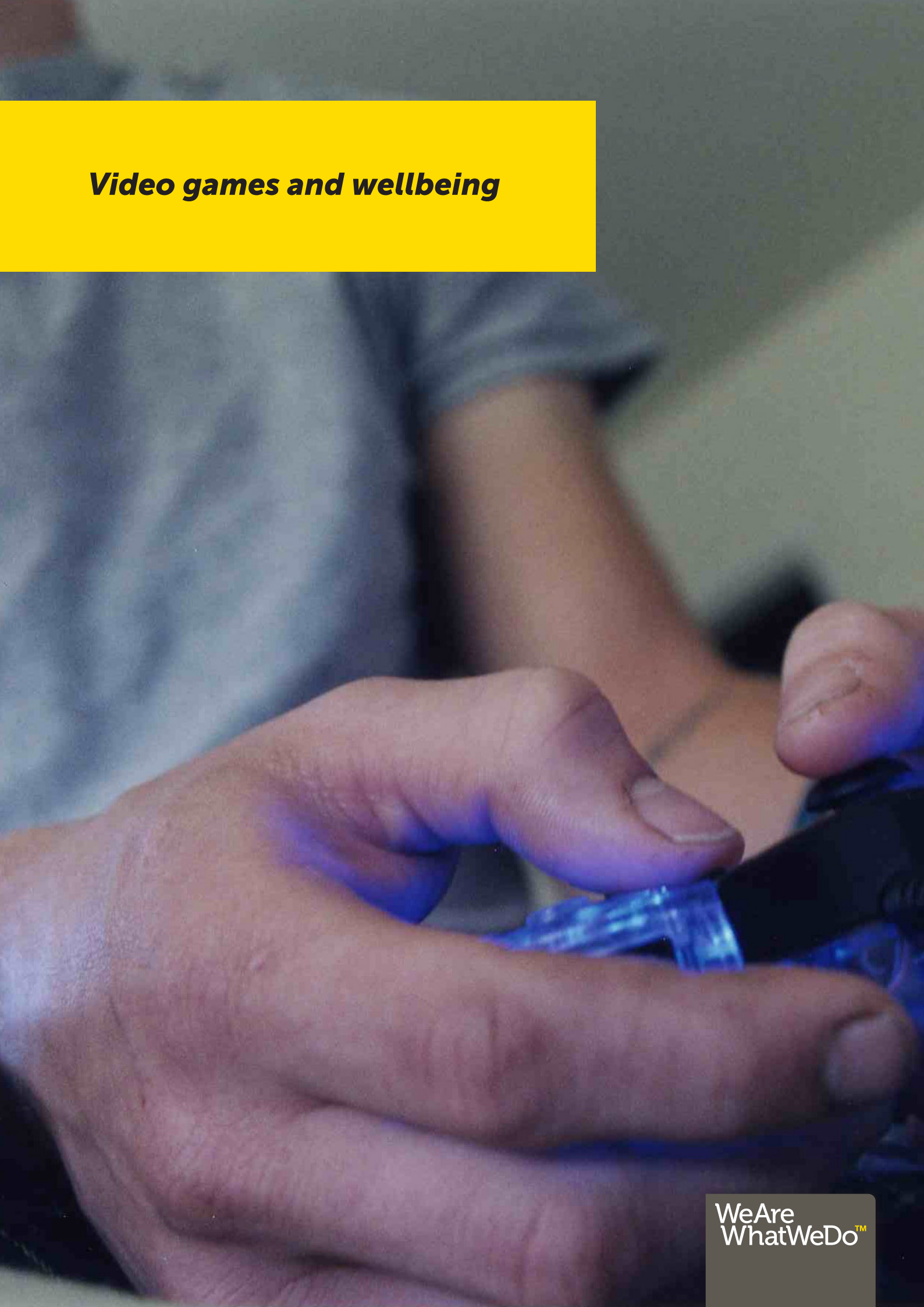
Video games and wellbeing



WeAre WhatWeDo™

Video games and wellbeing

This document was created by We Are What We Do, in consultation with Tom Chatfield, who was consulted during the scoping phase of this research, and whose work informed the final paper.

It was created as part of the research phase of a product/service development process aimed at improving wellbeing amongst young people in the UK, commissioned by The Nominet Trust. For more information see wearewhatwedo.org/portfolio/wellbeing/

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Executive Summary

The importance of wellbeing

It is estimated that around a quarter of people in the UK experience some form of mental health condition every year. These conditions often start young, with half of all cases of mental health disorders beginning by the age of 14. The impact of such high levels of mental illness in young people is far reaching.

Within the medical field and government policy there has been an increasing shift towards promoting wellbeing in order to protect against the development of mental disorders.

Although it is clear that many young people could benefit from interventions to improve their wellbeing, there are significant barriers preventing them from taking up such interventions. This paper explores the possibility of embedding behaviours that promote wellbeing into digital gaming activities, which are already familiar, enjoyable and easily accessible to young people.

The role of video games in young people's lives

The boundaries of what constitutes a "video game" are shifting. Originally video games were the domain of adolescent males, who played time-intensive games in arcades or on early computers and consoles. However, the proliferation of personal screens in our daily lives (phones, tablets, laptops) means that games or playful digital activities can be accessed at most times and in most places in our daily lives.

Young people in the UK have high access to and usage of video games and playful activities. 88% of children aged 5-15 are using some form of device to play video games at home. They also play regularly, with 5-15 year olds spending an average of 8.7 hours a week gaming. This high access and usage of video games supports the use of it as an activity in which to embed techniques to develop wellbeing.

The impact of video games on young people

Although traditionally research on video games has focused on their negative effects on young people, recent research has suggested that a moderate amount of video game playing could have a potentially positive effect on young people's wellbeing.

- Studies have found that some young people are already using video games to regulate their emotions, playing games to "let off steam", relax or forget their worries.

- Video games are being used by some young people to increase and strengthen positive social relations by providing a focus for a social group, encouraging peer sharing and

helping young people to make friends.

- A sense of mastery over the virtual environment has been shown to be a key reason behind some young people playing games.

The evidence around the potential positive impact of video games on wellbeing further supports the use of video games as a suitable activity to embed wellbeing enhancing techniques into.

