Emotional Health

Designing Games for Emotional Health

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Key Summary Points

1   There is a growing understanding of key skills that can help individuals better manage emotions to improve well-being, such as emotional understanding, executive functioning, and emotion regulation skills.

2   In promoting emotional health, games can operate at the low-order brain training level (e.g., drill-and-skill), as well as the higher order meaning-making level.

3   Emotional health is broad, and efficacious approaches to skills development in emotional health are highly contextual, taking into account expected outcomes, environmental context, and individual psychometric conditions.

Key Terms

Emotions
Emotional health
Emotional regulation
Emotional intelligence
Emotional understanding
Self-regulation
Executive functioning
Mental health

Introduction

It is not often we think about emotional health. Physical health, yes. We have heard of mental health. But what do we mean by emotional health? Furthermore, what are we referring to when we talk about games for emotional health?

In this chapter we ask: can games help us develop specific skills that can in turn improve our emotional health? If so, what are the best practices for designing and using games to develop such skills?

Defining emotional health

First off, we should define what we mean by emotional health. In short, it means different things to different people, but for the purposes of this chapter, we are defining emotional health as how we manage our emotional responses in interacting with the world around us that partly contributes to our overall well-being.

While some use the term mental health interchangeably with emotional health, there is a key distinction worth making. Mental health refers to a general state of well-being that allows us to cope with the normal stresses of life and make a contribution to one's community (WHO, 2004). Emotional health refers specifically to the positive and negative affect resulting from life events that contributes to our overall mental and physical health (Hendrie et al., 2006).

One can conceptualize emotional health along a continuum of poor to excellent, much like our physical health. A common misconception is that "good" emotional health would resemble an individual that is always happy or stress-free. This is not the case, however. Research in positive psychology, among other research, has attempted to look at emotional health as falling within a particular positivity ratio which examines the ratio of "positive" and "negative" emotions that make up one's affectivity (Watson, Clark, & Carey, 1988). In other words, good emotional health merely suggests that an individual has the ability to manage their emotional responses in ways that contribute positively to their overall sense of well-being, rather than an absence of "negative" emotions. For instance, they may have the capacity to assume different perspectives, or relax their bodies to better manage stress responses, or simply bounce back faster from highly stressful experiences. On the other hand, at the heart of poor emotional health is severe difficulty in responding to environmental demands in ways that do not hamper one's physical and mental health. Often such challenges coincide with emotion disorders or traumatic experiences that have shaped the way we emotionally respond to stimuli such as stressful situations or relationship demands.

Games and emotional health

When thinking about how to design games to promote emotional health, a common question often emerges. What skills are we really teaching and can they actually be learned? In other words, what are we really teaching when we teach individuals to more effectively manage their emotions, and can games help teach these skills?

First off, it is important to note that there exists a well-established and rather large field of psychotherapeutic interventions dedicated to improving mental and emotional health, which primarily rely on in-person interactions. For instance there is Cognitive Behavioral Therapy (CBT), Emotional Processing Therapy, Rational Emotive Behavior Therapy (REBT), Dialectical Behavior Therapy (DBT), and dozens of others, all varying on how the interaction between therapist and client occurs. Many of these interventions have been fairly successful in addressing some of more prominent emotional health challenges such as managing depression and coping with anxiety (Aldao, Nolen-Hoeksema, & Schweizer, 2010; Ellard, Fairholme, Boisseau, Farchione, & Barlow, 2010; Fava & Tomba, 2009).

One core challenge with such interventions is access. According to the World Mental Health Surveys of the World Health Organization (WHO), one in three people in the U.S. suffer from a mental disorder in their lifetime (Kessler et al., 2009), but only a portion of those people receive treatment, ranging from 26% to 60% for mild and severe mental disorders respectively. Many of these disorders have a significant emotional health component (Aldao et al., 2010). Taking into consideration large diversity in the population and treatment quality, one other major challenge is attrition and low adherence (Thompson & McCabe, 2012), meaning individuals may not stick to treatment protocols and recommendations.

Some are seeing games as one tool that can, and already has, made headway in addressing these challenges, among others. Games can increase accessibility to populations that may not be able to gain access to traditional interventions, and they often provide high levels of repeated engagement with exercises that can improve or match traditional intervention outcomes (e.g., Tate, Haritatos, & Cole, 2009). Furthermore, games provide a new avenue for emotional health, allowing individuals that may not be diagnosed with disorders access to tools that may empower them to improve their emotional health or overcome emotional health challenges.

