addiction is not a desired effect.

One more thing that might be helpful about games is that they can be backed up by an online community where the player might find support more easily if he or she can also talk about the game. Patients can find support groups online now, but a game that they have in common might make this more easy.

Serious games can add to regular treatment by for example letting them experience an alternative identity, but it is not likely that games will replace normal treatment. Perhaps gamification can offer some more possibilities.

“Fixing reality”: gamification

Game-like procedures have been used in reward systems for a long time. As a kid, some of us used to get stickers when we had done a good job on a school assignment. But the term 'gamification' has been on the rise over the past few years. One of its main advocates is Jane McGonigal, whose *Reality is Broken: Why Games Make Us Better and How They Can*

Change the World was published in 2011. In her book she claims that reality is boring and not very challenging compared to the video games that people are now increasingly growing up with. The book offers fourteen “fixes” for reality: things that the use of game techniques might help improve.

Gamification is the use of techniques from (video) games in order to make real-life more appealing or motivating, or to improve lives, the world or processes. In short: gamification is the use of game design elements in non-game contexts (Deterding et al. 2011). It can range from simply adding points, levels and achievements to certain processes so people can compare how they are doing, to setting up a game that will make people motivated to help investigate public spending, to adding a slip-and-slide in the office next to the flight of stairs to motivate people to go and see their colleagues more often. McGonigal is very optimistic about this. She thinks that it is possible to use all the experience people have with playing games and the knowledge they have built to change the world for the better (McGonigal 2011).

The idea that people can be or can become whoever they want to be is very popular and still gaining in popularity. Jane McGonigal illustrates this very well in *Reality is Broken*. She writes how people can change the world, society, culture, the environment and even their own health by designing things well, like game designers would. And she isn't the only one who thinks this way. The fact that the idea of making obese people or people who smoke cigarettes pay more for their health insurance is very popular in politics right now shows us that a lot of people think that these groups can somehow prevent themselves from becoming fat or starting to smoke. There is a strong idea present in western society that we have a very large amount of agency when it comes to shaping ourselves and our identities. Basically, we can be anything we want to, if only we work hard enough. The American Dream is based on precisely this premise. There is, however, a lot of evidence that we do not all get equal opportunities, because of money, the way we are raised, the people who teach us and the schools we go to, and many other things (Lareau 2003). So maybe reality is not as malleable as we'd like it to be.

The gamification movement, in which McGonigal is one of the most important – if not the most important - voices, is based on the idea that we can shape reality to make it more engaging, fun, and motivating. If the same task is designed well, she says, then we will be more likely to engage in it and actually find it motivating. McGonigal does not state that

games make anything easier. If anything, they make things more challenging when they are not, and invite us to be more engaged in reality. She gives various examples of where this has worked well, like in the example when British citizens were enlisted to check the receipts that their elected representatives had handed in as expenses for any strange things (such as garden remodels). In this case, a workload that would have taken journalists years to get through, only took weeks because it motivated people to help out (McGonigal 2011).

Ian Bogost, another influential person in the field of game studies, feels like gamification is “bullshit”. He does not see it as the solution to all problems in life at all, but feels like it is the next fad created by marketing executives. He says that “the very point of gamification is to make the sale as easy as possible”. Gamification is something that feeds on the popularity of games and uses it for nothing but profit making. However, he says that if done well techniques taken from games can work quite well, but that they are commonly implemented without care and that this will not help anyone, aside from the pockets of the marketing companies (Bogost 2011a). Gamification is only popular, according to Bogost, because it is now seen as something that can be implemented easily and which will work very well, even though this is not the case. If done well, it is very hard and takes a lot of work, like making a serious game. In a lot of cases, 'gamification' consists of just adding points and badges, but it is not the points and achievements that make the game. Bogost writes:

“Note how deftly Zichermann makes his readers believe that points, badges, levels, leader boards, and rewards are "key game mechanics." This is wrong, of course -- key game mechanics are the operational parts of games that produce an experience of interest, enlightenment, terror, fascination, hope, or any number of other sensations. Points and levels and the like are mere gestures that provide structure and measure progress within such a system.” (Bogost 2011b)

The games that McGonigal makes are mostly much more than adding in points and badges. The games that are mentioned in the book are mostly experiences, full games that take place in real life. Bogost does not seem to count what she does as 'gamification' either. He calls the simple version of gamification, where just points and badges are added, 'exploitationware', because it is mainly used to reward people for doing things they didn't really want to do in the first place, but the reward is a fake one, because points aren't inherently rewarding for people,

whereas there used to be real incentives (Bogost 2011b). Using the definition that I am using here, McGonigals games do fall under the category gamification, but it can be argued that gamification is not just one thing but a collection of many things, good and bad.