Harnessing the power of video games in wellbeing interventions

The higher the uptake of a product promoting wellbeing, and the more regularly young people play it, the more chance it will have of improving their wellbeing, assuming the embedded intervention is effective. Nicole Lazarro's "4 Keys 2 Fun" framework provides an overview of the motivations of players to play video games and the emotional draw of these games.

Looking at real-life examples through the 4 Keys framework shows how the 4 Keys can be incorporated into successful games to encourage regular play and engagement. It also demonstrates possible ways of achieving certain *types* of engagement in the games, such as concentration and flow, which could be complementary to techniques aimed at improving wellbeing.

The use of biofeedback in wellbeing interventions and video games

Biofeedback is an exciting area of development for both video games and the field of wellbeing. Biofeedback is a technique in which people are trained to improve their health and performance by monitoring activity from their own bodies e.g. heart rate, skin temperature. They can then using this information to learn how to change this activity in everyday life. Biofeedback is increasingly being used in wellbeing interventions, helping people tackle issues such as depression, anxiety and stress.

The use of biofeedback is also being explored as a way to enhance the appeal of video games. Some games incorporate true biofeedback such as heart rate, heart rate variability, skin conductivity and electro-encephalography (EEG). Other video games are using proxies for biofeedback such as body movement, eye-tracking or even straight forward self-assessment surveys.

Some developers, however, are starting to look beyond the pure entertainment value of biofeedback and are exploring how biofeedback in a game could also help a player regulate their emotions. This could provide a promising starting point in the development of a game that helps young people to improve their wellbeing.

1. Introduction

The importance of wellbeing

It is estimated that around 1 in 4 people in the UK experience some form of mental health condition every year.[1] Mental health problems start early: half of all cases of mental health disorders start by age 14 years, with three quarters starting by age 24 years.[2],[3] Conduct disorders are the most common mental health problem for young people, experienced by 6% of young people in the UK, followed by anxiety disorders (3%), hyperkinetic disorders (2%) and depression (1%).[4] The high level of mental illness in young people has wide reaching impacts on the individuals experiencing the problems, their family and friends, broader society and the NHS which currently spends £10.4 billion per year on treatment for mental health problems.[5]

There has been increasing emphasis on developing preventative approaches to this problem, and developing and protecting good mental health in young people has emerged as a key challenge in the prevention of mental illness in the population. For example, the government's mental health strategy for England, published in 2011, now prioritises developing mental wellbeing for young people, as well as early intervention.[6]

Good mental health is more than just the absence of mental illness. The World Health Organisation defines positive mental health as: "a state of **wellbeing** in which every individual realises his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community… Health is a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity."[7]

Wellbeing has two main components, **subjective** wellbeing and **psychological** wellbeing. Subjective wellbeing relates to "feeling good", and incorporates the emotions of happiness, contentment, interest, engagement, confidence and affection.[8] Psychological wellbeing is about good psychological functioning. This includes self-acceptance, autonomy, environmental mastery, purpose in life, personal growth and having close supporting relationships.[9]

Over the last two decades, an increasing body of research has shown that both components of wellbeing protect against the development of mental illness.[10] Research has also shown that it is possible to take action to develop better wellbeing. There is now a range of tested interventions and techniques that help young people to behave in ways that are both characteristic of and reinforce good wellbeing, including learning to manage stress and regulate emotions. Examples of some of the techniques that have been shown to improve wellbeing are given in the box below.

Some techniques proven to improve wellbeing in young people

Mindfulness: Mindfulness is a mind-body based approach that helps people change the way they think and feel about their experiences, especially stressful experiences. It involves paying attention to your thoughts and feelings so you become more aware of them, less enmeshed in them, and better able to manage them.[11] Mindfulness has very strong evidence supporting its positive effects on wellbeing[12], and there is growing research showing these effects extend to young people.[13]

Using one's strengths in a new way: this involves taking a character test or being told about your particular character strengths (e.g. creativity, honesty), and then being encouraged to use these strengths in your daily life, learn new strengths and recognise strength in others.[14]

Practicing optimism: this involves writing about the best possible outcome in the future. The outcome may be time-specific, such as imagining the best possible life whilst at school, or more general, such as imagining the best possible future life including family, career, and health.[15]

Performing acts of kindness: this involves carrying out behaviours that benefit other people or make other people happy, usually at some cost to oneself. Examples include visiting an elderly relative or giving someone a present.[16]

Writing letters of gratitude: this involves writing a letter to someone who has positively influenced your life and thanking them. In some exercises the letter is sent, in others it is kept by the writer.[17]

Counting one's blessings: this involves reviewing all the things in your life you are grateful for. In some exercises these are written down, in others they are simply thought about.[18]

These activities all promote positive thoughts, feelings and/or behaviours rather than trying to fix negative ones. They are all also relatively quick to carry out and can be done by a person on their own, without requiring anyone else to be involved.

Video games as a vehicle

Although it is clear that many young people could benefit from interventions to improve their wellbeing, there are also significant barriers which prevent this group from taking conscious steps to protect and improve their mental health. Many young people are not sufficiently aware of their feelings, may not realise the consequences of low levels of wellbeing, and may not think of taking action to improve how they feel.[19] Young people also find it hard to talk about mental health. Studies have shown that just over a quarter of 9-16 year olds (26%) and over two-thirds

of 17-25 year olds (67%) felt it was easier to tell someone they didn't feel well physically compared to telling someone they felt distressed or unwell mentally. One reason given by professionals and young people alike for this lack of help-seeking behaviour was the stigma surrounding mental health.[20] Even if young people do want to improve their mental health they may not know how to do this or who to approach to be supported in this.[21]

Recognising both the importance of promoting wellbeing amongst young people, and also the difficulty of introducing explicit wellbeing interventions to this audience, We Are What We Do has been exploring the possibility of embedding behaviours that are known to promote wellbeing into activities that are familiar, enjoyable and easily accessible to young people.

Video games are one such activity. Could they provide a vehicle for activities which promote better wellbeing? What characteristics make them suitable for this purpose?