Why should we care about emotional health?

According to the WHO (2004), at any point in time, there are an estimated 450 million people in the world who are afflicted by some sort of mental, neurological, or behavioral problem. Furthermore, there are increasing numbers of individuals that are undiagnosed or have emotional health challenges that are not disorders, yet still compromise their overall well-being.

About this Chapter

The increasing popularity and role of mobile technology and games in daily life continues to present new opportunities in the emotional health space. There are two key questions framing this chapter. First, can games help us develop specific skills that can in turn improve our emotional health? Second, are there best practices for designing and using games to develop such skills?

Case Study One: *EmoJump*, A Game Targeting Emotional Understanding Skills

EmoJump is a computer game being developed by the games4resilience lab at the University of Vienna to enhance children's understanding of external causes of emotions, belief-based emotions, and mixed emotions. It is designed as a "forced-speed" jump and run game. In every level the player is shown several cartoons, where he or she has to decipher the emotional state of a specific character using only story-based visuals or lines of dialogue in the scene. Faces communicate emotions very effectively and the training focuses on emotion understanding beyond facial recognition, so the faces of game characters are not shown. Thus, the player has to understand the situation the cartoon depicts and hold in his or her mind which emotion one would feel in that particular situation.

After watching the cartoon, the player enters the "forced speed" jump and run sequence where he or she encounters "coins" with faces expressing one of four basic emotions (happy, sad, fear, anger) and is tasked with collecting the appropriate coins that correspond to the situation depicted in the cartoon. This sequence continues through several rounds of cartoons, providing the player with level feedback and trophies that can be earned for high scores.

In line with Pons and Harris' (2000) Test of Emotional Comprehension, the game's level design is aligned with levels of emotion, ranging from a surface level understanding of emotions to higher-order thinking used to regulate emotional responses. Using story-based challenges as described above, early levels focus on understanding external causes of emotions and identifying internal processes (e.g., interpretations) that form belief-based emotions. The challenge of collecting the correct coin to correspond with an emotion is situated through the point of view of the main character, causing players to not only analyze a situation, but also to engage in a task requiring perspective-taking, a component of theory of mind. Later levels deal with mixed emotions and different possible interpretations of a situation or associated thoughts. As a result, the task of collecting coins to correspond to the appropriate emotion requires holding multiple, often conflicting, emotions in mind and collecting more than one target item while completing the "forced speed" run sequence.

Given that the ability to comprehend emotional states and their contexts is crucial for successful engagement in highly social environments, the game targets these skills. As emotional understanding is also a prerequisite to successfully engage in emotion regulation (Jacob et al., 2011) the designers wanted to target deficits in emotion understanding first before teaching emotion regulation strategies.

Key Frameworks

Before designing any game that seeks to improve individual emotional health it is important to understand two things. First, scientific research in the area of human emotion continues to grow each year, bringing with it new insights into how we generate and manage our emotions. This means it is extra important to be up to date on the latest research around the specific approach you may be integrating into your designs. Second, there are many existing perspectives on how to improve emotional health, which means one major task (even more than usual) for designers is to understand how the learning context, expected outcomes, and learner profiles may lend itself to a specific approach. In this section, we will briefly describe a few key approaches taken to improving emotional health that may serve as the focal point of a game-based intervention.

Emotional understanding

A precursor to any discussion on managing emotions often assumes individuals possess some degree of emotional understanding. For example, our ability to label emotions using specific language (e.g., anger), identify related facial expressions (e.g., smiling), and understand how belief systems influence our emotions, are all examples of skills underlying emotional understanding (Garner, 1999). Sometimes referred to as emotional knowledge, or as a subset of emotional intelligence (Nelis, Quoidbach, Mikolajczak, & Hansenne, 2009), emotional understanding is all about making sense of information to better understand our own and others' emotional states. Deficits in emotional understanding can be found in a range of psychopathologies and problem behaviors (Southam-Gerow, 2002), and knowledge of facial expressions and labels is a major predictor of academic achievement (Izard et al., 2001). Interventions focusing on emotional understanding often target children, but have also included adolescent and adult populations.

Inherent aspects of many games such as multiple sensory representations (i.e., visual, auditory) and narratives that provide a context for decision-making, have been used to tackle emotional-understanding skills. See Case Study One for an in-depth example that is situated in this emotional understanding focus.

