

TECHNICAL NOTE

Addictive patterns and the right to the integrity of the person

EXECUTIVE SUMMARY

In July 2024, the AEPD released a report called ["Addictive patterns in the processing of personal data: Implications for Data Protection"](#). The report analysed the design patterns used in the personal data processing of some digital products and services. In particular, it pointed out the deceptive and addictive patterns included in many data processing activities.

The use of such patterns has essential implications for different aspects related to data protection, such as accountability, the effective application of data protection by design and by default, transparency, lawfulness, fairness, purpose limitation, data minimisation, automated decisions that significantly affect users or the processing of special categories of data.

However, the main concern regarding the inclusion of deceptive and addictive patterns in data processing activities is the high risk that they entail for the rights and freedoms of the data subjects, mainly when they are children. Therefore, it is necessary to carry out an assessment, based on scientific evidence, of the risk to the rights and freedoms that such patterns imply.

This document introduces a collection of scientific evidence about how prolonged exposure to these patterns may harm an individual's physical and mental integrity and modify users' behaviour with long-term consequences for their health.

Therefore, using deceptive and addictive patterns in online personal data processing is highly risky for the rights and freedoms of the data subjects, and controllers should carry out a data protection impact assessment that could hardly pass a proportionality test, regardless of any other potential GDPR incompliances.

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I. INTRODUCTION

Internet providers have become the architects of users' online experiences in the framework of personal data processing on digital platforms, applications and services. As our report [“Addictive patterns in the processing of personal data: Implications for data protection”](#) has introduced, with the advent of sophisticated design patterns, some of these companies have introduced in the market features that are not only engaging but also deceptive and addictive. As the published report analyses all these patterns may require personal data as input, collect or generate new personal data, or influence user behaviour and decision-making in connection with personal data processing.

The incorporation of operations that implement addictive patterns into the processing of personal data has important implications for different aspects related to data protection, such as accountability, the effective application of data protection by design and by default, transparency, lawfulness, fairness, purpose limitation, data minimisation, automated decisions that significantly affect users or the processing of special categories of data. It also implies a risk for the rights and freedoms of all users. Particularly, for the right to their physical and mental integrity, but they can also cause discrimination, exclusion, manipulation, undermine individual autonomy, influence their thought process, their emotions, their behaviour, limit their freedom of information and expression, and affect their development. These consequences can be especially severe for children and younger users.

These addictive design patterns are strategically added to personal data processing activities to increase connection time and user commitment. However, the pursuit of user retention has raised significant concerns regarding the implications of such practices for health. Many people unlock their phones unconsciously every 15 to 30 minutes, being this kind of automatic checking one of the symptoms of behavioural addiction that consumes a considerable amount of users' time^{1,2}. But this is just one example of the behavioural changes that addictive patterns have achieved when included in personal data processing. As already mentioned, there is growing evidence to support that these patterns violate the right to personal integrity, affecting both physical and mental health.

The pervasive nature of these addictive design patterns has far-reaching consequences, extending beyond mere user behaviour. Scientific evidence suggests that prolonged exposure to these patterns can have detrimental effects on individuals' health. From sleep disturbances to increased anxiety and stress levels, the impact of these design choices is becoming increasingly apparent.

The right to the protection of personal data is not an absolute right; it must be considered in relation to its function in society and be balanced against other fundamental rights, in accordance with the principle of proportionality (recital 4, GDPR). This evidence is, therefore, proof to support that data processing operations including addictive design patterns may vulnerate fundamental rights and freedoms of the data subject. Specifically, the Right to the integrity of the person, established in Article 3 of the Charter of Fundamental Rights of the European Union: “Everyone has the right to respect for his or her physical and mental integrity”.

This document aims to explore the intersection between technology and fundamental rights, particularly focusing on how the inclusion of addictive design patterns in the processing of personal data in products and services by digital providers may impact the right to integrity of the person.

¹ Almourad, M. B., McAlaney, J., Skinner, T., Pleya, M., & Ali, R. (2020). Defining digital addiction: Key features from the literature. *Psihologija*, 53(3), 237-253.