Another critique of gamification is that incentives like points will actually decrease motivation for people who otherwise liked doing certain things. Taking the intrinsic motivation and adding an extrinsic one, according to this research, will actually make people less motivated. Judd Antin says that gamification is based on behaviourist psychology. Game mechanics, according to Antin, invoke reinforcement learning, like Skinner's rat, that would get food whenever he pressed a button. The rewards for humans are less clear: points, achievements and badges are not inherently rewarding to humans. Antin writes that although they may work for some people, who like the status of these badges, points and achievements, other people are actually status averse and might even be repelled by mechanics like these. He also writes that adding points might not be beneficial for people who are already intrinsically motivated by what they were doing. It adds a more shallow reward system to things that may already have been rewarding on a much deeper level for the participants. As no longitudinal studies have been done, we know nothing about how gamification could be beneficial or undermining motivation in the long run (Antin 2011).

So the general consensus on this subject seems to be that games are motivating, and that they can help enhance reality, but that simply adding points to something will most likely not be the best solution. SuperBetter is an example of a game that does more than adding just points to the experience of getting better.

Case Studies: SuperBetter

SuperBetter is an online program and iPhone app that Jane McGonigal came up with when she was suffering from severe depression, caused by a concussion that lasted much longer than normal. The goal of the program is to help people cope with various problems or to help them improve themselves. The problems it says it can help you deal with vary from depression and anxiety to actually coping with brain injuries. People can improve their everyday lives by eating better, losing weight, working out more or becoming less stressed out, or reaching out to their friends more. The program offers various 'power packs', each offering different quests and challenges to the 'player'. SuperBetter aims to help people build four types of resilience: physical, mental, emotional and social. While selecting a power pack

for anxiety will help you increase your mental resilience most of all, other packs will focus on other types of resilience. Every step of the way, the quests or challenges are explained as to why they will help the 'player' progress. Every part of the game is based on scientific research, for example research suggesting that building resilience will make other things easier to deal with and research telling us that increasing physical resilience will increase your ability to deal with stress. The program offers small tricks to help you to feel better, called power ups, and bad guys, representing the symptoms and bad behaviours that make your condition worse or make getting better harder. SuperBetter offers some of these in its Power Packs, but the user can add them as well.

The program also asks you to add 'allies': people who will track your progress, help you set new goals, give you achievements and encourage you. Also, SuperBetter does not just focus on 'getting better', but also on what a person can do even though they might not be feeling well or can not do all the things they would like to do. It's about making the hero feel better with who they are at that moment, not just about curing them.

SuperBetter claims to be about more than just earning points and achievements for the things that you do. The quests are supposed to be than a to-do list. They are supposed to help the player make a plan, carry out this plan and work towards their goals in small steps, while seeing their progress and getting encouragement from their allies. This is supposed to help the 'hero' (as SuperBetter calls the player) find meaning and purpose, to stay committed and to remain socially connected. The game aims to replace negative stress with positive stress, and add a heroic story to the process of recovery (McGonigal 2011).

Because SuperBetter is more than just points and achievements and also offers alternative solutions to problems, and encourages the user to reach out to 'allies', the critique that offering up points for something that the user might be motivated to do in the first place might actually make them less motivated is less applicable here. There are points, but they are not the most important part of the game. McGonigal writes that the goal of SuperBetter is not to replace traditional medicine, but to augment good advice and help patients take a more active role in recovery. She writes that it is more likely for them to stay positive in this alternate reality, where friends and family can define their *fiero* moments (moments of an 'epic win', where the player feels like they've achieved something really big). It will also help them build a stronger support system (McGonigal 2011). SuperBetter is also meant to keep patients positive, even if getting completely better might not be possible. It is supposed to

help patients focus on what they can do instead of what they can't to keep them positive and help them accept and live with certain things that are harder in their lives (Superbetter.com 2012).