Executive functioning

The term executive functioning (EF) is broad and can be an amorphous concept to get across, if you are not well versed in psychological theories of cognitive systems. In short, the idea is that there exists a set of cognitive processes (i.e., brain functioning) that controls our ability to deal with novel situations—situations where we do not just automatically respond without thought. In dealing with these novel situations, EF helps us inhibit our responses, or resolve conflicting thoughts on how best to respond (e.g., going on a first date). As you can imagine, these cognitive processes include quite a few things such as directing our attention, self-monitoring, planning, organizing, remembering and inhibiting impulsivity (Tang, Yang, Leve, & Harold, 2012).

So what does this have to do with emotional health? Simply put, EF is essential to our ability to resolve conflict between competing emotions or tendencies in how we respond to something (Botvinick, Braver, Barch, Carter, & Cohen, 2001; Rothbart, 2011). Research has shown that deficits in components of EF are strongly associated with various negative outcomes across one's lifespan, such as behavior problems, aggression, antisocial behavior, inattention, attention deficit hyperactivity disorder (ADHD), problems with peers, school failure, depression, and substance abuse during childhood and adolescence (Eigsti et al., 2006; Floyd & Kirby, 2001; Ivanov, Schulz, London, & Newcorn, 2008; Perner, Kain, & Barchfeld, 2002; Riggs, Blair, & Greenberg, 2004). On the flipside, higher levels of EF are associated with better perspective-taking skills, self esteem, relationship success, as well as positive social, emotional, behavioral, economic, and physical health outcomes (Blair & Peters, 2003; Carlson & Moses, 2001; Moffitt et al., 2011).

Games present interesting opportunities in EF training, in that repetition and escalating difficulty often serve as key design patterns found in training interventions targeting EF skills. In other words, cognitive processes are modified through repeated exercise before moving on to more challenging exercises that push related cognitive processes (e.g., memorization, paying attention to changing instructions). See Case Study Three for an example that illustrates a game-based approach to executive functioning training for emotional health.

Emotion regulation

So far we have covered emotional understanding and executive functioning, as they relate to emotional health, yet perhaps the most direct approach found in emotional health interventions is to focus on emotion regulation—the use of specific strategies to manage one's own emotional response to varying situations. One useful model to conceptualize emotion regulation is the Emotion Regulation Process Model (Gross & Barrett, 2011), illustrated in Figure 1, which outlines five strategies we can use to influence our eventual emotional response.
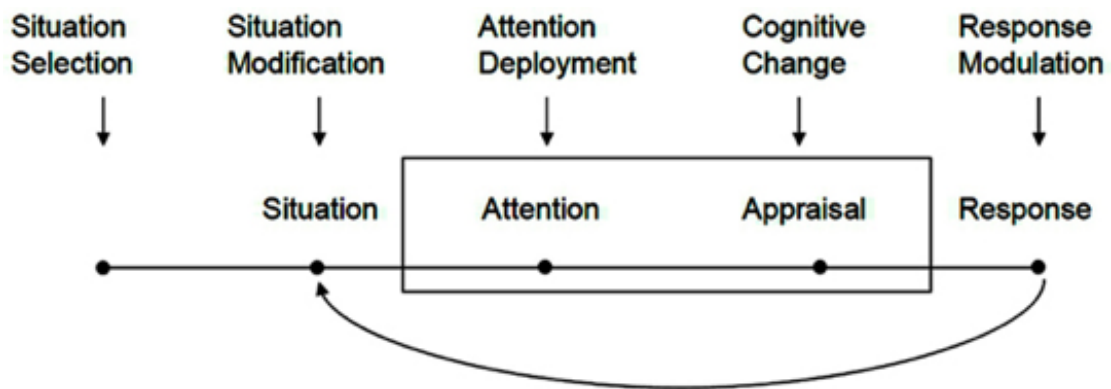

Figure 1. Emotion Regulation Model. Adapted from Gross & Barrett (2011).

The ability to effectively use such strategies is commonly referred to as emotion regulation skills, because these skills regulate the nature, frequency, and duration of one's own emotions (Gross & Muñoz, 1995). Two emotion regulation strategies commonly focused on are attentional deployment and cognitive change—more commonly referred to as cognitive appraisal. Attentional deployment skills refer to our ability to direct our attention to specific aspects of a situation to modulate our emotional response. Cognitive appraisal skills refers to our ability to re-interpret stimuli in different ways to in turn manage our emotional response.

