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As experts who have been studying the influences digital technologies on adults and young people for many years, we would like to thank you for providing the opportunity to provide scientific advice on the important topic of immersive and addictive technologies. The idea that digital technologies, online platforms, and multi-player games are inherently addictive is as compelling as it is disturbing. It rightly garners a great deal of widespread interest and public debate. The last year has seen widespread media coverage about a range of technology addictions have brought them to the front of many agendas ¹.

Unfortunately, this information environment has made it increasingly difficult to differentiate between high quality evidence and anecdotal or biased coverage. In this written evidence we build on our extensive research experience as experimental and clinical psychologists mainly focused on gaming contexts, to outline the what we know, do not know, and need to know about these technologies to ensure their positive impacts may be harnessed and potential downsides minimised. With this in mind, our research has focused on the issues surrounding problematic gaming and digital technology use, and as such informs our perspective on the fourth and fifth term of reference.

Term of Reference 4: Tackling digital and gaming addiction

Term 4a. *What are digital addiction and gaming addiction, and how do they differ from other forms?*

1. First and foremost, it is critical to understand there is no such thing as ‘digital addiction’ or ‘gaming addiction’ in the technical or clinical sense. In the United States, the American Psychiatric Association has proposed “Internet Gaming Disorder” as a topic for future study in their latest draft of the DSM². On the global stage, the draft version of the WHO’s ICD includes an entry for “Gaming Disorder”³. In both cases these are tentative preliminary outlines which are calls for high quality research. They do not provide firm diagnostic criteria or guidance for treatments, as we would find with established disorders. We have written two widely cited papers to guide scientific debate on this topic. We think the committee might find these highly informative^{4,5}.
2. Besides scientific and clinical formalisation, ‘digital addiction’ or ‘gaming addiction’ present a fundamental philosophical problem for study and treatment. Historically, diagnostic criteria for these such addictions have been based on those used for substance-based disorders or disordered gambling. While this sort of approach may have proved to be a useful starting point, it does make the assumption that video games, or digital technologies, are inherently harmful, such that excessive use is a cause for concern – in the same way that excessive substance use or gambling is. This assumption is incorrect, however⁶: such technologies are, by their very nature, immersive and interactive hobbies. Therefore, a clear distinction needs to be made between high-engagement (yet unharmed) use, and problematic or addictive use. For example, being preoccupied with a video game, or playing a game at the expense of engaging in other hobbies, does not necessarily constitute a clear benchmark for harmful engagement. Indeed, for some individuals, it may constitute a positive social experience. For those for whom engagement starts to become harmful, there is some evidence to suggest that it is not the games themselves which cause harm, but instead that problematic engagement arises as a form of self-medication for other issues⁷.

3. In short, there is currently a lack of clear and consistent scientific research to support the idea that concepts such as 'digital addiction' or 'gaming addiction', as they are currently defined, are accurate or meaningful in a scientific or clinical sense. In order to move our understanding of such disorders forward, we believe that research funding drives should focus on supporting large-scale studies that adhere to the principles of open science. Future research should be pre-registered, with data, experimental or survey materials and data analysis scripts made openly available to allow for sufficient scrutiny from the scientific community. For such research to form the basis of any future policy, it also needs to be independently replicated. As we do not yet have sufficient evidence of this quality, we would urge caution in recommending any policy or guidance regarding gaming or digital addiction.

Term 4b. *What is the scale of the problem and what support do those with digital or gaming addiction need?*

4. Given the issue with formalising a consistent and appropriate set of diagnostic criteria, it should come as no surprise that estimates of the prevalences of such addictions vary wildly in the present research literature. In the case of gaming addiction for example, reviews⁸ suggest show that the estimates range from 0.2% to 46% of the gaming population. This presents a specific problem for categorisation and treatment, in that if the prevalence rate is incorrectly inflated, we risk misdiagnosing and over diagnosing a disorder that, for a large number of video game players, is simply not there. In turn, this has clear knock-on effects in terms of perceived stigma and access to (and financial support for) treatment.
5. We have conducted and published research with nationally representative samples of adults living in U.K. to provide a tentative answer to this question⁹. Following a preregistered analysis plan¹⁰ prevalence rates of gambling disorder were directly compared to disordered gaming rates using criteria published in draft APA guidance. Results indicated that 1.0% of adults met the established criteria for gambling disorder whereas disordered gaming rates were significantly lower in the general population 0.47% ($z = -2.08$, $p = 0.038$) and were also lower comparing regular gamblers and gamers.
6. We have also published large-scale longitudinal research on the time course of problematic playing and health outcomes¹¹. In this research, focused on American adults, we observed similarly low prevalence rates among the general and gaming population. Over the course of six months we found that some correlates of disordered gaming such as feeling like one is playing games too much are consistent over time but adult gamers did show evidence of consistently meeting diagnostic thresholds. Out of a sample of more than 5,000 adults only three participants (0.05%) reported more than four of the APA criteria at both time points and none of the participants who met a diagnostic threshold including distress at the start did so at the end of the study. Further we did not find evidence that problem gaming at one point in time had any detectable lasting effects on social, mental, or physical health.

Term 4c. *What role does design play in gaming addiction, or the addictive use of social media, and how might that be managed?*

7. There is a good deal of speculation about specific features such as loot boxes but at present there is no empirical basis to determine if this is true. The potentially addictive mechanics employed by some game and platform developers should be indexed and regulated by a governmental body or through some form of transparent scientific collaboration. Unfortunately, because the evidence base is so spare, a more detailed reply to this term of reference is not possible.