This paper highlights aspects of video games that could be harnessed to create mental health promotion interventions which are popular and enjoyable enough to be voluntarily taken up by young people. It starts by looking at who plays video games, and how much time is spent on them. It then considers some aspects of video games that already have a positive effect on young people's wellbeing. It goes on to explore how video games engage young people and looks at a number of existing games to draw out ideas for how games could be used to create more frequent, more sustained and/or deeper engagement with wellbeing interventions. Finally it investigates how the development of biofeedback technology has fostered a link between video games and the wellbeing field, providing a good starting point for the design of any future intervention.

2. The role of video games in young people's lives

What constitutes a video game?

Video games were originally played in arcades or on early home computers and dedicated consoles. Playing video games was a minority pursuit, mostly done by adolescent males, who were known as "gamers" due to the amount of time they spent playing. However, as the number of screens in most people's lives has increased (smart phones, tablets, laptops) so too has the number of devices on which it is possible to access some form of playful activity.

Table 1: The percentage of people accessing games through their smart phones and tablets compared to dedicated consoles is predicted to continue to rise.[22]

Device used to play games	**Share of global games market in 2013**	**Share of global games market in 2016**
Dedicated consoles	**43%**	**36%**
PC	9%	6%
Tablet	**5%**	**12%**

Smart phone	**12%**	**16%**
Other	31%	30%

This proliferation of personal screens has led to a blurring of boundaries around what constitutes a video game. Alongside the more traditional commitment-heavy games played on consoles and computers, which often have high production values and matching budgets, there has been the release of lower budget casual games and playful apps for phones and tablets which have been a huge success. For example, Angry Birds has over one billion downloads and Candy Crush Saga has over seven million active daily users. These games, unlike console games which tend to dominate evenings and weekends, can be played in spare moments of time on "second screens" throughout the day.

The increasing use of game-like digital activities in fields as diverse as simulation, training education and social interaction also blur the boundaries between what is classically considered a "video game" played for fun and what is a playful activity with an embedded goal beyond entertainment.

Alongside the change in what is classified as a video game, is a change in who plays games and how they see themselves. No longer a minority pursuit, there are now over a billion people engaged in digital play of some kind, including those who traditionally didn't play, such as women and older people.[23] Many players do not self-identify as "gamers" or even see what they are playing as "games". It is easy to see why this may be the case if, for example, the "game" is being played as part of a training course or it differs greatly from a traditional commitment-heavy game on a console.

Despite the shifting definition of the term "video game", and the fact that many people do not associate their digital play with "gaming", the term is still a useful way to describe digital play. Within this report we will use the term video game to mean electronic/digital games played on personal computers, home consoles (e.g., Microsoft Xbox, Sony Playstation, Nintendo Wii), tablets (e.g. iPads), mobile devices (e.g. smart phones and handhelds like Nintendo 3DS) and the world wide web (e.g. via Facebook or other websites).

The role of video games in young people's lives in the UK

Good quality and up-to-date data about teens' use of video games can be hard to find, due to the rapid speed at which habits in this area are changing. However, Ofcom's *Children and Parents: Media Use and Attitudes Report of 2013*[24] gives a good overview of the media habits of young people in the UK from 5-15 years and the ubiquity of gaming behaviour across this group. Key statistics from this report are shown below:

Access to game-accessible devices is high:

- Nine in ten children aged 5-15 (91%) live in a household with access to the internet

through a PC, laptop or netbook.
- Close to nine in ten children (87%) live in a household with a fixed or portable games console.
- Half of children aged 5-15 (51%) have access to a tablet computer in the home.
- 43% of children aged 5-15 have their *own* mobile phones rising to 83% of 12-15 year olds. 62% of 12-15 year olds own a smartphone.

Most children play games:
- 88% of children aged 5-15 use some form of device to play video games at home.
- A games console connected to a television remains the most commonly-used device for gaming; used by at least half of all children. Handheld/portable games consoles remain the second most commonly-used devices for gaming and are used by half of all 5-15 year olds.
- 68% of those 5-15 year olds who use internet at home use it for playing video games.
- Use of a tablet computer for gaming has increased from 2012 - 2013 among all 5-15 year olds (7% vs. 23%).

Hours spent gaming:
- 5-15 year olds spend an average of 8.7 hours a week gaming.
- The estimated weekly hours spent gaming at home increases with the age of the child (6.2 hours for 5-7s, 8.4 hours for 8-11s and 10.7 hours for 12-15s).

Video games appear to already be played by the majority of young people on a regular basis, providing an effective and suitable medium to reach them through. Games also have well-developed distribution channels and models for financial sustainability, increasing the potential sustainability of interventions that use them as a vehicle.

3. The impact of video games on young people

The relationship between wellbeing and playing video games

The fact that young people spend a significant proportion of their free time playing video games raises questions about the impact of gaming on behaviour and wellbeing.

Traditionally, research on video games has focused on the negative effects of playing video games with studies, for example, reporting relationships between the playing of violent video games and later aggression, both self-reported[25] and combined peer-and-teacher reported.[26] Such a direct link, however, was not found in other studies.[27] Furthermore, there were criticisms of studies in this area with researchers arguing that laboratory measures of aggression do not predict actual behaviour.[28]

Recent research has suggested a more complex relationship between video games and wellbeing, which includes potential positive effects of moderate video game playing on young

people's wellbeing. A study completed in the UK by NatCen in 2008 looked at the relationship between wellbeing and the number of hours young people spent playing video games. The study found that moderate amounts of game playing (which they categorised as less than one hour to three hours a day) was associated with greater wellbeing than for game playing of above four hours or no game playing at all.[29] This relationship was also found in a study conducted in Iran[30], with non-gamers and those classed as "excessive gamers" reporting poorer mental health compared those who played moderate amounts.[31]

The NatCen study was not the first to identify a possible positive relationship between mental health and video games. Research conducted in the US in 2002[32] found that young people who played games on their computer appeared to have greater belief in their intelligence, and lower incidence of substance use than those who played no games at all.

What could be driving such a relationship between a moderate amount of video game playing and better levels of mental wellbeing?