Games for emotion regulation training can provide valuable decision-making and feedback experiences situated in contexts that largely influence the relevance of specific strategies. In other words, games allow players to experience the results of using specific strategies within specific contexts in ways in-person role-playing exercises may be unable to do. Furthermore, games provide interesting opportunities for using in-game data collected to aid in post-game reflection as well as monitoring changes in players.

Additional perspectives

There are several other approaches that may be relevant for game designers. Designers interested in working in conjunction with in-person therapy or leveraging specific therapeutic exercises may want to explore therapeutic frameworks that attempt to work across different diagnosed disorders. For instance, the Unified Protocol (UP) seeks to work across diagnosed disorders seeking to provide a more holistic approach that entails: 1) increasing emotional awareness, 2) supporting flexibility in appraisals, 3) identifying and preventing emotional avoidance, and 4) situational exposure to emotion cues (Ellard et al., 2010).

Lastly, but certainly not least, is a social approach where human-to-human interaction is the key focus. Research has shown that social interactions are closely linked to emotional health (Umberson & Montez, 2010) and there may be opportunities for designing social games situated in this focus.

Each of these approaches has a hefty body of literature that is worth diving into for more details. In the next section, we will consider what the psychological, game studies, and design research say about creating games to support the development of different skills linked to emotional health. In short, if enhancing emotional health is the goal, then how can we better design games or use them within interventions?

Case Study Two: *Leela*, A Commercial Game Targeting Mindfulness

In terms of emotion regulation training, mindfulness is one approach that has become increasingly popular. Typically when one hears mindfulness they imagine an individual in meditation or chanting. From an emotion regulation perspective, mindfulness is commonly defined as the process of directing attention on the present in a non-judgmental way (Kabat-Zinn, 2003) and incorporates emotion regulation strategies such as attentional deployment and cognitive reappraisal. In fact, emerging research in neuropsychology has shown that mindfulness can have profound emotional health benefits in managing anxiety, depression, pain, and psycho-regulatory activity (Chiesa, Calati, & Serretti, 2011). While traditionally mindfulness has been taught through in-person or audio-guided meditation, emerging technology incorporating physical interaction has expanded our possible approaches to developing such emotion regulation skills.

Deepak Chopra's *Leela* (N-Fusion Interactive, 2011) is a game for the Microsoft Xbox 360/Kinect that combines traditional relaxation with meditation techniques to cultivate mindfulness. The unique aspect of the game is the use of the Kinect platform, which allows players to use their body and movements to interact with the game in ways standard game controllers cannot enable. For instance, the "chakra" mini-games that are at the heart of the game make use of embodied game interactions such as twisting one's body, swinging one's arms, and controlling one's rate of breathing. Each of these mechanics is tied to traditional game mechanics such as win/lose states, escalating challenges, mastery sequences, and various feedback mechanisms.

The embodied approach—where you use your body—taken by *Leela* addresses one core limitation of many games designed to provide aspects of emotion regulation training, which is to involve the body in addition to our cognitive processes (Vacca, 2013). Research suggests that regulatory effort involving body-mind states and not just a cognitive focus can promote long-term engagement in that over time physiological involvement can relieve stress associated with engaging in self-control (Tang & Posner, 2009). Some key challenges in *Leela* and other game-based approaches that rely on promoting a "relaxed state" is balancing this goal with the tension that often comes with competitive win/loss mechanics incorporated into games (Sweetser & Wyeth, 2005). In addition, embodied learning experiences that require focusing on internal activity (e.g., shifting focus away from a wandering mind) often instead have to focus on external activity (e.g., breathing and gestures) (Mizen, 2009) to take advantage of commercial sensor technology, although that may quickly change in the coming years.

Key Findings

In the past few years, a number of research studies have suggested compelling directions for teaching skills related to emotional health through games, from a variety of different fields and with varying approaches.

Executive functioning

There have been several interesting findings on the use of games to improve executive functioning (EF) skills. As mentioned earlier, EF skills such as planning, inhibiting behavior, and remembering can also influence our ability to manage emotional responses.