Term 4d. *Are extra measures needed to protect children from these forms of addiction?*

8. As a matter of statute, the government should compel industry actors to participate in a monetary- and data-based levy with independent scientific experts. This step is required to collect the data necessary to draw empirical inferences about the regulatory frameworks that are needed. The outputs of this research should be grounded in open and transparent science.
9. Those collecting gold standard national cohort data including NHS Digital, the Center for Longitudinal Studies, and the Institute for Social and Economic Research should add measures to their existing projects.
10. Tenders for the analysis of these new data should be provided by Research Councils UK.

Term 4e. *How well co-ordinated are Government efforts on these forms of addiction?*

11. Current Government efforts are not well co-ordinated.
12. Social media, gaming, and digital entertainment companies collect, store, and profit from extremely rich and sensitive data on our daily lives. They are indispensable partners for the large-scale transparent scientific investigations that will lead to actionable evidence-based policy insights.
13. Research Councils UK should call for the creation of a “Social Data Science Clearinghouse Centre” which independent scientific experts can link data from social media, gaming, and digital entertainment companies to gold standard national cohort data.

Term 4f. *What can be learned from other countries?*

14. We believe that there are cautionary lessons to be learned from other countries where policies have been implemented in the absence of a clear evidence base. For example, in 2011 South Korea enacted the so-called ‘shutdown policy’; children and adolescents below the age of 16 were banned from using the internet between midnight and 6am each day. The policy came about as a response to fears that Korean children were facing an epidemic of excessive and harmful online gaming, and that this was affecting their sleep and academic performance. However, a 2017 analysis¹² showed that the shutdown policy did not have the intended effect – the policy resulted in around 2 minutes of extra sleep per night, and had a net effect of increasing the amount of time that children spent on the internet each day.

Term of Reference 5: The links between gaming and gambling

Term 5a. *What are the links between gaming and gambling?*

15. Research on this topic is at a very early stage. Preliminary research by Zendle and colleagues¹³ suggests that those predisposed to disordered gambling may be more likely to spend money on in-game items. This work involved surveying some 1,200 individuals, and asking questions about the types of video games that they play and whether they engage in purchasing so-called ‘loot boxes’ (which may contain valuable in-game items such as cosmetic upgrades), alongside measures of problematic gambling. These early results suggest that about 9% of the variance in problematic gambling scores can be accounted for by assessing the extent to which players are prepared to spend money on loot boxes, regardless of how the loot box mechanic is

specifically implemented (although there are variations depending on the mechanism). Further work is needed to understand this relationship, but it is worth noting at this point that loot boxes present a specific type of profit-making mechanic present in video games, and that the potential links between their use and problematic gambling are not indicative of a general link between video game playing and gambling.

Term 5b. *What are the effects of in-game spending, especially on children, and does it need stronger monitoring or regulation?*

16. Unfortunately, there are no reliable scientific studies which address this question. This is largely because academic scientists do not have access to the proprietary industry data needed to provide an answer to this question. Scientific research needs to study which gaming mechanisms are the most problematic and needing of both monitoring and regulation.
17. Responsibly addressing this term would require a government or research council body to fund independent scientists to work with video game companies on projects that the companies would not be able to influence the results (e.g. via non-disclosure agreements). We have previously proposed just such an model for use to address the impact of social media on the lives of young people¹⁴.

Term 5c. *What challenges and opportunities do gaming and eSports offer the gambling industry and how should that be managed?*

18. The primary opportunity provided to the gambling industry is a potential audience. For example, it is increasingly the case that many people consume game-related content not just by playing games, but via online spectatorship. Watching esports in particular has become a social experience, with online game streaming websites such as Twitch allowing viewers to interact with each other via in-stream chatrooms. This offers the possibility for gambling-related marketing to be directed at consumers of specific types of esports or other gaming content. In addition, the UK Gambling Commission has recently investigated Twitch in lieu of investigations which have uncovered illegal gambling streams present on the site¹⁵.
19. The primary challenge is direct competition. Some electronic game makers may offer experiences that displace traditional forms of gambling is roughly analogous to the displacement effect observed for e-cigarettes vs. tobacco-based products.

Closing Remarks

20. We stress that there is an absence of robust and actionable scientific evidence regarding what policy steps we should take to tackle immersive and addictive technologies. While there are notable exceptions, most of the research used to back up claims about the addictive potential of technology and gaming is not of sufficient quality to inspire or meaningfully shape policy change. As scientists, we wholeheartedly believe that strong claims need strong evidence, and that the evidence for the strength of claims we routinely face about technology use is not present in the slightest.
21. Yet we understand that the absence of good evidence is not evidence of absence for technology effects. We reflect regularly on this, and what this means for policy. Hence, we believe that policy needs to instigate statutory data and financial levies to facilitate the construction of a robust and replicable evidence base. Only with better quality data

and more rigorous science will we be able to provide policy with the understanding to instigate evidence-based and successful policy interventions.

22. ***In particular, we are concerned that our scientific field has so far struggled to keep up with the pace of the public debate around digital technologies and games, and has so far consistently failed to produce, and communicate, applicable research of a quality that the debate so desperately needs.***
23. In our view, this speaks to more fundamental problems in the way that social science is currently funded, conducted and disseminated in the UK: If researchers need headline grabbing publications, and many of them each year, to survive in the current funding landscape, the field will not produce the results the public needs. We therefore urge you most strongly to consider the need to change the scientific landscape: embracing movements like open data, open science and computational reproducibility. Only once the reward system of academic research improves, will our endeavour to use public funds, in concert with industry data from a statutory levy, to provide much needed unbiased, openly accessible and robust evidence be fruitful.
24. If such steps are not taken the pattern of low-quality research reports with headline catching press-releases will continue unabated and we will not be prepared to make effective evidence-based policy as new games, technological devices, and online platforms are adopted by the general population.

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January 2019