² Heitmayer, M., & Lahlou, S. (2021). Why are smartphones disruptive? An empirical study of smartphone use in real-life contexts. *Computers in Human Behavior*, 116, 106637.

By examining the evidence of the health impacts associated with these patterns, the implications for data protection are demonstrated. This note presents some of the most important conclusions drawn from a research project carried out at the AEPD through a systematic review of the evidence available to date. The [previously published report](#) focused on defining addictive patterns, providing a classification that allows them to be identified and analysing their implications for the protection of personal data. This note completes this analysis from the point of view of the potential impacts on rights and freedoms, since:

- The article 24 of GDPR states that *“Taking into account the nature, scope, context and purposes of processing as well as the risks of varying likelihood and severity for the rights and freedoms of natural persons, the controller shall implement appropriate technical and organisational measures to ensure and to be able to demonstrate that processing is performed in accordance with this Regulation. Those measures shall be reviewed and updated where necessary.”*. This note may assist data controllers in assessing the severity of the impact on the rights and freedoms of natural persons that would be implied by the addition of operations that implement addictive patterns to the processing of personal data, in particular, on the right to the integrity of the person.
- Understanding this severity and analysing the existing evidence can also help data controllers comply with Article 25 of the GDPR (Data Protection by Design and by Default), Article 28 (regarding the selection of processors) or Article 35 (Data Protection Impact Assessment). This note can be of fundamental help concerning the assessment of the necessity and proportionality of the processing operations in relation to the purposes and the assessment of the risks to the rights and freedoms of data subjects.

It should be noted that, although some impacts of operations that implement addictive patterns are personal and specific to each data subject, there is scientific evidence that shows that these impacts occur and that they depend on certain aspects such as age or gender, to mention just a couple of examples.

This information is addressed to data controllers of online processing activities, directly implemented by them or requiring evaluation criteria to select processors or choose between services, systems or components to execute their processing activities. Moreover, this document is directed to supervisory authorities that must enforce the application of the GDPR in order to protect the fundamental rights and freedoms of natural persons with regard to the processing of personal data.

II. ADDICTIVE BEHAVIOURS

The American Psychiatric Association stated in 2013 that a behavioural addiction is a diagnosable condition as scientific research has shown that it “*activates reward systems similar to those activated by drugs abuse and produces some behaviour symptoms that appear comparable to those produced by substance use disorders*”³. A similar definition has been adopted by the World Health Organization, including in the Eleventh Revision of the International Classification of Diseases and Related Health Problems⁴ the following categories under “*Disorders due to addictive behaviours*”:

- 6C50: Gambling disorder.
- 6C51: Gaming disorder.
- 6C5Y: Other specified disorders due to addictive behaviours.
- 6C5Z: Disorders due to addictive behaviours, unspecified.

Since it seems that there is still not sufficient scientific evidence to establish the diagnostic criteria and course descriptions (of the process associated with the disorder and its evolution) needed to explicitly identify those other addictive behaviours, different scholars use frequently the terms “*Problematic Use*”, “*Excessive use*”, “*Abuse*” or “*Use Disorder*” when referring to the negative effects of Internet, social media or different apps usage.

All these technology-mediated disorders or addictive behaviours have specific aspects in common:

- Repetitive patterns that imply a risk to physical or mental health.
- These patterns continue to occur despite attempts to abstain or moderate use.

Six basic elements are usually present: preoccupation, mood alteration, tolerance, conflict, withdrawal, and relapse⁵. Therefore, using the Internet, social media or an app is the person's greatest concern and the highest priority motivation. At the same time, this use regulates the person's emotions to the point that the person needs to use the Internet, social media or the app more time each day to achieve the same level of satisfaction. The amount of time devoted to these activities causes personal, labour, financial or social problems. Finally, the person suffers from psychological or physical symptoms when the Internet, social media or app cannot be used enough time, and the person cannot quit this activity.

Different methods have been proposed to try to detect this type of disorder, and many of them are based on conducting interviews and self-assessment⁶. Among the most used instruments is the Internet Addiction Test (IAT)⁷. Although there are other designed specifically to detect problematic aspects of Internet use such as smartphone⁸ or social network disorders.

