**Portland State University**
## PDXScholar

University Honors Theses                          University Honors College

2015

# The Potential of Serious Games as Mental Health Treatment

Sheena M. Miller
*Portland State University*

# Let us know how access to this document benefits you.

Follow this and additional works at: http://pdxscholar.library.pdx.edu/honorstheses

### Recommended Citation

Miller, Sheena M., "The Potential of Serious Games as Mental Health Treatment" (2015). *University Honors Theses.* Paper 148.

10.15760/honors.176

The Potential of Serious Games as Mental Health Treatment

by

Sheena M. Miller

An undergraduate honors thesis submitted in partial fulfillment of the

requirements for the degree of

Bachelor of Arts

in

University Honors

and

English

Thesis Adviser

W. Tracy Dillon, Ph.D.

Portland State University

2015

"Up until now, the biggest question in society about video games has been what to do about violent games. But it's almost like society in general considers video games to be something of a nuisance, that they want to toss into the garbage can."

–Shigeru Miyamoto

Manager of the Nintendo Entertainment Analysis & Development Branch

Creator of *Mario*

Abstract

Video games deserve to be readily recognized as a means of assisting people in healthcare settings. This paper proposes a simple taxonomy for serious games that function as mental health treatment: 1) Informative Game Playing; 2) Therapeutic Game Designing; and 3) Therapeutic Game Playing. These three categories are explained and examples of games from each category are included, as well as corresponding research when applicable. The process of elaborating on this taxonomy elucidates the capabilities of serious games and also emphasizes areas for design improvement as well as further clinical research. Several controversies and unresolved issues surrounding video game research are discussed.

*Keywords:* video game, art therapy, serious game, gamification, mental health, mental disorder, treatment, games for health, games for change
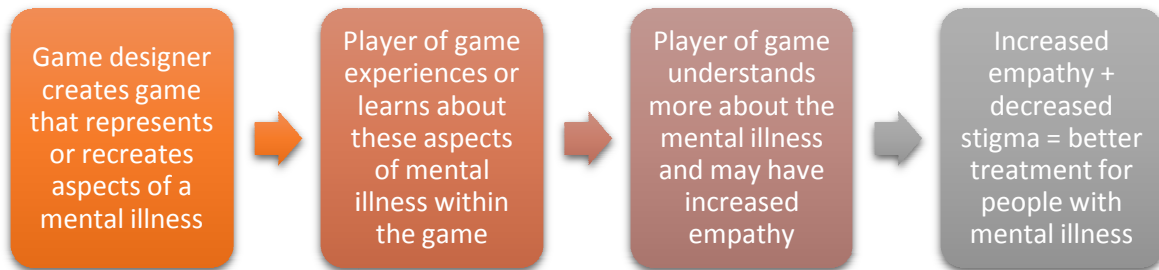
The Potential of Serious Games as Mental Health Treatment

A serious game is a game with a purpose other than entertainment (Michael). There are multiple taxonomies of serious games that range from being organized by the content, style, genre, or market of the game. Categories of markets that serious games can appeal to include: the military, the government, educational systems, corporations, and health care systems (Tarja et. al) (See Appendices A-C for related health care centric and general taxonomies of serious games). Within the subset of serious games that appeal to health care systems, there exists a series of games that focuses on mental health treatment. These mental health games vary widely in both scope and nature, but I propose that most will fit into at least one of these categories: 1) Informative Game Playing; 2) Therapeutic Game Designing; and 3) Therapeutic Game Playing (See Figure 1). Most of the time, the primary purpose of the game – either to inform the player, serve as a form of therapy for the game designer, or serve as a form of therapy for the game player – is apparent, but there can be overlap between the categories. This taxonomy was created as a result of studying trends of emerging mental health focused serious games, and identifying the primary niches of these new games.
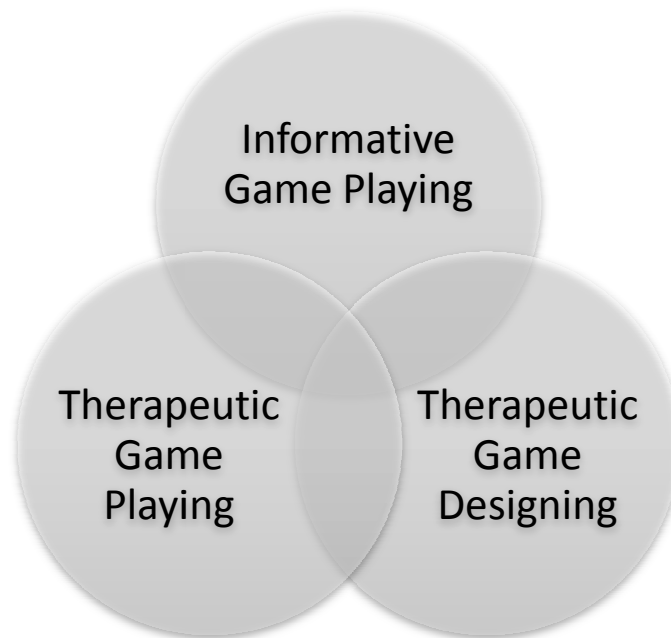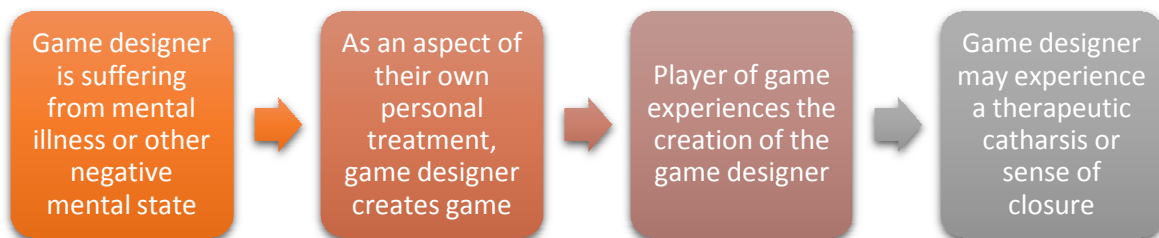


*Figure 1: Taxonomy of Serious Games as Mental Health Treatment*

The first category, Informative Game Playing, encapsulates games that represent the experience of living with a mental illness so that players can vicariously learn and understand the trials that people with mental illness go through; often these games rely on input from people living with mental illness in order to remain as factually accurate as possible (See Figure 2).

| Game designer creates game that represents or recreates aspects of a mental illness | → | Player of game experiences or learns about these aspects of mental illness within the game | → | Player of game understands more about the mental illness and may have increased empathy | → | Increased empathy + decreased stigma = better treatment for people with mental illness |

*Figure 2: Informative Game Playing*

The second category, Therapeutic Game Designing, is similar to the first in the sense that it often recreates aspects of living with a mental illness within the game, but differs in the sense that the game itself is not restricted to doing only that. The purpose of the game is for the creator to supplement their own therapeutic healing process via the action of designing a game, which can lead to a variety of user experiences (See Figure 3).

| Game designer is suffering from mental illness or other negative mental state | → | As an aspect of their own personal treatment, game designer creates game | → | Player of game experiences the creation of the game designer | → | Game designer may experience a therapeutic catharsis or sense of closure |

*Figure 3: Therapeutic Game Designing*

The third category, Therapeutic Game Playing, includes games that are created to provide players with therapy. Usually these games are highly specialized and offer evidence based treatment practices, since

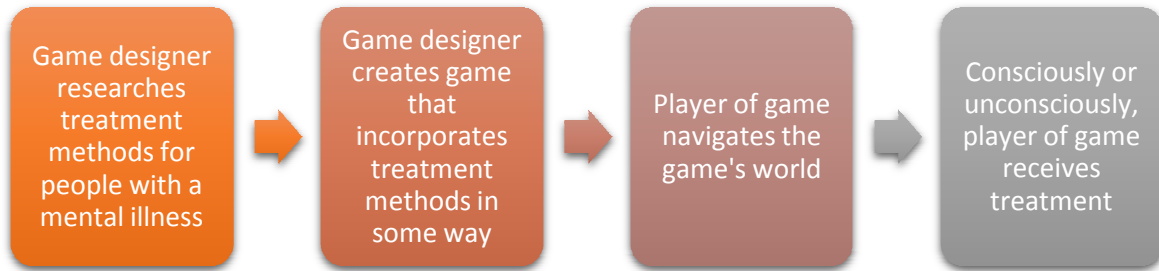they are direct treatment supplements (See Figure 4).