Using gamification for treating panic disorder

Although a gamification aid or alternative reality game, as McGonigal likes to call it, is probably not a good stand-alone treatment for patients with panic disorder, it can help patients keep track of their exercises, help them practise meditation, help them have a healthy lifestyle that can contribute to feeling better and help them reconnect and reach out to their friends and loved ones. It can also help them stay up to date with their therapist if the program is connecting the patient to the therapist. However, gamification always needs to be more than the simple adding of points and achievements. It needs to be an experience, an adventure. And at the very least it should connect people with others so they can compare their scores or get support. If gamification can add an 'epic story' to recovery instead of just the sad story of how they are not doing very well, that might very well help patients in their recovery. Gamification could help patients with panic disorder, but it's not a replacement for other treatment. Although it's based on the premise that reality is something you can shape to your own desires, which might not always be realistic, it could work, especially for a short-term treatment like the therapy for panic disorder. Some of the games that McGonigal has made show that this 'good' type of gamification that does more than just adding points can work for people, so it might well be worth trying out for patients with panic disorder.

Mobile applications

Mental health applications for mobile phones are gaining in popularity. As more and more people have smart phones these technologies become more ubiquitous as well. Some professionals actually use applications to support existing therapy plans, like Cognitive Behavioural Therapy (Trudeau 2010). These applications support therapy by allowing patients to do their 'homework' on them, such as tracking their moods and what they eat and submitting these comments back to the therapist. For both severely depressed and schizophrenic patients there is even a special watch that helps them get through their day. The watch tells patients what to do, such as getting out of bed, or doing relaxation exercises. The

watch can adjust these assignments according to the mood the patient is in and the ease with which they can execute them (Trudeau 2010). There is evidence that these applications do work. Young patients in particular don't skip their homework for therapy sessions any more. For them, this is definitely a more motivating way to keep up with therapy (Trudeau 2010). Morris et al. report that they reached positive results with an application for emotional self-awareness. The application asked patients some questions about their emotional state of mind at semi-regular intervals, and after filling out these questions on mood maps and emotional scales, they could access "mobile therapies": short translations of common cognitive behavioural therapy concepts that were adapted for mobile phones, such as breathing exercises, body relaxation exercises and mind relaxation exercises. The study showed promising results, with people reporting less stress, anxiety and higher self-awareness (Morris 2010).

In the Google Market, there are quite a lot of applications geared towards helping people with panic attacks available for downloading. They vary from simple breathing exercises, guides that tell you what a panic attack, anxiety and a panic disorder are, to hypnosis, meditation, emergency guides to get through a panic attack and applications monitoring the progress of the patient with their exposure exercises. Some of these applications claim to be made by doctors, others by professionals who train people to deal with stressful situations (HiveBrain Software 2012), and yet others by people claiming to have gone through Cognitive Behavioural Therapy themselves (Andreas & Georges AB 2011). None of them have been, as far as I know, scientifically tested. The guides could be useful, because it's important for patients to have information about their disorder. The applications that help with relaxations and breathing exercises can help patients achieve a lower general level of stress, which can lead to less anxiety. One of the applications offers a type of 'emergency button' that can be pushed when the patient is experiencing a panic attack, triggering an audio file where someone tells the patient what is happening in their body, why it cannot harm them and why it will pass with time, helping them to feel more comfortable with their symptoms (Excel at Life 2011).

Case Studies: Panic Quest!

One of the applications that stands out is called 'Panic Quest!'. The website claims that it's an online tool for practising exposure, helping the patient document their exposure sessions and

share them with friends and other patients. The idea is that the patients can see their progress in graphs and get encouragement from others, helping them keep up with their exposure exercises, which sounds like a good idea. Unfortunately, the application has only “1+” downloads in the Google Market (on July 30th, 2012), and it seems to be incomplete, as you can add exercises, but not sessions, so for now the user can't register anything. The website seems to work better, but has no place for the user to find other people suffering from the same problems. Fixing this, I think this could be a useful tool for patients, especially if they make their data available to their therapist.