For example, the Bergen Facebook Addiction Scale⁹ measures these six elements to determine Facebook Addiction:

³ American Psychiatric Association (APA). Diagnostic and Statistical Manual of Mental Disorders (DSM-5). Washington: American Psychiatric Publishing, 2013.

⁴ World Health Organization (WHO). International Statistical Classification of Diseases and Related Health Problems (ICD) <https://www.who.int/standards/classifications/classification-of-diseases>

⁵ Griffiths, M. (2005). A ‘components’ model of addiction within a biopsychosocial framework. *Journal of Substance use*, 10(4), 191-197.

⁶ Laconi, S., Rodgers, R. F., & Chabrol, H. (2014). The measurement of Internet addiction: A critical review of existing scales and their psychometric properties. *Computers in human behavior*, 41, 190-202.

⁷ Young, K. S. (1998). *Caught in the net: How to recognize the signs of internet addiction and a winning strategy for recovery*. John Wiley & Sons.

⁸ Kwon, M. et al. (2013). Development and validation of a smartphone addiction scale (SAS). *PloS one*, 8(2), e56936.

⁹ Andreassen, C. S., Torsheim, T., Brunborg, G. S., & Pallesen, S. (2012). Development of a Facebook addiction scale. *Psychological reports*, 110(2), 501-517.

- You spend a lot of time thinking about Facebook or planning how to use it?
- You feel an urge to use Facebook more and more?
- You use Facebook in order to forget about personal problems?
- You have tried to cut down on the use of Facebook without success?
- You become restless or troubled if you are prohibited from using Facebook.
- Do you use Facebook so much that it has had a negative impact on your job/studies?

The participants must give one of the five response options to these six questions: (1) Very rarely, (2) Rarely, (3) Sometimes, (4) Often and (5) Very often. This test can be used to measure disorders related to other social media networks or apps different from Facebook¹⁰. It has to be considered that the rapid changes in Internet applications and services make it challenging, an even impractical, to design and evaluate measurement instruments for every new platform or design feature, as these tools would become quickly obsolete.

Some of the most exhaustive meta-analyses reviewing available scientific evidence based on the available questionnaire and tests estimated in 2021 and 2022 that 25% of the global population suffers from a social or digital media disorder^{11, 12}.

¹⁰ Duradoni, M., Innocenti, F., & Guazzini, A. (2020). Well-being and social media: A systematic review of Bergen addiction scales. *Future Internet*, 12(2), 24.

¹¹ Cheng, C., Lau, Y. C., Chan, L., & Luk, J. W. (2021). Prevalence of social media addiction across 32 nations: Meta-analysis with subgroup analysis of classification schemes and cultural values. *Addictive behaviors*, 117, 106845.

¹² Meng, S. Q. et al. (2022). Global prevalence of digital addiction in general population: A systematic review and meta-analysis. *Clinical psychology review*, 92, 102128.

III. IMPLICATIONS FOR THE INTEGRITY OF THE PERSON

Users are often encouraged to protect themselves from addictive patterns through a combination of awareness, self-discipline (practising digital detox¹³), and practical strategies (disabling notifications, turning off autoplay, setting time limits, auditing app configuration, etc.). But all responsibility should not be left in their hands.

Research suggests that “*Problematic Use*”, “*Excessive Use*”, “*Abuse*”, or “*Use Disorder*” continues to rise. Research also indicates that the increase in mental health problems might be related to all these behavioural disorders, as a cause and as an effect. Although it is a line of research that still needs much development, physical and mental effects of these disorders could be, mainly^{14, 15, 16, 17}:

- Physical effects:
 - Musculoskeletal pain.
 - Altered affective experience state.
 - Brain alteration and early neurodegeneration.
- Mental effects:
 - Depression.
 - Anxiety and stress.
 - Loneliness.
 - Low self-esteem.
 - Insomnia and low sleep quality.
 - Eating disorders.
 - Low life satisfaction.