*Figure 4: Therapeutic Game Playing*

## Literature Review

I will discuss case studies of each of the three categories of serious games that function as

mental health treatment outlined above. Details will include their respective audiences, plots, basic

tenants of their design, and the psychological research or additional evidence that supports their design.

### Informative Game Playing

Games that set out to inform the player vary in their approaches, but ultimately aim to distill

within the player knowledge or understanding about the mental illness on which they are focusing. In

turn, these games aim to create empathy within the player. The first game that will be discussed in this

section, *Elude*, informs the player of what it is like to experience depression (See Appendix D1 for a

definition of depression). The product owner and designer of *Elude*, Doris C. Rusch, with the

assistance of teams at DePaul University, created a number of similar games that inform their players

of various other mental health issues. Referred to as an interactive documentary project, *For the*

*Records* includes four separate games that encapsulate Obsessive Compulsive Disorder (OCD),

Attention-Deficit/Hyperactivity Disorder (ADHD), Bipolar Disorder, and Anorexia Nervosa (See

Appendices D2-D5 for definitions of these mental disorders). The games' titles are *Into Darkness, It's*

*for the best, Fluctuation*, and *Perfection* respectively.

*Elude* is a video game created by the Gambit MIT Game laboratory that intends to raise

awareness of depression by informing others of what it is like to experience the illness firsthand. *Elude* metaphorically portrays depression as the player attempts to climb upwards in the game but is vulnerable to the quickly changing "emotional landscape" ("Elude"). When the landscape is normal, then the player is capable of jumping upwards through the trees and getting closer to a clustering of clouds high above, which represent happiness. Without warning, the landscape can shift to depression which results in darker lighting, and a decreased ability to jump. If left unchecked in depression mode, the player is vulnerable to being dragged down below the earth to a dark fiery location, the metaphorical suicide. The only way that a player can win is by repeatedly calling out to the world in the game and finding objects, called passions, that release vibrations and help the player climb upwards more effectively. The intended audience of *Elude* is family members of people diagnosed with depression; the game is meant to be distributed in an educational package to help people empathize with the depressed individual ("Elude").

The game, *Into Darkness*, recreates the desire to repeat rituals, or compulsions, in order to ward off unwanted obsessions through gameplay. The player is stuck in a maze, which metaphorically represents the condition of OCD. As the player attempts to navigate out of the maze, darkness and frightening music increase, representing obsessions. The only way to delay the onset of the darkness and frightening music is via walking in circles in the game, which portrays giving into the need to perform compulsions. Although the player is rewarded immediately in a sense by this action since the darkness and frightening music decrease, the exit of the maze is inaccessible when this occurs. The sensation that the player must endure to exit the maze, and metaphorically OCD itself, is one of discomfort and unease; only by withstanding the darkness and frightening music, or the anxiety that accompanies resisting performing a compulsion to ward off an obsession, can the player find the exit and leave the maze (Rusch 2014).

*It's for the best* addresses the psychological addiction to medication that people with ADHD can

face. The game is based on one of the development team member's experiences of being diagnosed with ADHD as a child, then being told he had to take medication to be better at school. This resulted in lowered self-esteem for him. An additional factor is that ADHD, as a mental disorder, has the tendency to be downplayed by others in their understanding of its severity, which both ignores and increases these feelings of decreased self-worth that often plague people with the illness. The gameplay communicates these experiences to the player via bombarding them with a flurry of papers, representing assignments at school, which clutter the screen at an increasingly rapid speed. The task at hand is to click on the papers as quickly as possible, to complete the assignments, and make them disappear from the screen. There is a pill in the middle of the screen, which when clicked, or metaphorically taken, removes all the current papers from the screen and slows the reappearance of new ones. The player soon finds that it is more satisfying to attempt to keep up with the papers without the pill, but that this is also an impossible feat. The unfinished papers stack up, representing self-doubt without the help of medication, and the whispered phrase, "you're not good enough" is heard on repeat (Rusch 2014). Due to the integral role that one of the game designers, who was diagnosed with ADHD, played in creating this game, it could be interpreted to fit in both the Informative Game Playing category and Therapeutic Game Designing category.

Bipolar Disorder is channeled into *Fluctuation*, a game that metaphorically portrays the shift from mania to depression. Central themes of the game are a loss of control and an alienation from the self and others, which are manifested in the gameplay by a mismatch between player input and character performance, essentially malfunctioning controls. When experiencing a manic phase in the game, the player is continually catapulted increasingly higher into the air by bouncing off shattering glass platforms, which represent the poor decisions made in manic phases combined with the extreme high of it all. The controls become increasingly inaccurate as the phase intensifies, and a fractal pattern with sound effects take over the screen, symbolizing the architecture of a divine plan, one of the

symptoms of mania. When the depressive phase begins, the player is plunged deep into the ocean with the broken shards of glass from the manic phase blocking the surface, which stands for the person attempting to deal with mistakes during the manic phase. The controls again mismatch the player input, but this time restrict and slow down the available motions. While the player is trapped below the glass in the ocean, other characters with beams of light try to reach out to the player, representing the good intentions of people who care about someone with Bipolar Disorder and try to help. Paradoxically, these light beams send the player deeper into the ocean of depression, symbolizing how taxing it is to not be able to respond to loved ones the way one wants to respond to them. Additionally, there is a depth meter on the screen, but its readings are inaccurate, which stands for the inability to ever know when depression will be over, or control it in any way. Overall, the game aims to bridge the gap between potential misunderstandings between people with Bipolar Disorder and loved ones who want to help, but end up either feeling alienated or doing the alienating (Rusch 2014).

*Perfection* is a game that communicates what it's like to live with Anorexia Nervosa. In the metaphor behind this game, the vehicle is a garden, while the tenor is the human body. The point of the game is to reach perfection, which is represented as a garden with no weeds or slugs. The garden is closed off towards the intimidating outside world, which represents judgment and criticism from others. In order to remove the weeds and slugs from the garden, the player must stop watering the garden, which represents starving, or rubbing the mouse over the items, which represents exercising. However, whenever the player partakes in both the excessive starving and exercising activities, the heart plant in the center of the garden starts to wilt, or die. The only way for the player to win is to accept the weeds and slugs, and keep watering the garden. Eventually the walls around the garden come down, representing a healthy relationship with the self, exercise, and food (Rusch 2014).

Rusch has said that the purposes of these *For the Records* games include increasing understanding and alleviating stigma for people with mental illness. She notes the importance of

examining the phenomenology of mental illness, and the unique potential video games hold for expressing such internal experiences to people who might not be able to easily empathize with people diagnosed with mental illness. In one of her research statements, Rusch has said that the games were inspired in part by Jonathan Belman and Mary Flanagan's research on empathy (Rusch 2014). Their research focused on the immersion video games offer as a form of empathy education, and how helpful cognitive and emotional empathy are for various aspects of society at large. Additionally, they proposed a series of four optimal game design principles for creating empathy in players:

> Principle 1: Players are likely to empathize only when they make an intentional effort to do so as the game begins. The game may explicitly ask players to empathize, or it may more subtly encourage them to take on a focused empathetic posture. However, without some kind of effective empathy induction at the outset, most people will play "unempathetically."