In designing interventions targeting EF skills, repetition and escalating levels of challenges have been found to be effective (Diamond & Lee, 2011). For instance, the game-based intervention *Play Attention*, which targets learners with ADHD to train attention skills and improve memory, makes extensive use of repetition and varying difficulty levels, and has been found to improve performance on tasks requiring attentional control (Unique Logic and Technology, 2011). While the game does not directly target emotional health outcomes, the EF skills that are targeted, such as inhibiting impulsivity and shifting attention, could have implications for emotional health training. Other examples include the *Cogmed* program, which has been used with individuals who have ADHD and Autism as a means of improving working memory and by extension, attentional control (Klingberg et. al., 2005). For the most part, interventions focusing on executive functioning have largely targeted children, where research has shown that wider effects can be achieved (Wass, Scerif, & Johnson, 2012).

Lastly, interventions focusing on executive functions have been found to be more effective when the focus is broader so as to include emotional and social development (Diamond & Lee, 2011), in addition to physical engagement requiring body movement and awareness (Tang & Posner, 2009). In other words, games that make use of emerging physical gaming platforms such as the Nintendo Wii and Microsoft Kinect, may also be able to augment existing EF training approaches through physical engagement.

Emotion regulation

Interventions targeting emotion regulation skills—the use of emotion regulation strategies to better manage emotional responses—have been found to be more effective when designed with certain criteria in mind.

One such criterion has to do with the kind of strategies targeted. As you can recall from our earlier discussion on emotion regulation, particular strategies for response come earlier in the emotion regulation model. Research has shown that such strategies—often referred to as antecedent strategies—are generally more effective in managing emotional responses than inhibiting an emotional response generated (Goldin, McRae, Ramel, & Gross, 2008). For example, researchers from the University of Auckland designed a game called *SPARX* to help young people learn such antecedent strategies to deal with feeling down, depressed, or stressed using methods from Cognitive Behavioral Therapy (CBT).

Results from research by Merry et al. (2012) indicate that the game was as effective as standard care for adolescents and significantly reduced depression, anxiety, feelings of hopelessness, and improved quality of life. This game provides the player a first-person experience where he or she engages in mini-games that present challenges and prompt the player to make decisions and then receive feedback.

Another criterion is situational context in which strategies are learned. Research has shown that emotion regulation strategies are context dependent and training interventions should reflect the importance of such situational context. For instance, researchers have found differences in the effectiveness of different strategies based on the strength (i.e., magnitude) of the affect (e.g., anger) (McRae, Misra, Prasad, Pereira, & Gross, 2012). Games such as *Bravemind* from USC's Institute for Creative Technologies situates the use of strategies such as inhibition within situational reenactments so as to significantly improve the emotional health of individuals with post-traumatic stress disorder (PTSD) (USC ICT, 2013).

Lastly, there is increasing interest in expanding emotion regulation training to include physiological awareness. For example, researchers in Spain designed a video game to increase emotional and impulsivity self-control for individuals struggling with Bulimia Nervosa, which incorporates a motion-tracking suit equipped with various sensors. Results show that players saw improved abilities (Fagundo et al., 2013).

There are additional findings emerging from a variety of fields that overlap with findings in interventions to improve emotional health. Such findings include research in spacing or optimal repetition patterns, embodied cognition (how our body helps us think), and ambient computing (how our environment influences our thoughts and behavior).

Assessment Considerations

In understanding whether games can truly change skills associated with emotional health, it seems logical that we understand how emotions constantly change over time. How we can actually measure emotions, however, is an evolving and highly contextual endeavor. Emotional reactivity can be measured biologically, using *fMRI* to capture brain activity through changes in blood flow, heart rate and nerve activity via vagal tone monitoring, and facial muscle electrical activity through EMG (electromyography) measurements, to name a few. These measures can be combined and interpreted in different ways based on what you are interested in understanding and the context of the research (Cole, Martin & Dennis 2004).

In the clinical space, the Test of Emotion Comprehension has been developed by Pons & Harris (2000) as a useful tool for measuring children's understanding of emotion. The test is particularly useful for revealing hidden emotions that may be difficult for children to articulate depending on their self-awareness and level of development. The test consists of nine levels of emotion, spanning surface level understanding and emotion identification, to higher order emotional functioning. The children must determine whether emotions are real using false belief tasks that test a child's understanding of another

person's emotions by attributing behaviors in given scenarios to how a character is feeling (Pons & Harris, 2000). This test can serve as a blueprint for mapping different levels of emotional comprehension onto game mechanics and levels, as will be discussed in the later case study of *EmoJump* (see Case Study One).