Previous research has tried to understand the causes of all these disorders. Many authors highlight four different categories^{18, 19} of causes:

- Mental factors such as depression, anxiety, or insomnia.
- Social factors such as loneliness, interpersonal problems, low self-esteem, social pressure, or fear of missing out.
- Technological factors such as Internet access, early mobile phone ownership, or parental technological literacy.
- Behavioural factors such as personality (psychological inflexibility, low emotional intelligence level, etc.) or lack of self-control.

¹³ Radtke, T., Apel, T., Schenkel, K., Keller, J., & von Lindern, E. (2022). Digital detox: An effective solution in the smartphone era? A systematic literature review. *Mobile Media & Communication*, 10(2), 190-215.

¹⁴ World Health Organization. (2015). Public health implications of excessive use of the internet, computers, smartphones and similar electronic devices: Meeting report, Main Meeting Hall, Foundation for Promotion of Cancer Research, National Cancer Research Centre, Tokyo, Japan, 27-29 August 2014. World Health Organization.

¹⁵ van Velthoven, M. H., Powell, J., & Powell, G. (2018). Problematic smartphone use: Digital approaches to an emerging public health problem. *Digital Health*, 4, 2055207618759167.

¹⁶ Wong, H. Y. et al. (2020). Relationships between severity of internet gaming disorder, severity of problematic social media use, sleep quality and psychological distress. *International journal of environmental research and public health*, 17(6), 1879.

¹⁷ Stangl, F. J., Riedl, R., Kiemeswenger, R., & Montag, C. (2023). Negative psychological and physiological effects of social networking site use: The example of Facebook. *Frontiers in Psychology*, 14, 1141663.

¹⁸ Al-Samarraie, H., Bello, K. A., Alzahrani, A. I., Smith, A. P., & Emele, C. (2021). Young users' social media addiction: causes, consequences and preventions. *Information Technology & People*, 35(7), 2314-2343.

¹⁹ Kuss, D. J., Kristensen, A. M., & Lopez-Fernandez, O. (2021). Internet addictions outside of Europe: A systematic literature review. *Computers in Human Behavior*, 115, 106621.

Therefore, some factors can be both cause and effect of all these disorders, they are amplified by them. A systematic literature review²⁰ shows that all these addictive behaviours may be mediated or moderated by these mental, social, technological, and behavioural factors. It should be clarified that a mediator explains the process through which two variables are related while a moderator explains the strength and direction of this relationship.

Without consistent instruments for detecting or methods for classifying disorders, drawing conclusions from the few available neurobiological and genetic studies might be premature²¹. For example, when trying to understand if there are neurological or genetic causes that may explain a greater sensitivity to reward.

But the influence of other variables such as age, gender or geographical area have been already demonstrated.

A. AGE

The impacts of all these addictive behaviours are similar on children than on adults^{22, 23, 24, 25}. Recent studies²⁶ show how the prevalence of severe psychological symptoms increased from 6.7% in 2001–2002 to 10.4% in 2017–2018, relying on the HBSC (Health Behaviour in School-aged Children) survey, a cross-national survey sponsored by participating countries and conducted in partnership with the World Health Organization. The increase was substantial among 15-year-old and older girls, from 10.9 to 19.1%. The higher prevalence of more severe psychological symptoms in 2017–2018 compared with 2001–2002 can be eliminated after adjusting the model for problematic social media use, suggesting that this problematic use contributes to the increasing trend of psychological symptoms in children in recent years.

Since it seems that this age group is uniquely susceptible to harm arising out of addictive patterns²⁷, some findings of the works focused on children should be pointed out here.

First, many studies agree that teenagers and young adults are more vulnerable to addictive patterns. Some of the proposed causes are that this group has higher levels of digital competence than others which leads them to have a false sense of security, they feel more comfortable using digital means of communication and spend more hours exposed to addictive patterns, they have access to these patterns when they are very young and they have not yet formed criteria or enough self-control (they are still developing impulse control), they imitate their parents affected by the same disorders and become themselves addicted²⁸, etc.

²⁰ Lozano-Blasco, R., Robres, A. Q., & Sánchez, A. S. (2022). Internet addiction in young adults: A meta-analysis and systematic review. *Computers in Human Behavior*, 130, 107201.