> Principle 2: Give players specific recommendations about how their actions can address the issues represented in the game.

> Principle 3: A short burst of emotional empathy works well if desired outcomes to not require significant shifts in how players' beliefs about themselves, the world, or themselves in relation to the world. But if these kinds of shifts are a design goal, the game should integrate both cognitive and emotional empathy.

> Principle 4: Emphasize points of similarity between the player and people or groups with whom he/she is supposed to empathize, but beware of provoking defensive avoidance. (Belman and Flanagan 2010).

Belman and Flanagan have long-term research goals of applying and testing these principles to highlight user's emotional responses to game design tactics. Optimizing the way that players can understand the plights of others vicariously is incredibly useful. Additionally, a qualitative user study

on how the *For the Records* games are received by players is currently under way.

Battling stigma, prejudice, discrimination, and improving the lives of people with mental illness is highly important. Studies have shown that on multiple levels, stigma can have impacts as detrimental as reducing a person's likelihood of seeking out care for their disorder (Patrick et. al 2014). Other studies have also reinforced the relevance of the work that serious game researchers do. Mass media has the potential to reduce prejudice (Clement et. al 2013) and education has been shown to reduce stigma (Corrigan et. al 2012) against people with mental disorders.

**Therapeutic Game Designing**

Games that serve as therapy for the designer can take many different forms. The fundamental requirement for being included in this category is based on the game designer's personal statements about the game. If the designer has stated that creating the game served as a form of art therapy for them or helped them overcome a mental health obstacle, then it falls under the Therapeutic Game Designing category. The games that are going to be discussed in this section are *Papo & Yo*, *That Dragon, Cancer*, and *SuperBetter*.

Vander Caballero created *Papo & Yo,* a 3D puzzle-platformer that revolves around the story of Quico, a young boy, as he is attempting to find a cure for his best friend, Monster, who has an addiction to frogs. When Monster eats frogs, he transforms into a violent foe, and Quico is forced to run and hide. The end of the game reveals that by himself Quico is not capable of fixing Monster's addiction. The designer of this game grew up with an alcoholic father and manifested his experiences and what he learned from them into his game. Although this game does not incorporate therapeutic techniques for the player specifically, it artistically expresses the ramifications of being close to someone with a severe addiction, and served as art therapy for the creator of the game. When Caballero was asked the following question in an interview, "Can you think of any specific example that you pulled from talking to a therapist that is in the game?" he responded:

[Laughs] All of it! Yeah, all of the game has been [discussed] in therapy, everything. The

reason I'm able to get these things in the game is because I opened them in therapy. If I

couldn't - if I was not able to do it in therapy - it wouldn't be in the game. And that's

what happens with people. A lot of people, when they make these things, they hide

emotions, but they still put it in the game. But for me, the way I do it differently is I

discover the emotion and understand it, then I put it in the game (Caballero).

For Caballero, creating *Papo & Yo* was a cathartic experience; in therapy, he'd discussed what it was

like growing up with an alcoholic father and how it affects him to this day. Through making the game,

Caballero is able to move on in a way by sharing his past experiences publicly with his friends, family,

and an audience that will and will not relate to the game, depending on the player. Caballero goes on to

add his opinion about the process of creating the game in the wake of his sessions with his therapist:

So what happens when you go in psychoanalysis is it's like an onion; you start taking out

these layers. And through those layers, you discover the actual emotions. You start to

discover the actual pains that you block ... Now when I go back I see it as an adult, I

don't see it as the kid I was. And that's it; it's going back to all of your emotions and

taking care of yourself. That's the beauty of it. And I use a lot of those concepts in the

game. Everything has meaning to it. And then when you look at the game, every part of

the game is a peel of the onion; then at the end you're gonna open it all. And then you're

gonna get confronted with the reality of what's left - what I was living (Caballero).

By understanding his emotions in a mature fashion, Caballero is capable of recreating them in the

*Papo & Yo* universe and communicating the intricacies of the hardships he faced in his youth in a

way few other art forms can. Video game art therapy helped Caballero come to terms with the trauma

he was exposed to early on in life, and also resulted in the creation of an amazing, award-winning

game. Some of the awards *Papo & Yo* received include: the Brazilian International Game Festival's

2012 Best Narrative Award and Audience Award; the PSN Stores Editor Choice Award 2012; the

Independent Games Festival's 2013 Excellence in Narrative – Honorable Mention; and the Indie

Games Mag's Best Indie Games of E3 2011 ("Papo & Yo").

     *That Dragon Cancer* is a game created by Ryan and Amy Green in the wake of their five year

old son Joel's death due to terminal cancer. The game has been described as a "living painting" that

chronicles the experience of having a child diagnosed with terminal cancer (About the Game). The

game is in point and click format, and retells the mythical story created by Amy for their other children

about Joel's metaphorical battle with a dragon, cancer. Scenes from the game occur in hospital settings,

some of which essentially trap the player in a room with the crying child and no way to stop the crying,

recreating the feeling of hopelessness that can accompany this type of familial situation (Stuart 2015).

In an interview about why the game matters, Green said, "I think [the game] is important because I

think my son is important. Joel may not change the world, but he changed my world. When people deal

with hard things, it changes their world. If we share those things, then we can overcome struggles"

(Campbell 2013). Green went on to say, in another interview, "People focus on the unproductive

escapism in games, but that inherent abstraction can help us to experience someone else's private grief.

Interactivity allows us to take a step back from our own lives, turn the rock around in our hand, and

understand our grief from a whole new angle. It's that vital detachment that people often look for in

therapy, or in making art that helps them cope with loss" (Joho 2015). Green argues for the

effectiveness of therapy, or art therapy, when dealing with grief. Video games certainly are an important

art form to be considered useful in such a way.

     Another game designer, Jane McGonigal, used the process of creating a game to assist her with

her own mental health. *SuperBetter* was created as a means of dealing with the restrictions and

symptoms that accompany a severe concussion: not being able to read, write, or run; intense nausea,

vertigo, and migraines. McGonigal became depressed, and was aware of the way that depression or

other psychological stress can delay physiological healing processes (Gouin 2011). To expedite her

own recovery from both depression and the concussion, McGonigal created a game that eventually

evolved into what is now known as *SuperBetter*. McGonigal regularly credits creating and playing the

game as an integral aspect of her healing process, and has made it available to also help people with

their own journeys, whatever they may be. The goal of *SuperBetter* is to build its players' personal

resilience and help them achieve their life goals, which can vary from facing anxiety to running a

marathon; the team of people who have worked on the game include doctors, psychologists, scientists,

and medical researchers from institutions such as Stanford, UC Berkeley, University of Pennsylvania,

and Ohio State University Medical Research Center (About SuperBetter 2012). Essentially,

*SuperBetter* is a goal-tracking game which requires the player to identify challenges that he or she faces

in the real world by activating power-ups, battling bad guys, and completing daily quests to achieve

epic wins. Each of these categories offer presets as examples, but usually require player input about

specific goals. Allies and boosts also help players actualize their achievements, and progress is marked

by resilience points and levels. Different types of resilience (physical, mental, emotional, and social)

are presented and each is emphasized as equally important in achieving longevity. Lengthening and

improving both the span and depth of the players' life is the central aim of the game, and often

McGonigal opens her talks to the public about the game with this point. Research studies are cited in

messages to the player throughout the game, and McGonigal is transparent with the variety of ways

science reinforces the design and importance of her game (McGonigal 2014). Since this game served as

therapy for the designer, but also can help its players overcome their mental health related obstacles, it

can be seen as a part of both the Therapeutic Game Designing and Therapeutic Game Playing

categories.