One explanation could be that the amount of time spent by a young person playing video games is actually a *symptom* of wellbeing rather than the *cause* of it. For example, those young people who play many hours of video games may be doing this because they are socially isolated and have lower wellbeing to start with and consequently play to keep themselves entertained and to escape from their problems. This hypothesis is supported by a recent review of studies on internet video game addiction which concluded that lower psychosocial wellbeing is more likely to be a cause rather than a consequence of an internet gaming addiction.[33]

Similarly those who play no video games at all may be more likely to live in households without internet access. These households tend to be poorer[34] which brings with it other causes of low wellbeing in young children.[35] It is plausible that those who play video games moderately simply have better wellbeing to start with.

There is, however, a small but growing body of evidence that suggests that playing video games can actively support a number of components of wellbeing including emotional regulation, good social relationships and environmental mastery which could, potentially, be contributing to greater wellbeing in the video game players.

Video games and emotional regulation

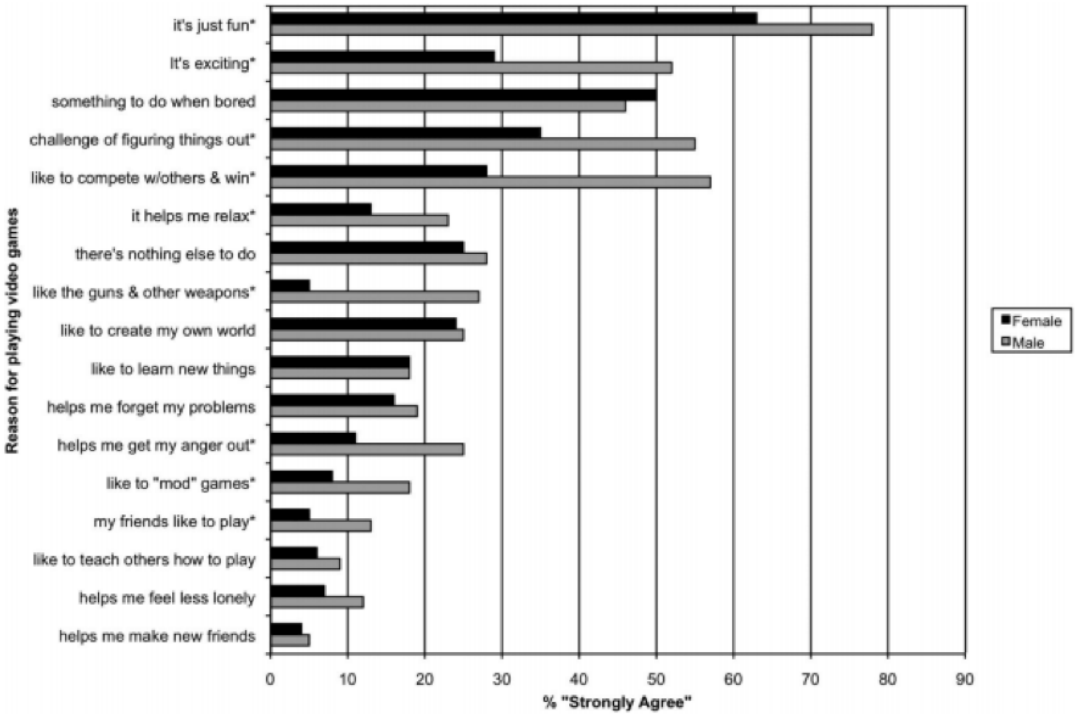
Many components of good mental health or wellbeing are underpinned by the ability to regulate emotions.[36] According to Gratz and Roemer, emotional regulation can be thought of as involving four main components: being aware of and understanding of emotions, accepting the existence of those emotions, the ability to control impulsive behaviors when faced with negative emotions, and finally, the ability to use strategies that are situationally appropriate to modulate emotional responses.[37] Emotional regulation is a broad concept, and some strategies for modulating emotional responses are more beneficial over the long term than others. Video games provide a way of redirecting attention. If retreating into a video game is an automatic and regular response

to difficult situations, this could prevent players engaging with the cause of their negative emotions. On the other hand, if actively chosen as a response to negative emotions and used in moderate doses, playing video games could be a positive adaptive response in both the short and long term.[38]

Evidence has been emerging that some young people already use video games as a way to alter their emotional states, and do so consciously with emotional change given as a reason for playing.

For example, one study with over a thousand 12-14 year olds by Olson[39] found that two thirds (62%) of boys and nearly half (44%) of girls who played video games agreed that they sometimes used video games to relax, whilst substantial numbers (45% of boys and 29% of girls) said they used games to cope with anger. Other reasons around emotional regulations were also given, such as “it helps me forget my problems”, and “helps me feel less lonely”.

Figure 1: Percentage of participants who said they “strongly agreed” with the given reason for playing video games[40]



Reasons for playing video games for boys and girls. Agreement percentages for the questions “I play video games because…[answer option].” Base: 1,137.

In a subsequent qualitative study by Olson et al.[41] with 42 young adolescent boys the use of video games to manage emotions came up repeatedly when the boys described why they played. A typical comment was "If I had a bad day at school, I'll play a violent video game, and it just relieves all my stress.”

Similarly, a study with nearly 500 11-15 year olds by Colwell et al[42] found “stress relief” to be a significant factor in why these young people played video games. Young people talked about playing video games after having problems at school, or with friends or parents, and that by doing this their mood would improve.

Little research has been done on the effects of game playing on subgroups of children, such as those diagnosed with mental illness or learning difficulties. In the original Olson study it was also found that boys with ADHD symptoms were more likely than others to use games to cope with angry feelings whilst children who agreed to feeling sad, hopeless, and worthless were much more likely to select "to forget my problems" as a reason for playing video games.[43] This suggests that the need for video games as an emotional regulation mechanism may be greater in those who find it difficult to regulate their emotions in other ways.

Video games and positive social relations

Another element widely accepted as a contributor to an individual’s wellbeing is the social relationships that they have and maintain. Friends, families and other social contacts are crucial for both providing social interaction, love and friendship in day-to-day life and also providing support when times get tough.[44]

Studies have shown that video games play a role in encouraging the formation and maintenance of friends both on and offline and therefore could contribute to increased wellbeing.

- *Providing focus for the group*

Research has found that although most boys had some times when they played games alone, most also routinely played with one or more friends.[45] In one study as few as 18% of boys and 12% of girls surveyed said they always played alone.[46] It is suggested that, at the most basic level, video games provide a rationale for “hanging out” and that they structure the time that friends spend together. Games also provide a topic of conversation for young people to talk about together.