²¹ Tereshchenko, S. Y. (2023). Neurobiological risk factors for problematic social media use as a specific form of Internet addiction: A narrative review. *World Journal of Psychiatry*, 13(5), 160.

²² Keles, B., McCrae, N., & Grealish, A. (2020). A systematic review: the influence of social media on depression, anxiety and psychological distress in adolescents. *International journal of adolescence and youth*, 25(1), 79-93.

²³ Alonzo, R., Hussain, J., Stranges, S., & Anderson, K. K. (2021). Interplay between social media use, sleep quality, and mental health in youth: A systematic review. *Sleep medicine reviews*, 56, 101414.

²⁴ Valkenburg, P. M., Meier, A., & Beyens, I. (2022). Social media use and its impact on adolescent mental health: An umbrella review of the evidence. *Current opinion in psychology*, 44, 58-68.

²⁵ Ye, X. L., Zhang, W., & Zhao, F. F. (2023). Depression and internet addiction among adolescents: a meta-analysis. *Psychiatry Research*, 326, 115311.

²⁶ Mojtabai, R. (2024). Problematic social media use and psychological symptoms in adolescents. *Social psychiatry and psychiatric epidemiology*, 1-8.

²⁷ At this time, the judicial processes opened after the filing, on behalf of children and adolescents, of hundreds of individual cases across the United States against Meta's Facebook and Instagram, Google's YouTube, ByteDance's TikTok, and Snapchat have not finished. This multi-district litigation encompasses, in addition to individual suits, over 140 actions brought on behalf of school districts and actions filed jointly by over thirty state Attorneys General. The evidence evaluated as well as the conclusions reached will surely be of great interest.

²⁸ Chemnad, K., Alshakhsi, S., Al-Harashsheh, S., Abdelmoneium, A. O., Al-Khalaf, M. S., Baghdady, A., & Ali, R. (2023). Is it contagious? Does parents' Internet addiction impact their adolescents' Internet addiction? *Social Science Computer Review*, 41(5), 1691-1711

Second, some of the motivators for these disorders are very common among teenagers and young adults, such as anxiety, low self-esteem, social pressure, or fear of missing out. Unfortunately, the severity of these addictive disorders is associated not only with a higher rate of mental health problems but also with a greater severity of their symptoms²⁹. Mental health problems are a motivator of disorders, and disorders usually worsen mental health problems symptoms.

Third, the disorders' impacts usually lead to poor academic performance, and this strongly affects the quality of family relationships and life satisfaction levels. And finally, some studies suggest that all these disorders produce in children an inability to cognitively process emotions, specifically, a diminished ability to recognize and express emotions.

In addition, must be considered that providers are very interested in cultivating children as users. An early adoption of their platforms, applications and services will likely increase the number of future users as they will continue using their services as they grow older.

Finally, different researches suggest that is crucial to consider that the interactions of children and young users with digital technologies involve very different layers with different meanings for them including the device itself, either as an object or a brand, the installed applications and their settings, the networks that connect them technologically and socially, the content they access, and the cultural and moral standards that guide their digital decision-making³⁰.

Given the influence of the age variable on the impact of addictive behaviours, it is essential to develop validated measurement instruments specific for the population under study. For example, it is important to develop instruments for children under 10 years old instead of teenagers³¹, since the youngest children's perspective has been rarely analysed to date. At these early ages, the physical and mental effects are not only those directly produced by addictive behaviours but also those indirectly produced by not dedicating enough time to activities that are beneficial for the development and well-being of children (spending time with other children and adults, physical activity, outdoor play, etc.).

B. GENDER

Regarding gender, there are significant differences between males and females^{32, 33, 34} across all age groups, although it is necessary to carry out more studies with a gender focus. Different research works suggest a pattern consistent across many cultures and geographic locations. Summarizing, males are more prone to develop gaming disorders and problematic use of porn sites than females. At the same time, females are more vulnerable to developing social media addictive behaviours in all its variants. Furthermore, addictive disorders could be predicted by different variables depending on gender, because the motivators are different for males and females.