**Therapeutic Game Playing**

Games that function as therapy for the game player can vary in their nature, since some

commercial games have produced unintentionally positive therapeutic results, and some therapeutic

games are designed and tailored to produce such results. The games that are going to be covered in this

section include *Tetris*, *Social Clues*, *Project: EVO*, and *Personal Zen*.

　　　Studies have shown that playing video games in general can be an effective means of

ameliorating mental health problems. Although *Tetris* was not created with the idea of reducing

flashbacks for people with Post-Traumatic Stress Disorder (PTSD) in mind, studies have proven that it

is capable of doing so. Focusing on visuospatial cognitive tasks, such as playing *Tetris*, can disrupt the

formation of involuntary mental image flashbacks (Holmes et. al 2009) (see Appendix D for a

definition of PTSD). In a hospital setting, game playing has been proven to calm down people

undergoing anxiety-inducing events. The study is explained in detail:

　　　　　In a study of 112 children (ages 4 –12 years) undergoing general anesthesia for elective

　　　　　surgery, patients were assigned to one of three groups: (a) parent present, (b) parent

　　　　　present　oral mida- zolam (preop sedative), or (c) parent present　a hand-held video

　　　　　game distraction (Patel et al., 2006). The video game distraction consisted of 10

　　　　　commercial games to play on a Nintendo Gameboy platform (A. Patel, personal

　　　　　communication, November 4, 2009). Patients who did not have a hand-held video game

　　　　　showed significant increases in anxiety from baseline to induction of anesthesia.

　　　　　Patients who played the video games showed no significant increases in anxiety from

　　　　　baseline to induction and reduced anxiety compared with the parent-present group and

　　　　　no difference with the midazolam group during induction of anesthesia. These findings

　　　　　are significant for this population group and procedure because the games and hand-held

　　　　　device represent a low-cost, easy-to- implement, portable, and effective method of

　　　　　anxiety management in a vulnerable population during a critical time of care. Further-

　　　　　more, the findings have clinical implications because the impact of the video games on

anxiety was as effective as a pharmacological intervention for anxiety. (Kato)

Essentially, the video game playing functioned exactly the same as prescribed medicine, in regards to

reducing anxiety.

The games played in the aforementioned studies were typical commercial games, and they still

had a positive impact on players; games tailored to treat specific disorders in players via design and

play tactics can have astronomical effects. One such game that exists is *Social Clues*, which is a

therapy tool for children with Autism Spectrum Disorder (ASD) and other neurodevelopmental

disabilities (See Appendix D7 for a definition of ASD). *Social Clues* incorporates evidence-based

practices such as Applied Behavioral Analysis, Errorless Learning, Social Narrative, and Discrete Trial

Training, into the game play and design.  All of these practices have been proven to be effective

treatment methods for children with ASD, and are seamlessly incorporated into this puzzle-adventure

game. Through trial and error of the player's maneuvering in the cartoon world, the game teaches

pragmatics and social skills ("A Curriculum").

*Project: EVO* is aimed primarily at an audience of players with ASD, and was created by Akili.

It has been designed in close collaboration with neuroscientists at UCSF, and aims to engage brain

pathways involved in executive brain functions such as attention, focus, and problem solving since

many people with ASD have impaired executive function (Autism Speaks 2015). The game itself

operates on touch screens and depicts the journey of a friendly alien traveling down a river. While the

player plays *Project: EVO*, measurements for various cognitive tests are recorded, and the purpose of

the game is to target and improve cognition and symptoms (A different type of medical product).

A game created by Dr. Tracy Dennis-Tiwary and her team, *Personal Zen*, aims to reduce anxiety

and stress by delivering Attention-Bias Modification Training in the gameplay, and a study has proven

that it does so effectively (Tracy 2014). As the player navigates through a grassy field, they must

essentially learn to focus on the positive avatar displayed over the negative one, which reinforces the

idea of thinking positively overall and trains people to learn how to tune out negativity or anxiety inducing stressors in their day-to-day lives.

## Discussion

In the field of psychology, as well as in popular media, video games have always been a highly controversial topic. I will elaborate on several of these controversies, which are germane to this study since they are still areas of unresolved live debate that affect the way video game research is viewed as a whole. Following these two controversy sections, I will explore some of the limitations of the research referenced in the Literature Review section.

### Controversy: Violent Video Games

A science brief published in 2003 on the APA website written by Craig A. Anderson, who obtained his PhD in Psychology from Stanford University in 1980, states a series of eleven "myths" and "facts" about violent video games. In response to the myth number nine, which purports that the side-effects of violent video games are small, Anderson claimed that analysis showed "violent video game effect sizes are larger than the effect of second hand tobacco smoke on lung cancer, the effect of lead exposure to I.Q. scores in children, and calcium intake on bone mass. Furthermore, the fact that so many youths are exposed to such high levels of video game violence further increases the societal costs of this risk factor (Rosenthal, 1986)" (Anderson 2003). Anderson also stated that one study found "significant increases in aggression" among a population of college students following their playing of E-rated video games in order to refute myth number eight, which states that unrealistic or cartoon-like video game violence is safe for young players.

In 2005, the American Psychological Association (APA) Task Force on Violent Media issued a "Resolution on Violence in Video Games and Interactive Media" policy statement that argued for the negative effects of violent video games and urged caution towards violent video game exposure. This resolution was based on a significant amount of research conducted up to this point in time (Resolution

on Violence 2005). In response to this statement, which was viewed by some members of the field as alarmist and falsified, an open statement to the APA Task Force on Violent Media was written and signed by 230 media scholars, psychologists, and criminologists. The final paragraph of this open statement reads:

> Fundamentally, we are of the belief that the task force has a tremendous opportunity to change the culture of this research field to one which is less ideological and open to new theories, data  and beliefs. So too, should scholars feel free to argue for existing theories. We believe that the field is beginning to undergo theoretical and data-driven changes that challenge previously held beliefs. Only with the freedom for data to sort itself out can this field progress. We would endorse any attempt to properly reflect these differences in data, theories, and beliefs. Such a policy statement might be less conclusive, but certainly more sophisticated, and it could do much to restore the credibility of this field. Policy statements based on inconsistent and weak evidence are bad policy and over the long run do more harm than good, hurting the credibility of the science of psychology. We are certainly happy to help the Task Force however we can in support of their important work. (Scholars' Open Letter 2014)

As of May 2015, the APA Task Force on Violent Media is still reviewing its 2005 Resolution, which will take into account more recent research. The Task Force had its first meeting in June 2013 (APA Task Force).

A study conducted at the University of Gothenburg challenges the notion of generalizing on the effects video games have on players' behaviors while investigating the way both "aggression" and "collaboration" can coexist in game environments, and even be linked causally in certain instances. However, the researchers highlighted the importance of caution in regards to claiming that a game, or games in general, cause "aggression", "collaboration", or any other related umbrella term (Bennerstedt

2011).

**Controversy: Video Game Addiction**

Multiple psychologists and psychiatrists have examined the idea of video game addiction, or similar concepts. One widely cited study examined two samples of Dutch schoolchildren that ranged in age from 13 to 16 years old, and aimed to identify the addicted population of video game players using three measurements: compulsive internet use (questionnaire that measures withdrawal symptoms, loss of control, salience, conflict and coping), hours spent gaming per week (self-reported questionnaire), and psychosocial outcomes (Rosenberg's Self-Esteem Scale, UCLA Loneliness Scale, Depressive Mood List, and the Revised Social Anxiety Scale for Children questionnaires). The study found that 3% of the participants in the samples met their definition for being addicted to video games. Ultimately, the only difference in regards to results to the study's measured variables between the addicted heavy gamers and the non-addicted heavy gamers was that the former group was more depressed than the latter group over the span of 2009 (Van Rooij et. al 2011).