There are a few methods for measuring and assessing player emotion skills and behavior in games. Among these methods are:

1. **Observation:** Often conclusions about a player's emotional experience can be reached through simple observations by a researcher, either in person or via video recordings. Researchers and designers may use checklists of emotional responses, including expressions such as smiles and frowns to determine the emotional climate of the play session and specific responses to notable in-game actions and events. A drawback of this method is the issue of subjectivity among observers. People's observations and perception of the emotional climate of a given experience will vary and this can create inconsistency as well as problems establishing inter-rater reliability for the data collected.
2. **Player self-report:** Researchers can conduct emotional evaluations of players before, during, and after gameplay sessions. Typically, this involves a player responding to a series of questions posed by the researcher, or pointing to a visual cue to indicate the emotion he or she is feeling. Many game systems can actually embed this assessment within the play experience by having the player answer a quick question with a controller or gestural interaction, before moving onto the next segment in the game.
3. **Think-alouds:** Guided think-aloud methods require players to verbalize their internal thoughts and feelings to determine the effects of a game's design and the overall experience on the player's emotional state. Researchers moderate and guide the talk aloud. Information gathered from this method can also help designers and researchers learn more about strategies a player may engage in to address his or her emotional responses.
4. **Biometrics:** Biometrics are physiological measures of heart rate, respiration, skin galvanic response, eye tracking, postural movement, facial EMG and even brain activity via *fMRI*, which can help to determine a player's emotional states. Physical responses from a player's body allow researchers to chart when a player is in a heightened positive or negative emotional state, and at which point they are able to recover from it. In addition, there is increasing use of brain sensor interfaces (e.g., reading brain waves to control in-game elements) that designers can use for assessment that can be linked to neuroscience frameworks such as Davidson's (1999; 2012) emotional styles that outlines specific neural circuits underlying specific emotional response patterns.

5. **In-game data collection:** This growing field of research uses in-game actions in the form of clicks, level completions, and failures, and a number of other important in-game decisions, and aligns the resulting data with behavioral measures, such as biometric measures as described above, or data from psychological rating scales like the BASC, Behavior Assessment System for Children, which may include self-reports or teacher reports of behavior (Reynolds & Kamphaus, 2013). Analysis of the patterns in the game can reveal emotional regulation strategies and key moments for further evaluation.

Future Needs

Simply put, there is a growing consensus that emotion regulation skills in particular, are highly contextual and interventions must consider context as a design priority. For instance, particular strategies to improve emotional health that might serve high-poverty populations may not serve those with terminal illness. As such, game designers need to truly understand the situational contexts, as well as the psychometric contexts of their populations to design interventions that are helpful and not irrelevant or in worst case, harmful. Along the same lines with situational context, are limitations of one's target population, so as to consider a strengths-based focus rather than a deficit-based perspective. In other words, in particular contexts it may serve learners better to focus on leveraging skills that come easy to them, rather than build up skills that "fall short." Furthermore, there is a growing need to go beyond cognitive-only approaches and adopt mind/body approaches that incorporate embodied experiences such as the integration of physical sensors in gameplay. The increased ubiquity of new sensor technology will likely present needs around frameworks that connect in-game behaviors with target emotional health outcomes. Lastly, there is greater need for cross-disciplinary collaboration that can combine practical and theoretical knowledge to address specific populations. For instance, early childhood educators, counselors, and game designers can benefit from more formal collaborative spaces where they can share their practical and theoretical knowledge to improve relevant skills influencing emotional health.

Case Study Three:
Space Ranger Alien Quest, A Game Targeting Executive Functioning

Space Ranger Alien Quest is an action video game developed through an international collaboration among New York University's CREATE lab, CUNY's CHILD lab, the games4resilience lab at the University of Vienna, and the University of Applied Sciences Technikum Wien. Researchers in this consortium are currently investigating the alignment of game performance with executive functioning (EF) (a clear set of cognitive skills tied to self-regulation), with the intention of implementing the game as an intervention to train children and improve health and academic outcomes in the near future. The game has been designed to focus on shifting between mental sets of information while also incorporating design features known to influence emotional response. Research on games such as *Space Ranger Alien Quest* seeks to fulfill a need to assess individuals' self-regulation skills while also testing the capability of a specific game mechanic (e.g., sorting items based on new rule sets) to improve a specific cognitive strategy (e.g., mental set shifting).