- *Encouraging peer to peer learning and sharing*

Studies have shown that the playing of video games can often result in peer to peer sharing and learning[47] which could strengthen existing relationships or encourage new friendships (see below). Examples of sharing include sharing cheat codes, sharing strategies for playing the game and informally coaching someone in their playing experience. This happens both offline with friends and family, but also online with games forums and open discussion boards.[48]

- *Helping young people to make friends*

Video games provide young people with common ground to talk about with each other and thus can help with the process of making friends. In one study[49] it appeared that those young people with learning difficulties were motivated by this aspect of playing video games more than those without learning difficulties. The young people with learning difficulties were also more likely to

be bullied and excluded by their peers, which may have led them to place higher value on the connections they made with their peers through video games.

With the increasing popularity of massively multiuser online role-playing games (MMORPG's) video games also provide the opportunity to make friends with users who they may never meet. Yee[50] found that among players aged 12 to 17, over half of girls (54%) and nearly a third of boys (30%) reported confiding secrets or personal issues to friends made through online gaming that they had withheld from real-world friends.

Video games and mastery

Environmental mastery is another component of wellbeing. It comprises a person's ability to choose the environment they are in, manipulate that environment and act on and change the environment through their mental and physical activities.[51] Having environmental mastery both gives the individual confidence and a sense of control over their situation, but also allows them to manipulate and adapt their situation so that it best suits their needs which in itself could contribute to their wellbeing. People can experience a sense of mastery and achievement through playing video games - manipulating the virtual world and overcoming challenges that are presented within the game.

Research has found that environmental mastery is a key reason why some people play video games. In a study that surveyed 3000 online players of MMORPGs, achievement was one of the three main reasons people gave as to why they played.[52]

Qualitative studies have also found that young people like the element of achievement and challenge. For example, games with multiple storylines were seen as more enjoyable than easily completed games, as it was fun to continue being able to "beat" the computer game a number of times rather than just once.[53] Video games also were seen to provide a sense of achievement that other media, such as TV, was lacking.[54]

In a series of studies by Ryan et al[55] the team looked at the effect of players' autonomy (the perceived opportunity to do activities that interested the player in the game) and competence (the extent to which the player felt challenged but not overwhelmed) on their enjoyment of the game and their desire to play it again. They found that the higher a player rated the game on competence and autonomy, and thus the more mastery they felt, the more they enjoyed it and wanted to play it again.

Being challenged, and completing that challenge often involves decisions and consequent risks. Video games have been seen as one way of becoming more comfortable with those risks, more accepting of failure and more able to therefore make better subsequent decisions. These are all crucial life skills which could contribute to personal mastery and growth. The evidence showing the link between online mastery and its translation into mastery in other non-video game related contexts is less clear cut than that for emotional regulation or social interaction. However, the technology company IBM felt the similarities between real world and online risk taking and

leadership was so similar that they advocated using video games as a potential training tool for leaders of the future.[56]

Earlier in this report video games were discussed as a good vehicle for delivering wellbeing interventions due to their ubiquity. The research above shows that for some people video games are already actively helping to promote and strengthen some of the components of wellbeing, particularly mastery, making and maintaining social relationships and emotional regulation. The next section explores how the emotional aspects of gaming could be harnessed to create more frequent, more sustained and/or deeper engagement with wellbeing interventions.

4. Harnessing the power of video games in wellbeing interventions

The "4 Keys 2 Fun"

What makes players engage with video games, coming back to play them regularly and often for extended periods of time? One of the most useful and established methodologies for understanding **how the best games succeed** is a scheme known as the "4 Keys 2 Fun" [57],[58] developed by the player experience designer Nicole Lazarro.

Lazarro believed that the emotional elements of video games played a large role in people's desire and motivation to play them and set up a research study which spoke to players after playing video games and observed their non-verbal cues.

From this study Lazarro identified four Keys that she says are both **a reason people play** and are **mechanisms for emotion** in different aspects of the player experience. These are Hard Fun, Easy Fun, The People Factor and Altered States. The importance of each key for having fun is seen to vary depending on both the game and player, however, analysis of a range of best selling games such as Bejeweled and Grand Theft Auto (GTA) revealed that these games created emotion in at least three of the four Keys.

The 4 Keys - reasons to play and mechanisms for emotion - are as follows:

Hard Fun

Hard Fun is derived from engaging in meaningful challenges, strategies, and puzzles. Hard Fun creates emotion by structuring experience towards the pursuit of a goal and the player is rewarded with feedback on progress and success. For many players overcoming obstacles is why they play.

In the study, players who enjoyed the Hard Fun of a challenge said they liked:

- "Playing to see how good I really am"
- "Playing to beat the game"

Easy fun

Easy Fun is about grabbing attention with ambiguity, incompleteness, and detail. Players focus on the sheer enjoyment of experiencing the game activities and use the game to fill their attention with something new. Easy Fun maintains focus with player attention rather than getting them to compete for a goal. It entices the player to consider options, find out more and to linger and become immersed in the digital world they are in.

In the study players who enjoyed the Easy Fun of immersion said they liked:

• “Exploring new worlds with intriguing people”
• “Excitement and adventure”
• “Wanting to figure it out”

The People Factor

The People Factor is about creating opportunities for players to compete, cooperate and perform together. Enjoyment can come both from playing with players inside the game (multiplayer online options) and with players who are physically in the same room. Multiplayer games are built around playing with others, and in some cases players don’t even like the games they are playing but do so to spend time with their friends, building teamwork and camaraderie as they strive to achieve shared goals.

Players whose enjoyment focused on the people factor explained that:

• “It’s the people that are addictive not the game”
• “I want an excuse to invite my friends over”

Altered States / Serious Fun

Altered States (later called Serious Fun by Lazzaro) is the way in which the player’s perception, behavior, and thought combine in a social context to produce emotions and other internal sensations. In the study players reported that the feeling the game produced in them, during or after playing, was one of the major reasons why they played. They used games as therapy, using play to move from one mental state to another or to think or feel something different. The emotions most frequently experienced in the study were excitement and relief.