Video game addiction is not a disorder in the most recent fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM) published by the American Psychiatric Association in May 2013. However, Internet Gaming Disorder was included as a Condition for Further Study, which means that there is no basis for clinical usage of the condition, but research on it is recommended in the future (American Psychiatric Association 2013). It has been argued that the idea of video game addiction is based upon "media hysteria" and that methods used to try to identify it are "inappropriate" and "misleading"; it has also been suggested that other factors such as poor time management skills or a desire to escape from underlying problems are likely reasons excessive video game playing occurs (Wood 2007).

**Limitations of the Literature Review**

Due to the novelty of this game sector, it proved difficult to access direct quantitative data on

the efficacy of specific game design tactics or the games themselves included in the paper. Many of the sources included stated that clinical trial research was currently in progress, which can potentially be added to this paper at a later date, or included in a future paper.

Many of the game examples used in the paper were metaphorical in nature, which is due to personal choice. The list of games included is by no means exhaustive, and merely reflects some of the research I have gathered up to this point in time, presented in an organized fashion.

**Conclusion**

As mental health treatment, serious games possess untapped potential. Some of the biases against video games may be restricting growth in this area. The brief taxonomy in this paper aims to organize serious games as mental health treatment into three accessible categories, and to highlight the capabilities of each of these types of games to a lay audience. Further research in this field is necessary, vital, and promising.

References

"About." Games for Change. Games for Change, n.d. Web. 10 Dec. 2014.

<http://www.gamesforchange.org/about/>.

About SuperBetter. (2012). Retrieved May 19, 2015, from https://www.superbetter.com/about

About the Game. (n.d.). Retrieved June 5, 2015, from That Dragon, Cancer website:

http://thatdragoncancer.com/about

"A curriculum built on 'evidence-based practices.'" Social Clues. USCGames, n.d. Web. 30 Nov. 2014.

<http://www.socialcluesgame.com/#!science/c7jq>.

A different type of medical product. (n.d.). Retrieved June 5, 2015, from Akili website:

http://www.brain.akiliinteractive.com/

American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders: DSM-

5. Washington, D.C: American Psychiatric Association.

http://dx.doi.org/10.1176/appi.books.9780890425596

Anderson, C. A. (2003, October). Violent Video Games: Myths, Facts, and Unanswered Questions

[Fact sheet]. Retrieved May 19, 2015, from American Psychological Association website:

http://www.apa.org/science/about/psa/2003/10/anderson.aspx

APA Task Force on Violent Media. (n.d.). Retrieved May 13, 2015, from American Psychological

Association website: http://www.apa.org/pi/families/violent-media.aspx

Autism Speaks' DELSIA Funds Clinical Trial of Therapeutic Video Game. (2015, March 2). Retrieved

June 5, 2015, from Autism Speaks website: https://www.autismspeaks.org/science/science-

news/autism-speaks%E2%80%99-delsia-funds-clinical-trial-therapeutic-video-game

Belman, J. and Flanagan, M. Designing Games to Foster Empathy. Cognitive Technology, 14(2).

Bennerstedt, U., Ivarsson, J., & Linderoth, J. (2011). How gamers manage aggression: Situating

skills in collaborative computer games. International Journal of Computer-Supported

Collaborative Learning.

Caballero, Vander. "THERAPY, ALCOHOL, AND CHICKENS: THE STORY BEHIND PSN'S PAPO

& YO" Interview by Matt Leone. Polygon. Vox Media, 2012. Web. Dec. 2014

Campbell, C. (2013, May 9). GAMING'S NEW FRONTIER: CANCER, DEPRESSION, SUICIDE.

Retrieved June 5,

2015, from Polygon website: http://www.polygon.com/2013/5/9/4313246/

gamings-new-frontier-cancer-depression-suicide

Clement S, Lassman F, Barley E, Evans-Lacko S, Williams P, Yamaguchi S, Slade M, Rüsch N,

Thornicroft G. Mass media interventions for reducing mental health-related stigma. Cochrane

Database of Systematic Reviews 2013, Issue 7. Art. No.: CD009453. DOI:

10.1002/14651858.CD009453.pub2.

"Elude." Gambit. Comparative Media Studies at MIT, n.d. Web. 30 Nov. 2014.

<http://gambit.mit.edu/loadgame/elude.php>.

"Facts & Statistics." Anxiety and Depression Association of America. ADAA, n.d. Web. 28 Nov. 2014.

<http://www.adaa.org/about-adaa/press-room/facts-statistics>.

Gouin, J.-P., & Kiecolt-Glaser, J. K. (2011). The Impact of Psychological Stress on Wound Healing:

Methods and Mechanisms. Immunology and Allergy Clinics of North America, 31(1), 81–93.

doi:10.1016/j.iac.2010.09.010

Hofmann, Stefan G., and Jasper A. J. Smits. "COGNITIVE-BEHAVIORAL THERAPY FOR

ADULT ANXIETY DISORDERS: A META-ANALYSIS OF RANDOMIZED PLACEBO-

CONTROLLED TRIALS." The Journal of clinical psychiatry 69.4 (2008): 621–623. Print.

Holmes EA, James EL, Coode-Bate T, Deeprose C (2009) Can Playing the Computer Game "Tetris"

Reduce the Build-Up of Flashbacks for Trauma? A Proposal from Cognitive Science. PLoS

ONE 4(1): e4153. doi: 10.1371/journal.pone.0004153

Joho, J. (2015, April 15). THE DOCUMENTARY ON THAT DRAGON, CANCER IS AN

    INVITATION TO PLAY THROUGH

    GRIEF. Retrieved June 5, 2015, from Kill Screen website: http://killscreendaily.com/articles/

    thank-you-playing/

Kato, Pamela M. "Video Games in Health Care: Closing the Gap." *Review of General Psychology* 14.2

    (2010): 113-21. *ProQuest*. Web. 15 Mar. 2015.

McCallum S. Gamification and serious games for personalized health. Stud Health Technol

    Inform. 2012;177:85–96. Retrieved from: http://www.ncbi.nlm.nih.gov/pubmed/22942036

McGonigal, J. (2014, January 6). SuperBetter: Show Me the Science! [Blog post]. Retrieved from

    you found me. website: http://janemcgonigal.com/2014/01/06/superbetter-show-me-the-science/

Michael, D. R., & Chen, S. L. (2005). Serious Games : Games That Educate, Train, and Inform.

    Boston, MA, USA: Course Technology. Retrieved from http://www.ebrary.com

"Papo & Yo" ["Father & I"]. Games for Change. Games for Change, n.d. Web. 30 Nov. 2014.

    <http://www.gamesforchange.org/play/papo-yo>.

Patrick W. Corrigan, Benjamin G. Druss, and Deborah A. Perlick

    The Impact of Mental Illness Stigma on Seeking and Participating in Mental Health Care

    Psychological Science in the Public Interest October 2014 15: 37-70,

    doi:10.1177/1529100614531398

Patrick W. Corrigan, Scott B. Morris, Patrick J. Michaels, Jennifer D. Rafacz, and Nicolas Rüsch

    Challenging the Public Stigma of Mental Illness: A Meta-Analysis of Outcome Studies

    Psychiatric Services 2012 63:10, 963-973

PyramidHeadcrab. "Video Gaming and Anxiety." *Mental Health*. Kotaku, 13 June 2013. Web. 14 Mar.

    2015. <http://tay.kotaku.com/video-gaming-and-anxiety-513171174>.