I think the idea of the 'Panic Quest!' application is one of the ways in which applications could help patients with PD. The research by Morris et al. shows that this type of application can probably be beneficial to patients. The other applications that have breathing and relaxation exercises deal with one of the causes of panic attacks, but not with the disorder itself. Still, some of these applications might be able to offer some support to patients.

Using Mobile Applications to treat Panic Disorder

The danger of mobile applications is that they might make patients think that they can handle their panic attacks with these types of applications, while there is no proof that this will actually help them. A panic disorder is something that can get worse if it goes untreated for too long, making it even harder to treat afterwards (Kampman 2004). The longer a patient waits, the bigger their problem is likely to get. That is why I feel that these types of applications should always include the advice to their users to seek professional help as well. These types of applications can work well if used in combination with therapy, but will probably not offer the sole solution to the problem.

Virtual Reality

Another digital aid that has increased in popularity during recent years is the use of virtual reality. In traditional therapy, exposure in vivo is considered a vital part of the treatment, but sometimes exposure in the actual situation can be impractical, for example in the case of a fear of flying. Besides that, some patients can be so afraid of a place or an event that they refuse treatment because of it. Recent studies have shown that virtual reality can actually be

just as effective as exposure in vivo. 76% percent of patients preferred virtual reality treatment to exposure in vivo, and the amount of people refusing treatment dropped from 26% to 3%. Some clinics have now started using these methods (Brinkman 2009).

Research has also shown positive result in replacing interoceptive exposure and exposure in vivo with virtual reality exposure. Patients were exposed to situations that they feared, but in a virtual reality environment. Patients showed almost the same improvements with virtual reality therapy as they did with normal cognitive behavioural therapy. In the VR environment, the patient could be exposed to the situations they were afraid of, and interoceptive parts of therapy could be added later (like the sound of heart palpitations or shortness of breath, or blurred vision). One of the major advantages of this is that the environments can be completely controlled (such as the amount of people in the situation, or the conversations they are having) so that the patient can start going to these places without encountering any unexpected situations, such as a very busy train or someone else not feeling well, which they might be sensitive to at that point in their treatment. These things can then be added in later. Patients showed good results in long-term recovery as well (Villa Martin 2005).

A downside to Virtual Reality treatment might be the occurrence of cybersickness, which is being more frequently reported for virtual reality. This is similar to movement sickness, and is probably the result of conflicts between sensory systems. However, with the right environment (such as one without too much movement), this does not need to be a problem. Other research suggests that this cybersickness may not be caused by the virtual reality, but by the anxiety of the person in the virtual reality environment (Ling 2011).

Virtual Reality treatment is a viable supplement to or replacement for common CBT, but it is not suitable for patients to practise with at home. It needs the guidance of a therapist, and the costs of the equipment (such as a head mounted display) are quite high. It might also not be useful everywhere; we don't need to innovate for the sake of innovation. Most patients do well with normal treatment, scores for people treated with VR are the same as scores for those undergoing normal CBT. Still, VR treatment might be useful for those avoiding exposure otherwise.

Combinations

As is apparent from the example of Jane McGonigal's *SuperBetter*, combinations of the above are also possible. Gamification can be combined with applications, games can be combined with virtual reality, and games can be enhanced by an application to remind patients to do their exposure exercises or to meditate. Each of these media has their own uses and can be used to help the patient with a different part of their treatment. Virtual reality is perhaps more suited for use with a therapist present and can enhance treatment by simulating difficult situations in a safe environment. Apps can help remind the patient of their exercises or help them keep track of their progress. Gamification can help keep them motivated. Perhaps a combination of them will be most helpful, but we must also keep in mind that this might not work as expected, and will thus need thorough practical research before this is recommended to patients.