Players whose enjoyment focused on their internal state said they liked:

• “Clearing my mind by clearing a level”
• “Feeling better about myself”

Using the 4 Keys framework to make a successful game

The game We Are What We Do hopes to design is for young people in general, and not a specific target audience. Therefore, the more people who play it, and the more regularly they play it, the more chance it will have to have an impact, assuming the embedded intervention is effective. Using the 4 Keys framework, and looking at real-life examples of how these have been incorporated into successful games, we can learn about possible ways of encouraging take up and continual playing of the game. The 4 Keys also demonstrate possible ways of achieving certain *types* of engagement in the games, such as concentration and flow, which could be complementary to techniques aimed at improving wellbeing.

Getting people to play regularly: Using Hard Fun and the People Factor

Hard fun and the People Factor have both been incorporated into a number of successful video games to keep people playing regularly. One such video game is the popular Wii Fit which is used in conjunction with a peripheral balance board that the player stands on whilst doing exercise and provides real time feedback. The game uses Hard Fun by providing challenges and setting targets for the players to keep them coming back to train. Nintendo's Dr Kawashima's Brain Training is another example of this use of Hard Fun. The game provides players with puzzles including stroop tests, mathematical questions, and Sudoku puzzles, all designed to help keep certain parts of the brain active.

In terms of Hard Fun, what is perhaps most interesting about these games is their polished and extremely successful apparatus around the challenge: the setting of long-term motivational goals, making of appointments for repeated effort, use of varied mini-games and miniature objectives, reward of effort rather than punishment of failure, and visual and linguistic emphasis on positive gain and self-empowerment.

Different video games require different amounts of time repetition. Long content-heavy games, such as World of Warcraft, often require long sessions of playing on a regular basis, whilst games played on the smartphone, such as Angry Birds, can be dipped in and out of for short periods. However, Hard Fun in the form of challenges can be built into any of these games.

Both of these games also incorporate the People Factor as they allow the player to share scores and compete with other people, both their direct friends and family, but also people on the internet. For example, Wii Fit has set up a *Gym Communities* website which lets you share scores with other training buddies and throw out challenges to the gym community so that you are competing in challenges with other people.

If challenges and competition could be built into a game which delivers wellbeing benefits, the regular play of the game could be harnessed to progressively shift and then reinforce positive cognitive or behavioural habits over time.

Getting people to play regularly: Using Hard Fun and Easy Fun

Hard Fun has also been combined with Easy Fun in some video games to keep players playing regularly. The game Zombies Run! does just this, using Hard Fun and Easy Fun to motivate people to exercise - something that many people find hard to do by themselves.

Zombies Run! is an audio app which places the runner as the lead character in a plot where they have to run away from Zombies who are following hot on their heels. Training goals (Hard Fun) are nested in the audio story told through headphones. However, part of the reason people keep coming back is the Easy Fun element of games - the escapism and entertainment of being in the moment surrounded by the scene of a Zombie plot with new information being fed in every minute.

As the game is audio only it did not cost vast amounts of money to produce. However, missions were recorded in a specially-built studio in the style of a radio play, with a professional writer and voice cast, and the polish and narrative immersion offered paid off hugely.

Zombies, Run! was a massive Kickstarter success developing a highly engaged player community, many of whom had little interest in traditional fitness apps. This was thanks in large part to the immediate appeal of its central proposition, that most fitness apps are boring, but it would be extremely cool and fun to be running away from zombies as an actor in a drama.

Harnessing this Easy Fun element in a game that included wellbeing enhancing techniques could encourage a far higher rate and regularity of practice, and thus increase the impacts of the techniques.

Keeping people engaged in the game: Using Easy Fun to create flow

Games are designed to engage sustained attention. Whilst playing a game there is sometimes sustained concentration on the game itself resulting in a state of flow where the player is within that moment, focusing solely on the game to the exclusion of other sensory distractions. While achieving a state of flow has wellbeing benefits in itself, the strategies games use to achieve this could also be used to carve out larger chunks of time for wellbeing training.

A Tetris-like-game uses Easy Fun to create this kind of loss in what is effectively a repetitive, abstracted series of puzzles demanding total concentration of a kind that involves both “flow” and loss of self. This state was something specifically aimed at by the Tetris-like PlayStation game Lumines (and its sequels and spinoffs).

Highly mentally engaging repetitious tasks may be a valuable tool in helping players focus on a game which included wellbeing techniques and to block out other concerns. It may also be a useful complement to an entirely contrasting style of play within a single game.

Keeping people engaged in the game: Using Easy Fun to stimulate the senses

The deliberate and clever use of sensory stimulation to create different types of absorption in video games could be used to help young people direct their attention in ways which support wellbeing interventions. A number of games demonstrate how Easy Fun can be used to engage players in relaxing activities that might otherwise not be sufficiently engaging to sustain attention.

Endless Ocean on the Nintendo Wii offers a free-form game environment. It uses the Wii remote to allow players to navigate a huge undersea environment as a diver, exploring, finding sea creatures and treasure, taking photographs, and being mentored by an in-game character. The virtual environment is notable for its lack of threats, its visual splendour and immersive qualities, and the favourable comments on relaxation and escape it has attracted.

Flower is a game for the PlayStation 3 which asks players to control the petals of a flower blowing in the wind by simply turning the controller gently in the air to change the direction of the wind, and pressing a button to make it blow. The game's creator, Jenova Chen, deliberately aimed at visual richness and beauty in order to make the game a meadow-like refuge from reality. A sumptuous orchestral soundtrack and lush visuals engage the players senses and turn the screen into something like a window to another world, although the game retains traditional objective-oriented progressions and challenges (Hard Fun), as you collect more petals and navigate increasingly difficult obstacles and puzzles. It could be argued that Flower also incorporates the Altered States key as it specifically sells itself as removing the player from the stressful external world to the visually beautiful digital world.

A number of intriguing games have focused on audio and motion-related stimuli and inputs, and almost completely lack graphical interfaces.[59] An example of an audio game is Papa Sangre. It was made for use on smartphones and is played entirely by listening, and by tapping the screen to simulate walking. The player is cast as a visitor to a kind of subterranean hell. Wearing headphones, a three-dimensional soundscape is modelled around the player, and careful listening is used to navigate specially designed rooms and challenges – by tapping the screen of the phone in two different zones to simulate steps.