Resolution on Violence in Video Games and Interactive Media [Press release]. (2005). Retrieved from:

https://www.apa.org/about/policy/interactive-media.pdf

Rusch, D. C. (2014). Games about Mental Health - Designing the Experience of "What It's Like."

Founders of Digital Games. Retrieved from: http://www.fdg2014.org/papers

/fdg2014_demo_10.pdf

Scholars' Open Letter to the APA Task Force On Violent Media Opposing APA Policy Statements on

Violent Media. (2014, May). Scribd. Retrieved from:

http://www.scribd.com/doc/223284732/Scholar- s-Open-Letter-to-the-APA-Task-Force-On-

Violent-Media-Opposing-APA-Policy-Statements-on-Violent-Media

Schouten, B., Fedtke, S., Bekker, T., Schijven, M., & Gekker, A. (2013). Games for Health:

Proceedings of the 3rd european conference on gaming and playful interaction in health care.

Springer Science & Business Media. Retrieved from: https://books.google.com/books?id=1ui9

BAAAQBAJ&dq=games+for+health+project+taxonomy&source=gbs_navlinks_s

Stuart, K. (2015, March 9). That Dragon, Cancer: is it right to make a game about cancer? Retrieved

June 5, 2015, from theguardian website: http://www.theguardian.com/culture/2015/mar/08/

that-dragon-cancer-computer-game

Tarja, Susi, & Johannesson, Mikael & Backlund, Per (2007). Serious Games: An Overview. Skövde,

Sweden. Institutionen för kommunikation och information. Retrieved from:

http://urn.kb.se/resolve?urn=urn:nbn:se:his:diva-1279

Technology and Mental Health. (2014). In M. Khosrow-Pour (Ed.), Encyclopedia of Information

Science and Technology (3rd ed., pp. 6459-6465). IGI Global.

Theory and Taxonomies of Serious Games. (n.d.). ENTRExplorer Project.

http://www.entrexplorer.com/pdf/Theory_and_Taxonomies_of_Serious_Games.pdf

Tracy A. Dennis and Laura J. O'Toole. Mental Health on the Go: Effects of a Gamified Attention-Bias

Modification Mobile Application in Trait-Anxious Adults

Clinical Psychological Science 2167702614522228, first published on March 6, 2014

doi:10.1177/2167702614522228

Van Rooij, A. J., Schoenmakers, T. M., Vermulst, A. A., Van Den Eijnden, R. J.J.M. and Van De

Mheen, D. (2011), Online video game addiction: identification of addicted adolescent gamers.

Addiction, 106: 205–212. doi: 10.1111/j.1360-0443.2010.03104.x

Wood, Richard T.A. (2007), Problems with the Concept of Video Game "Addiction": Some Case Study

Examples. Springer Science + Business Media. Retrieved from:

http://link.springer.com/article/10.1007/s11469-007-9118-0

Appendix A

Ben Sawyer & the ENTRExplorer Project

Serious game taxonomies have been created by multiple people, but one of relevance was created by Ben Sawyer, and referenced in a paper by the ENTRExplorer Project entitled, "Theory and Taxonomies of Serious Games". It lays out some of the many markets for serious games and some basic information about how that works (Theory and Taxonomies of Serious Games).

| | Games for Health | Advergames | Games for Training | Games for Education | Games for Science and Research | Production | Games as Work |
|---|---|---|---|---|---|---|---|
| Government & NGO | Public Health Education & Mass Casualty Response | Political Games | Employee Training | Inform Public | Data collection / Planning | Strategic & Policy Planning | Public Diplomacy Opinion Research |
| Defense | Rehabilitation & Wellness | Recruitment & Propaganda | Soldier/Support Training | School/House Education | Wargames/ planning | War planning & weapons research | Command & Control |
| Healthcare | Cybertherapy / Exergaming | Public Health Policy & Social Awareness Campaigns | Training Games for Health Professionals | Games for Patient Education and Disease Management | Vizualization & Epidemiology | Biotech manufacturing / design | Public Health Response Planning & Logistics |
| Marketing & Communication | Advertising Treatment | Advertising marketing with games, product placement | Product Use | Product Information | Opinion Research | Machinima | Opinion Research |
| Education | Inform about diseases/risks | Social Issue Games | Train teachers / Train workforce skills | Learning | Computer Science & Recruitment | P2P Learning Constructivism Documentary? | Teaching Distance Learning |
| Corporate | Employee Health Information & Wellness | Customer Education & Awareness | Employee Training | Continuing Education & Certification | Advertising / visualization | Strategic Planning | Command / Control |
| Industry | Occupational Safety | Sales / Recruitment | Employee Training | Workforce Education | Process Optimization Simulation | Nano / Biotech Design | Command / Control |

*Table 1: A Serious Game Taxonomy Created by Ben Sawyer, Table from ENTRExplorer Project*

Appendix B

The Games for Health Project

The following table elucidates one way of classifying serious games utilized in healthcare, and was created by the Games for Health Project, which was started in 2004 (McCallum 2012) (Schouten 2013). This taxonomy has fluctuated over time, but the following contains the most recent version available.

| Area of Health Activity | Personal | Professional Practice | Research and Academia | Public Health |
|---|---|---|---|---|
| **Preventive** | Health Assets: "Exergaming", Stress, Nutrition, PERMA | Patient Communication | Data collection | Public Health Policy & Social Awareness Campaigns |
| **Therapeutic** | PT/OT Sensorimotor "Rehabitainment"; Disease Management | Pain distraction; Cyberpsychology; Disease management | Virtual Humans | First responders |
| **Assessment** | Self-ranking | Measurement | Inducement | Interface and Visualization |
| **Education & Training** | First Aid, Patient Education; Health Literacy | Skills and Training | Recruitment | Management Simulations |
| **Informatics** | Personal Health Record (PHR) | Electronic Medical Record (EMR) | Visualization | Epidemiology |
| **Production** | Personal Data Collection; Quantified Self | Biotech Manufacturing & Design | Biotech Manufacturing & Design | Large-scale Data Collection & Monitoring |

*Table 2: The Games for Health Taxonomy, developed by the Games for Health Project*

Appendix C

Encyclopedia of Information Science and Technology, Third Edition

Under the Psychology of Human Behaviour category of the Encyclopedia of Information Science and