The game, designed for children between the ages of seven and eleven, puts players in the role of a space ranger who must take care of aliens by giving them food and drinks. Specific aliens that appear on the screen have very specific needs, however the aliens are incredibly fickle and live on a strange planet with an unstable environment that is always changing. Players have to keep up with an ever-changing series of rule hierarchies and changes to advance through levels. For example, red aliens may be hungry and need food given to them at the beginning of a level, but then change their minds a series of times due to environmental changes like rapid sunsets and sunrises, strange storms or bolts of lightning appearing on-screen. Actions in the game are largely driven by empathic goals in which players are caregivers and emotionally driven feedback from the characters. The narrative, character design, and visual design of the interface are based on emotional design research on how the role of color, lighting and character design in games can induce positive states in players (Bura, 2008, Knez & Niedenthal, 2008, Um, Plass, Hayward, & Homer, 2012). Lastly, a player's success is measured in terms of the aliens' moods and his or her ability to make the aliens happy.

Thus far, validation research and a training study have been completed, and show promising results. Preliminary results have found that the game produces a similar range of scores to those achieved on established measures of EF in clinical settings (e.g., card sorting tasks, spatial attention tasks) and that children who play the game over a period of time show improved skills in comparison to those who are not exposed to the intervention (Bromley, et. al. 2013; Sprung, et. al., 2013). Additionally, children enjoyed playing the game and were motivated to pursue more difficult levels featuring complex rule structures with more rapid environmental changes and actions. Further studies unpacking the differences in behaviors resulting from an emotional response and cognitive skill development are planned for the future. Implications of these findings suggest that children's ability to self-regulate may benefit from playing video games that are specifically designed to address such cognitive activities.

Best Practices

The following design principles should be considered when creating games to build skills targeting emotional health based on the current frameworks and findings.

1. **Provide a situational context when providing training around emotion regulation strategies:** Environmental influences and social conditions can significantly influence the utility of specific strategies in the learner's real-world situations and needs.
2. **Provide opportunities for repeated practice over time:** While for younger populations it may be easier to develop emotion regulation and understanding skills, for adult populations it may require additional engagement to re-learn certain behaviors patterns.
3. **A narrow focus on implementing a specific strategy can lead to more rigorous, efficacious, and engaging gaming experiences:** Whether your focus is on attentional control, how to re-appraise body image, or emotional states that drive behaviors, keeping a narrow focus allows for diversification of application contexts and increasing levels of complexity.
4. **Consider focusing on strengths as much as focusing on needs:** At times our ability to respond in emotionally healthy ways to challenging life events relies on our use of specific strengths rather than building up what may be considered deficiencies.
5. **Where possible incorporate embodied experiences:** We often forget emotions are closely linked to our physical states. Gaming experiences that allow us to engage in embodied experiences can help us tap a broader spectrum of awareness and regulatory techniques (e.g., breathing deeply, focusing on a sensation).

Resources

Games

Beating the Blues (http://www.beatingtheblues.co.uk/)
Braingame Brian: Toward an Executive Function Training Program with
      Game Elements for Children with ADHD and Cognitive Control Problems
      (http://www.gamingandtraining.nl/beschrijving-braingame-brian/)
Deepak Chopra's Leela (http://www.thq.com/us/deepakchpoprasleela/360)
Lumosity Lab Brain Games & Brain Training (http://www.lumosity.com/)
Mindbloom (http://www.mindbloom.com/)
Mood Gym (https://moodgym.anu.edu.au/welcome)
MoodHacker by ORCAs (http://www.orcasinc.com/products/moodhacker/)
Play Attention (http://www.playattention.com/)
Playmancer (http://www.playmancer.eu/)
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Research Labs

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Games4Resilience Lab at University of Vienna (http://www.manuelsprung.at/en/)

CREATE Lab at New York University (http://create.nyu.edu/)

Emotion Regulation Lab at Hunter College City University of New York (http://urban.hunter.cuny.edu/~tdennis/index.html)

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Jakob Leyrer is a current doctoral student in the Department of Psychology at the University of Vienna, and a Research Assistant at the Games4Resilience Lab. His research centers around the development of games to train emotional understanding and executive functioning in children. As a project manager on the game *EmoJump*, he has assembled groups of graduate students, artists and programmers to design and build a research prototype. On *Space Ranger Alien Quest* he has worked in collaboration with teams from New York University, the Graduate Center at City University of New York, and programmers

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