The use of Easy Fun in the form of visual, audio and motion related stimuli could potentially be extremely useful for keeping the player engaged in the game, as well as being complementary to any game designed to boost inward focus.

Altered states: A cross cutting Key

As we have discussed, research has shown that some people actively use video games to regulate their emotional state. People use a range of video games to elicit a range of emotions - from calming down to letting off some steam, and what elicits a particular emotion in one person will be different to that of another. Therefore, Altered States could potentially be a Key for *any* game as an individual may find it useful for regulating their emotions. For example, some people

may use the Wii Fit to improve their mood by playing a game of virtual tennis, some may turn to Tetris as the state of flow has a calming effect on them, whilst others may find the threat-free world of Endless Ocean relaxes them. Some games do, however, explicitly sell Altered States as a reason for playing the game, including games with a relaxation element, such as Flower, or horror and adventure games designed to thrill.

Whether a game developed by We Are What We Do would have any explicit reference to Altered States is to be decided. As discussed earlier in the report, stigma around mental health can act as a barrier to young people seeking help and consequently we would have to consider carefully how the Altered States were described, if described at all, in order to avoid this element putting young people off playing the game.

5. The use of biofeedback in wellbeing interventions and video games

Biofeedback is an exciting area of development for both video games and the field of wellbeing. Biofeedback is a technique in which people are trained to improve their health and performance by using signals from their own bodies. Specialist equipment allows people to "see" or "hear" activity inside their bodies (e.g. heart rate, skin temperature, muscle activity). They can then use this information to learn how to change or control this activity in everyday life.[60] In some fields, such as sport and music, biofeedback is being used to enhance performance. For example, providing long distance runners with data on their heart rate and breathing whilst training, alongside relaxation techniques, has been shown to improve their running efficiency.[61] Similarly, providing biofeedback along with emotional management techniques to musicians has been found to decrease their anxiety before a performance.[62]

Biofeedback is also increasingly being used in wellbeing interventions, helping people tackle issues such as depression,[63] anxiety[64] and stress.[65] For example, an individual could be shown their heart rate on a screen in a purposefully created stressful situation and practice lowering it using relaxation techniques. By being able to see their heart rate they could see what is effective at changing it. Having practiced this, they may then be able to use these techniques to lower their heart rate and respond more calmly in a real life stressful situation.[66]

Within the video game world, biofeedback is being explored as a way to enhance the 4 Keys, in other words, to enhance the appeal of a game. Just like movement sensors were integrated into video games producing the Wii so biofeedback is being explored to add to the experience of a game. Some developers, however, are starting to look beyond the pure entertainment value of biofeedback and are exploring how biofeedback in a game could also help a player regulate their emotions. This could provide a promising starting point in the development of a game that helps young people to develop their wellbeing.

How is biofeedback currently being used in video games?

True biofeedback has been relatively rare in games, but is rapidly being enabled by increasingly

affordable and ubiquitous technologies. It is being used in video games in a range of ways from the simple principle of showing the player their physiological changes to building this feedback into the plot of a game.

Games also vary on the extent to which they are explicitly using biofeedback to improve elements of wellbeing. Some games, for example, have increased wellbeing as one of their main selling points. Others, however, use biofeedback but don't mention wellbeing at all.

Type of biofeedback: Measuring blood colour/heart rate
A number of apps are using the LED light and camera on an iPhone to, effectively, convert the camera into a pulse oximeter able to "see" the fluctuations of blood colour in veins.

How is it being used in a video game:
Stress Doctor is one of the apps using this technique and it shows the information it collects as a graph. By seeing a graph of their heart rate the player is able to regulate their breathing effectively which, the game's developers claim leads to a reduction in stress.

Developed by Azumio Inc. the app makes bold claims for its scientific rigour and potential stating:

"We show you a continuous graph of your heart rate, so that you can see whether your body is responding to your breath in every moment. Deep breathing has proven beneficial effects on lowering stress, helping you sleep better, reducing anxiety, lowering blood pressure, strengthening your immune system, improved overall well being, and more! With just 5 minutes of practice per day, you will be amazed how much of a difference it makes."[67]

However, actual reviews and experience suggest this is far from achieved. The Azumio range of "self tracker" apps could, however, give inspiration on tools and techniques on using and tracking biofeedback - both to help players track their progress against their own goals and within a social network.

Type of biofeedback: Heart Rate Variability

Heart Rate Variability measures the variation in the length of the gap between each heartbeat. There is not an equal gap between each heartbeat. For example, an average heart rate of 60 beats per minute does not mean that the interval between each heartbeat would be exactly 1 second, instead the gap could vary from 0.5 seconds to 2 second between each beat.

During exercise, HRV decreases as the heart rate and exercise intensity increase. HRV also decreases during periods of mental stress. High HRV has physical and mental benefits, whilst low HRV is associated with physical and mental problems.

How is it being used in a video game:
One of the most intriguing recent examples of biofeedback in video games is the currently-

under-development horror game Nevermind,[68] which aims to teach techniques for controlling anxiety that may be useful in real life. Specifically, Nevermind uses a Garmin cardio chest strap along with an ANT+ USB stick to gather heart-rate data from the player. The game itself is an adventure horror game that takes place in the dark world of the subconscious. The player has to explore the labyrinths of the subconscious and solve puzzles along the way. Throughout the game the equipment monitors the player's HRV to determine when the player becomes scared or stressed. The more scared or stressed the player becomes, the harder the game becomes.

The game is developed not only to make things harder for the player when they get more anxious but it also learns through dialogue choices and gameplay, what frightens the player the most, and begins to use those aspects more regularly. For example, if the player becomes uncomfortable around sexual dialogue, the monsters will become more sexual in nature. The rationale being that providing stressful experiences forces the players to figure out what stress management techniques work for them as they need to calm down to progress in the game.

The developers of the game explain the dual goals of the game being "*to create an unforgettable gameplay experience that also teaches players how to be more aware of their internal responses to stressful situations."*[69]

Type of biofeedback: Measuring Galvanic Skin Response / Electrodermal Response / Skin Conductivity

All tissue in the human body has the ability to conduct electricity, including skin. When a person is aroused or stressed they produce moisture/sweat on the skin, which in turn makes the skin more conductive. By running a mild current across an area of skin it is possible, therefore, to measure how aroused or stressed the person is.