Technology, a taxonomy of serious games was created (Technology and Mental Health 2014).
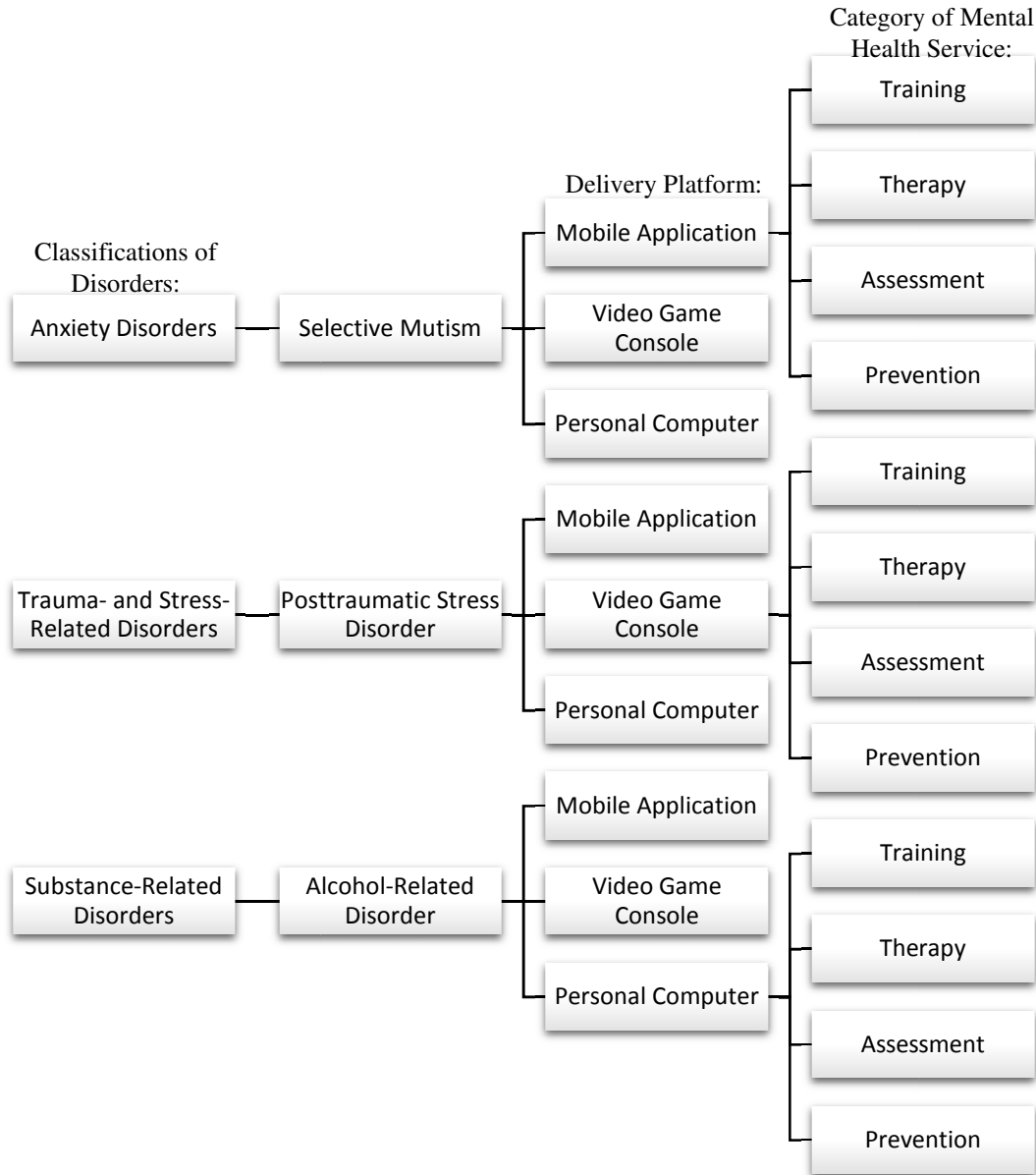


*Figure: "Expanding the taxonomy of technology and mental health", Encyclopedia of Information Science and Technology*

Appendix D

The Diagnostic and Statistical Manual of Mental Disorders, 5th Edition

. The Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5) is a classification

and diagnostic tool for the American Psychiatric Association (APA) that functions as a source of

authority for psychiatric diagnosis. It was published on May 18, 2013 and contains diagnostic criteria

and descriptions of mental disorders.

Refer to the following labeled paragraphs for summaries of the DSM-5 definitions of mental

disorders referenced within this paper.

D1:

Depression is currently defined as the presence of five or more of the following symptoms, at

least one of which must either be symptom one or two, during the same 2-week period: 1) depressed

mood most of the day, almost every day; 2) loss of interest or pleasure in activities; 3) significant

changes in weight or appetite; 4) frequent insomnia or hypersomnia; 5) frequent psychomotor agitation

or retardation; 6) fatigue or loss of energy nearly every day; 7) feelings of worthlessness, excessive or

inappropriate guilt nearly every day; 8) diminished ability to think or concentrate nearly every day; or

9) recurrent thoughts of dying or suicidal ideation (American Psychiatric Association 2013).

D2:

OCD is defined as the presence of obsessions, compulsions, or both. Obsessions are defined by:

1) persistent thoughts, urges, or images that are experienced as intrusive and unwanted, and that cause

anxiety or distress; and 2) the individual attempts to ignore or suppress these thoughts, urges, or images

by neutralizing them with another thought or action, performing a compulsion. Compulsions are

defined by: 1) repetitive behaviors or mental acts that the individual feels driven to perform in response

to an obsession or based on personal rules; and 2) these behaviors or mental acts aim to prevent or

reduce anxiety or distress but are not connected in a realistic way with what they are designed to

neutralize or prevent, or are excessive in nature. To complete the OCD diagnostic criteria list, the

obsessions and/or compulsions must be time-consuming (more than 1 hour per day) or cause significant

distress or impairment (American Psychiatric Association 2013).


D3:

     ADHD is defined as a persistent pattern of inattention and/or hyperactivity-impulsivity that

interferes with functioning or development as characterized by one and or two. 1) Inattention is

measured by the frequent presence of six or more of the following symptoms that have persisted for at

least six months and have negatively impacted social, academic, or occupational activities: a) fails to

give close attention to details, makes careless mistakes; b) has difficulty sustaining attention in tasks or

play activities; c) does not seem to listen when spoken to directly; d) does not follow through on

instructions and fails to finish schoolwork, chores, or duties in the workplace; e) has difficulty

organizing tasks and activities; f) avoids, dislikes, or is reluctant to engage in tasks that require

sustained mental effort; g) often loses things necessary for tasks or activities; h) is easily distracted by

extraneous stimuli; or i) is forgetful in daily activities (American Psychiatric Association 2013).


D4:

     Bipolar I Disorder can be diagnosed when the following criteria are met for a manic episode.

The manic episode may have been preceded by and may be followed by hypomanic or major

depressive episodes. A manic episode is defined as a distinct period of abnormally and persistently

elevated, expansive, or irritable mood and abnormally and persistently increased goal-directed activity

or energy, lasting at least 1 week and present most of the day, nearly every day (or any duration if

hospitalization is necessary). During the period of mood disturbance and increased energy or activity, three (or more) of the following symptoms (four if the mood is only irritable) are present to a significant degree and represent a noticeable change from usual behavior: 1) Inflated self-esteem or grandiosity; 2) Decreased need for sleep (e.g., feels rested after only 3 hours of sleep); 3) More talkative than usual or pressure to keep talking; 4) Flight of ideas or subjective experience that thoughts are racing; 5) Distractibility (i.e., attention too easily drawn to unimportant or irrelevant external stimuli), as reported or observed; 6) Increase in goal-directed activity (either socially, at work or school, or sexually) or psychomotor agitation (i.e., purposeless non-goal-directed activity); or 7) Excessive involvement in activities that have a high potential for painful consequences (e.g., engaging in unrestrained buying sprees, sexual indiscretions, or foolish business investments). It is required that the mood disturbance is sufficiently severe to cause marked impairment in social or occupational functioning or to necessitate hospitalization to prevent harm to self or others, or there are psychotic features. It also must be clear that the episode is not attributable to the physiological effects of a substance (e.g., a drug of abuse, a medication, other treatment) or to another medical condition. At least one lifetime manic episode is required for the diagnosis of bipolar I disorder.