Conclusion

There is a lot of optimism about the use of serious games. Many scholars see great potential in games, because they allow the player to experience instead of just hear about things, and because they are seen as very befitting to today's learners. Not all scholars agree on all these points, but the general consensus seems to be that games have a lot of potential for this. Even though most of this evidence is still just theoretical, some recently developed games have worked well and this has added to the general optimistic view on serious games.

Considering the theoretical evidence and the fact that some well-working serious games have already been made, it is quite likely that a working game to treat panic disorder can be made. Games are motivating and engaging and allow the player to experience the world in a new way. Unlike Cognitive Behavioural Therapy for depression, Cognitive Behavioural therapy for treating panic disorder might not at this moment contain a lot of things that can be made into a game, because big parts of the treatment are based on exposure, which has to be experienced in real life, and not in a game. But perhaps games can offer alternative options for treatment. Games are seen by some, amongst whom James Paul Gee, as a very good way to explore alternative identities, for example in a role playing game. The game does not necessarily need to reflect common treatment practises for treating panic

disorder, but might involve treatment options that are unique to games, such as letting the patient experience alternate, less frightened, identities.

For now games do not seem to be the very best option for treating patients with panic disorder. There are also certain downsides: the patient can feel like they are lacking the support of a therapist. Besides this, it might be that not all players interpret the content of the game in the same way. Another problem is that most of the proof that serious games work is still theoretical, and it is based on a view of the world in which we can become anything we want to and do anything we want to, which might not necessarily be a correct world view. Therefore I would suggest that developing a game that can be played at home while still attending regular sessions with a therapist might be the best option for research. Perhaps the visits to the therapist could be less regular, but it is important that the patient gets to discuss the content with the therapist and has the feeling that someone is there for them. Furthermore, there must always be the option for the patient to choose normal treatment, as not all patients like games or are motivated to play them.

Another option is to use games to give patients 'a break'. This might not be a valid way to treat patients with panic disorder, and it could lead to more avoidance, but when carefully monitored, perhaps games could be used as a way to help patients get a little room to breathe when they are very anxious and are feeling out of control. Playing games takes attention away from the body, and this might at times be a nice change of pace for some. With panic disorder, being afraid of some bodily sensations can lead to the patient having a lot of negative thoughts and ultimately to a panic attack. It would be best if the patient could manage these feelings, but if this is not an option at times, maybe playing games could relieve the patients somewhat.

As for gamification, there appear to be a lot of ways to do it the wrong way. Just awarding points and badges for doing it right will most likely not contribute that much, although it might work for some people, especially those who are highly motivated by competition. If done the right way however, gamification can probably contribute to the recovery of patients with panic disorder. Adding a narrative, a heroic story, reconnecting players with their friends and family and other support, might give a great deal of support to the patient. Besides that, having clear goals and things to avoid like in the example of SuperBetter might make the patient feel more confident and motivated to keep on going.

Gamification could be well combined with the use of mobile applications. Mobile applications can be used to check how the patient is doing at regular intervals and they can remind them to do their exposure exercises. Furthermore, they can be used with gamification options. Mobile applications can also help the patient in the case of a panic attack, to remind them that nothing bad will happen and that the attack will eventually pass. It can also offer guided meditation or mindfulness exercises. Like serious games and gamification, mobile applications will not be able to replace other treatment; they are more of a support option.

Virtual Reality is the only option so far that might be able to replace a big part of treatment in the near future. It does still need to be supervised by a therapist. The equipment is expensive and cannot be afforded by anyone. Besides that, the rest of the treatment is also normally supervised by a therapist. Virtual reality could well be used in combination with any of the previous options, like gamification and mobile applications for support outside of the sessions.

Various digital media can be used to support the treatment of patients with panic disorder. However, replacing the normal therapy options will probably not happen in the near future. A serious game to help patients will most likely need to involve a completely new way of treating patients, and even then it's not sure they will be able to translate this to the context of real life very well. Virtual Reality can replace certain parts of treatment, but it cannot be done without the help of a therapist. Gamification and mobile applications are just support techniques that will not replace therapy in the foreseeable future.

A lot of these digital aids have yet to prove their potential in helping people. However, patients could benefit from their support in various ways. Therapists will still very much be needed, even though their load might be relieved somewhat by these digital aids.

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