How is it being used in a video game: This technique is used in the Wild Divine[70] series of apps, with the skin conductivity being measured using a piece of equipment that attaches to three fingers. As well as measuring the skin conductivity, the equipment also measures the player's Heart Rate Variability.

Wild Divine technology allows the player to direct what happens on the screen using biofeedback. For example by relaxing, the player increases their HRV and decreases their skin conductivity. This in turn allows the player to manipulate items on the screen e.g. allows the player to lower a feather onto a pillow on the screen.

Wild Divine offers an interesting model as, since 2001, it has been among the most prominent technologies aimed at using biofeedback to promote wellbeing through meditation and relaxation. It describes the principles behind its technology and software as a version of "active feedback coaching" in which the player receives biofeedback from the game alongside feedback from a coach built into the game. For example, its most recent release is called Zen Journey and has a Zen master coaching the player through various tasks and settings.

Type of biofeedback: Electro-encephalography (EEG)

The brain's cells produce tiny electrical signals when they send messages to each other. Traditionally these were measured by attaching electrodes to a person's scalp and a machine called an electroencephalograph would transform these electric signals to waves on a graph, showing brain activity. An intriguing new field is the emergence of affordable and simplified EEG devices, able to measure brain activity affordably, with potentially large applications for health.

How is it being used in a video game:
One such affordable device, initially marketed at gamers, is the NeuroSky headset which measures brainwave signals and monitors the attention levels of the player. In combination with Neurosky software it allows the player to monitor their brain waves on the screen, for example, seeing their levels of concentration, and also play certain games only using their mind.

Thus far, impressive software applications have been few and far between, and games are mostly of the simplistic "toy-like" variety; the potential in the long term in this area is large, but development in the short term lacks models and market share.

Proxies for biofeedback

Meaningful proxies for biofeedback are also a fertile area, in terms of measurements of indicators like movement and posture, rather than direct measurement of data such as pulse.

One intriguing area is the degree to which commoditized technologies already found in almost all consoles/smartphones can act as proxies for mental states, even while not offering true biofeedback. Examples include accelerometers, used to assess movement rates and stillness, cameras, used to track eye movements, or rates of response and interaction, used to track levels of stress, as well as GPS and even straightforward self-assessment surveys. These are the typical tools used by best-selling fitness apps by giants like Nike; while dedicated console accessories like the motion sensing input devices Nintendo Wii Balance Board and the Kinect for Microsoft's Xbox are also used in bestselling mainstream fitness and wellness apps.

Worth noting is a famous "bonus game" within Nintendo's massively successful game Wii Fit (over 23 million sales) in which the player is invited simply to sit still on the balance board while watching a digital candle burning on the screen. The longer they manage to remain still, the better their score – while small distractions, like digital moths, flicker across the screen in order to create more of a challenge.

Another game which uses movement as a feedback mechanism is Guru Meditation, designed by Ian Bogost. Bogost is a game designer and philosopher known for deep thinking about serious games, and their problems. His meditation game Guru Meditation (developed in homage to the old Atari 2600 console from the 1970s) is especially interesting thanks to the depth of thinking behind it devoted to what "true" meditation would look like in a game – and how to pare

down the experience to its essentials.

Best viewed in its iPhone incarnation[71] it is extremely crude visually – thanks in part to a deliberate desire to avoid the rich sensual stimulation supplied by experiences like Wild Divine (see above).

Using the iPhone's accelerometer, touch and sound controls, it depicts a yogi onscreen. If the player is still and balanced, the yogi slowly rises into the air. If you move too much, he drops. Once enough still time has passed, the yogi begins floating and the timer starts.

As Bogost himself observes, there's also a special opportunity embodied in building a game for smartphones, in terms as much of what is excluded and prevented as included:

"The iPhone offers a unique opportunity for a true relaxation game, since it makes such constant demands on our attention—telephone, email, text messages, Twitter, etc. Guru Meditation for iPhone literally makes it impossible to pursue other activities while playing. As such, it offers a convenient secondary commentary on the often overwhelming values of 'connection' that today's portable communication devices embrace."[72]

Using biofeedback in a game developed by We Are What We Do, whether true biofeedback or a proxy, could help to achieve a shift in emotional state and self-awareness, with therapeutic benefits, and real impacts on behaviour beyond the game – bringing the alteration to the world itself, so to speak.

6. Conclusion

The promotion of wellbeing in young people is increasingly recognised as being important for the general mental health of the nation. There are behaviours and techniques which when practised have been shown to be effective in increasing wellbeing in young people, however the majority of young people are not accessing these. Barriers to access range from not knowing about these behaviours, to not knowing how to access them, to not wanting to access them in the first place.

Video games, with their popularity among young people and established distribution channels, appear to be a well-suited medium in which to embed these behaviours. Using video games as a medium also presents a wide range of opportunities for the format of the intervention as digital game playing and playful activities are so pervasive in our modern-day lives. Furthermore, research suggests that video games already have a positive impact on a number of elements of wellbeing, including positive social relations, environmental mastery and emotional regulation, with some young people already explicitly using video games to alter their emotional state.

There is also a lot we can learn from video games to make any game produced by We Are What We Do as widely and regularly played as possible, and thus as effective as possible. The 4 Key framework provides clear mechanisms to engage young people, which can keep players

playing regularly and help them achieve certain *types* of engagement in the games, such as concentration and flow, which could be complementary to techniques aimed at improving wellbeing.

Finally, video games and the field of wellbeing are already converging with their use of biofeedback with a number of video games using biofeedback to help an individual regulate their emotion, whether intentionally and explicitly (e.g. Wild Divine) or more implicitly (e.g. Nevermind). Although some games of this kind have already been developed there is a greater potential within video games than is currently being exploited and new evidence emerging in this area to be built upon. This provides fertile ground for We Are What We Do to begin to explore how best to integrate wellbeing promoting behaviours into a video game, and how to ensure the game brings the greatest improvement in wellbeing to those young people that play it.

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