A Hypomanic Episode is defined as: A) A distinct period of abnormally and persistently elevated, expansive, or irritable mood and abnormally and persistently increased activity or energy, lasting at least 4 consecutive days and present most of the day, nearly every day; B) During the period of mood disturbance and increased energy and activity, three (or more) of the following symptoms (four if the mood is only irritable) have persisted, represent a noticeable change from usual behavior, and have been present to a significant degree: 1) Inflated self-esteem or grandiosity; 2) Decreased need for sleep (e.g., feels rested after only 3 hours of sleep); 3) More talkative than usual or pressure to keep talking; 4) Flight of ideas or subjective experience that thoughts are racing; 5) Distractibility (i.e., attention too easily drawn to unimportant or irrelevant external stimuli), as reported or observed; 6)

Increase in goal-directed activity (either socially, at work or school, or sexually) or psychomotor

agitation; or 7) Excessive involvement in activities that have a high potential for painful consequences

(e.g., engaging in unrestrained buying sprees, sexual indiscretions, or foolish business investments); C)

The episode is associated with an unequivocal change in functioning that is uncharacteristic of the

individual when not symptomatic; D) The disturbance in mood and the change in functioning are

observable by others; E) The episode is not severe enough to cause marked impairment in social or

occupational functioning or to necessitate hospitalization. If there are psychotic features, the episode is,

by definition, manic; F) The episode is not attributable to the physiological effects of a substance (e.g.,

a drug of abuse, a medication, other treatment). Hypomanic episodes are common in bipolar I disorder

but are not required for the diagnosis of bipolar I disorder. Major depressive episodes are common in

bipolar I disorder but are not required for the diagnosis of bipolar I disorder (American Psychiatric

Association 2013).

D5:

Anorexia Nervosa is defined as the presence of the three following factors: A) Restriction of

energy intake relative to requirements, leading to a significantly low body weight in the context of age,

sex, developmental trajectory, and physical health. Significantly low weight is defined as a weight that

is less than minimally normal or, for children and adolescents, less than that minimally expected; B)

Intense fear of gaining weight or of becoming fat, or persistent behavior that interferes with weight

gain, even though at a significantly low weight; and C) Disturbance in the way in which one's body

weight or shape is experienced, undue influence of body weight or shape on self-evaluation, or

persistent lack of recognition of the seriousness of the current low body weight (American Psychiatric

Association 2013).

D6:

      Post-Traumatic Stress Disorder is defined as the presence of the following: A) Exposure to

actual or threatened death, serious injury, or sexual violence in one (or more) of the following ways: 1)

Directly experiencing the traumatic event(s); 2) Witnessing, in person, the event(s) as it occurred to

others; 3) Learning that the traumatic event(s) occurred to a close family member or close friend. In

cases of actual or threatened death of a family member or friend, the event(s) must have been violent or

accidental; or 4) Experiencing repeated or extreme exposure to aversive details of the traumatic

event(s) (e.g., first responders collecting human remains; police officers repeatedly exposed to details

of child abuse); B) Presence of one (or more) of the following intrusion symptoms associated with the

traumatic event(s), beginning after the traumatic event(s) occurred: 1) Recurrent, involuntary, and

intrusive distressing memories of the traumatic event(s); 2) Recurrent distressing dreams in which the

content and/or affect of the dream are related to the traumatic event(s); 3) Dissociative reactions (e.g.,

flashbacks) in which the individual feels or acts as if the traumatic event(s) were recurring. (Such

reactions may occur on a continuum, with the most extreme expression being a complete loss of

awareness of present surroundings.); 4) Intense or prolonged psychological distress at exposure to

internal or external cues that symbolize or resemble an aspect of the traumatic event(s); 5) Marked

physiological reactions to internal or external cues that symbolize or resemble an aspect of the

traumatic event(s); C) Persistent avoidance of stimuli associated with the traumatic event(s), beginning

after the traumatic event(s) occurred, as evidenced by one or both of the following: 1) Avoidance of or

efforts to avoid distressing memories, thoughts, or feelings about or closely associated with the

traumatic event(s); 2) Avoidance of or efforts to avoid external reminders (people, places,

conversations, activities, objects, situations) that arouse distressing memories, thoughts, or feelings

about or closely associated with the traumatic event(s); D) Negative alterations in cognitions and mood

associated with the traumatic event(s), beginning or worsening after the traumatic event(s) occurred, as

evidenced by two (or more) of the following: 1) Inability to remember an important aspect of the

traumatic event(s) (typically due to dissociative amnesia and not to other factors such as head injury,

alcohol, or drugs); 2) Persistent and exaggerated negative beliefs or expectations about oneself, others,

or the world (e.g., "I am bad," "No one can be trusted," "The world is completely dangerous," "My

whole nervous system is permanently ruined"); 3) Persistent, distorted cognitions about the cause or

consequences of the traumatic event(s) that lead the individual to blame himself/herself or others; 4)

Persistent negative emotional state (e.g., fear, horror, anger, guilt, or shame); 5) Markedly diminished

interest or participation in significant activities; 6) Feelings of detachment or estrangement from others;

7) Persistent inability to experience positive emotions (e.g., inability to experience happiness,

satisfaction, or loving feelings); E) Marked alterations in arousal and reactivity associated with the

traumatic event(s), beginning or worsening after the traumatic event(s) occurred, as evidenced by two

(or more) of the following: 1) Irritable behavior and angry outbursts (with little or no provocation)

typically expressed as verbal or physical aggression toward people or objects; 2) Reckless or self-

destructive behavior.; 3) Hypervigilance; 4) Exaggerated startle response; 5) Problems with

concentration; 6) Sleep disturbance (e.g., difficulty falling or staying asleep or restless sleep); F)

Duration of the disturbance (Criteria B, C, D, and E) is more than 1 month; G) The disturbance causes

clinically significant distress or impairment in social, occupational, or other important areas of

functioning; H) The disturbance is not attributable to the physiological effects of a substance (e.g.,

medication, alcohol) or another medical condition (American Psychiatric Association 2013).

D7:

Autism Spectrum Disorder is defined as: A) Persistent deficits in social communication and social interaction across multiple contexts, as manifested by the following, currently or by history (examples are illustrative, not exhaustive; see text): 1) Deficits in social-emotional reciprocity, ranging, for example, from abnormal social approach and failure of normal back-and-forth conversation; to reduced sharing of interests, emotions, or affect; to failure to initiate or respond to social interactions; 2) Deficits in nonverbal communicative behaviors used for social interaction, ranging, for example, from poorly integrated verbal and nonverbal communication; to abnormalities in eye contact and body language or deficits in understanding and use of gestures; to a total lack of facial expressions and nonverbal communication; 3) Deficits in developing, maintaining, and understanding relationships, ranging, for example, from difficulties adjusting behavior to suit various social contexts; to difficulties in sharing imaginative play or in making friends; to absence of interest in peers; B) Restricted, repetitive patterns of behavior, interests, or activities, as manifested by at least two of the following, currently or by history (examples are illustrative, not exhaustive; see text): 1) Stereotyped or repetitive motor movements, use of objects, or speech (e.g., simple motor stereotypies, lining up toys or flipping objects, echolalia, idiosyncratic phrases); 2) Insistence on sameness, inflexible adherence to routines, or ritualized patterns of verbal or nonverbal behavior (e.g., extreme distress at small changes, difficulties with transitions, rigid thinking patterns, greeting rituals, need to take same route or eat same food every day); 3) Highly restricted, fixated interests that are abnormal in intensity or focus (e.g., strong attachment to or preoccupation with unusual objects, excessively circumscribed or perseverative interests); 4) Hyper- or hyporeactivity to sensory input or unusual interest in sensory aspects of the environment (e.g., apparent indifference to pain/temperature, adverse response to specific sounds or textures, excessive smelling or touching of objects, visual fascination with lights or movement); C) Symptoms must be present in the early developmental period (but may not become fully manifest until social demands exceed limited capacities, or may be masked by learned strategies in later life); D)

Symptoms cause clinically significant impairment in social, occupational, or other important areas of current functioning; E) These disturbances are not better explained by intellectual disability (intellectual developmental disorder) or global developmental delay. Intellectual disability and autism spectrum disorder frequently co-occur; to make comorbid diagnoses of autism spectrum disorder and intellectual disability, social communication should be below that expected for general developmental level (American Psychiatric Association 2013).