²⁹ Torous, J. et al. (2021). The growing field of digital psychiatry: current evidence and the future of apps, social media, chatbots, and virtual reality. *World Psychiatry*, 20(3), 318-3

³⁰ Livingstone, S. (2024). Reflections on the meaning of 'digital' in research on adolescents' digital lives. *Journal of Adolescence*.

³¹ Rega, V., Gioia, F., & Boursier, V. (2023). Problematic media use among children up to the age of 10: a systematic literature review. *International Journal of Environmental Research and Public Health*, 20(10), 5854.

³² Mari, E. et al. (2023). Gender differences in internet addiction: A study on variables related to its possible development. *Computers in Human Behavior Reports*, 9, 100247.

³³ Su, W., Han, X., Yu, H., Wu, Y., & Potenza, M. N. (2020). Do men become addicted to internet gaming and women to social media? A meta-analysis examining gender-related differences in specific internet addiction. *Computers in Human Behavior*, 113, 106480.

³⁴ Ananda, M. A. R. (2024). Gender Differences in Internet Addiction and Its Impact on Exposure to Pornography and Internet Gaming Disorder. *CoverAge: Journal of Strategic Communication*, 14(2), 78-90.

These results are very useful for parents, teachers, care providers, etc. A gender-informed perspective allows them to monitor children's behaviour, to diagnose it or to guide it using different approaches.

One last aspect regarding gender is worth mentioning. Teenagers and young adults belonging to sexual and gender minorities seem to be more vulnerable to all these disorders³⁵, specifically concerning social media use. Social media may appeal to young adults with internalized stigma or very low self-esteem and insufficient emotional support, as a good opportunity for self-expression and connecting with others. In fact, when used in moderation, social media offers this kind of benefit. But this may be a motivator to use social media intensively, to the point of problematic use. Again, knowing this specific vulnerability allows parents, teachers and care providers to respond adequately.

C. GEOGRAPHICAL AREA

The different prevalences of this type of disorder are not due to the geographical area but rather to the population average income³⁶ or to the culture or social environment^{37, 38, 39}. For example, it seems that "collectivist" cultures suffer a higher prevalence than "individualist" cultures. Such cultural differences may be attributable to the requirement of compliance with strong social norms or to the higher prevalence of some of the mediator or moderator factors, since both aspects can be found, to a greater extent, in "collectivist" cultures.

Previous research suggests that addictive behaviours decrease in Australia and New Zealand. On the other hand, Asian cultures with the highest prevalence rates range between 40% and 50%. In European and American countries, the average is around 10%. However, thorough and updated studies are required⁴⁰, especially because different cultures and societies rely on different measurement methods (questionnaires, metrics, scales), and fair comparisons are difficult to establish. Additionally, some geographic areas are often underrepresented in studies or there may be interrelated aspects in the analyses such as genetics.

³⁵ Vogel, E. A., Ramo, D. E., Prochaska, J. J., Meacham, M. C., Layton, J. F., & Humfleet, G. L. (2021). Problematic social media use in sexual and gender minority young adults: Observational study. *JMIR mental health*, 8(5), e23688.

³⁶ Casale, S., Akbari, M., Seydavi, M., Benucci, S. B., & Fioravanti, G. (2023). Has the Prevalence of Problematic Social Media Use Increased Over the Past Six Years and Since the start of the COVID-19 Pandemic? A Meta-Analysis of the Studies Published Since the Development of the Bergen Social Media Addiction Scale. *Addictive Behaviors*, 107838.

³⁷ Chen, L., & Nath, R. (2016). Understanding the underlying factors of Internet addiction across cultures: A comparison study. *Electronic Commerce Research and Applications*, 17, 38-48.

³⁸ Blachnio, A. et al. (2019). Cultural correlates of internet addiction. *Cyberpsychology, Behavior, and Social Networking*, 22(4), 258-263.

³⁹ Pan, Y. C., Chiu, Y. C., & Lin, Y. H. (2020). Systematic review and meta-analysis of epidemiology of internet addiction. *Neuroscience & Biobehavioral Reviews*, 118, 612-622.

⁴⁰ Lozano-Blasco, R., Robres, A. Q., & Sánchez, A. S. (2022). Internet addiction in young adults: A meta-analysis and systematic review. *Computers in Human Behavior*, 130, 107201.

IV. CONCLUSIONS

This technical note extends the analysis in the AEPD report ["Addictive patterns in the processing of personal data: Implications for data protection,"](#) released in July 2024. The report included an analysis of some design patterns in digital products and services and pointed out the deceptive and addictive patterns involved in some personal data processing activities.

The report concluded that the use of such patterns has important implications for different aspects related to data protection, such as accountability, the effective application of data protection by design and by default, transparency, lawfulness, fairness, purpose limitation, data minimisation, automated decisions that significantly affect users, or the processing of special categories of data.

However, the main concern regarding the inclusion of deceptive and addictive patterns in data processing activities is the high risk that they entail for the rights and freedoms of the data subjects, mainly when they are children. Therefore, it is necessary to carry out an assessment, based on scientific evidence, of the risk to the rights and freedoms that such patterns could imply.

A systematic review of the available evidence suggests that prolonged exposure to these patterns can have detrimental effects on individual's physical and mental integrity, modifying users' behaviour with long-term consequences for their health.

The terms "Behavioural or non-substance addiction", "Addictive behaviours", "Problematic Use", "Excessive use", "Abuse", or "Use Disorder" are used in published research when referring to the negative effects of using the Internet, social networks or different digital applications. In any case, they refer to repetitive patterns that imply a risk to physical or mental health when these patterns continue to occur despite the person's attempts to abstain or moderate use.

Six essential elements are usually present in all these disorders: preoccupation, mood alteration, tolerance, conflict, withdrawal, and relapse. There are different methods to detect this type of disorder, and many of them are based on conducting interviews and self-assessment. According to the results of these methods and the latest available meta-analyses, around 25% of the world's population suffers from one of these disorders.

These disorders involve effects on people's health, physical (musculoskeletal pain, altered affective experience state, brain alteration and early neurodegeneration) and mental (depression, anxiety and stress, loneliness, low self-esteem, insomnia and low sleep quality, eating disorders, low life satisfaction).

Different investigations point to different causes for these disorders, related to mental factors such as depression, anxiety, or insomnia; social factors such as loneliness, interpersonal problems, low self-esteem, social pressure, or fear of missing out; technological aspects such as Internet access, early mobile phone ownership, or parental technological literacy and behavioural factors such as personality or lack of self-control. This implies that some factors can be both cause and effect of all these disorders and are amplified by them.

It is still too early to analyse neurobiological and genetic aspects. However, it has been shown that other variables, such as age (for example, children and teenagers are especially vulnerable, as their health and development are more significantly impacted), gender, or geographical location, also influence.

The main conclusion of our systematic review is that personal data processing operations, including addictive patterns, may pose a high risk to the fundamental rights and freedoms of data subjects. Specifically, the Right to the integrity of the person as established in Article 3 of the Charter of Fundamental Rights of the European Union. Therefore, controllers should

carry out a data protection impact assessment if there are such patterns in their data processing: because of their design decisions, because they are included in services, systems or components that they use to implement their data processing or because processors include them. Considering the current report, a DPIA could hardly pass a proportionality assessment, regardless of any other potential GDPR incompliances.

The data controllers of personal data processing activities should consider this report when they plan, or they want to prevent, the inclusion of deceptive or addictive patterns in their processing activities, for example, directly in their interfaces. But, also, when they must select data processors or choose between services, systems or components to execute their processing activities because these patterns may affect their customers or employees (social networks, educational services, instant messaging applications, etc.). Of course, controllers, mainly public bodies, should prevent the inclusion of such patterns in the selection of processor and to analyze if they are included in the services and products acquired. Moreover, this document is directed to supervisory authorities that must enforce the application of the GDPR to protect the fundamental rights and freedoms of natural persons concerning the processing of personal data.

An additional conclusion is that more long-term scientific research is needed to understand these types of disorders (antecedents, correlates, consequences, mediators and moderators, etc.) and improve their prevention, diagnosis, and treatment approach. A consensus on criteria and assessment is also needed to achieve homogeneous definitions and assessment methods.