



Harmful internet use

Part I: Internet addiction and problematic use

STUDY

Panel for the Future of Science and Technology

EPRS | European Parliamentary Research Service

Scientific Foresight Unit (STOA)

PE 624.249 – January 2019

EN

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Study

January 2019

Abstract

This report reviews the existing scientific evidence regarding internet-use-related addiction problems at an individual level in Europe. In the last two decades, there has been an exponential growth in research in this field. Since 2013, internet gaming disorder has been included in the appendix of the American Psychiatric Association's fifth Diagnostic and Statistical Manual of Mental Disorders, and gaming disorder has been included in the eleventh International Classification of Diseases published by the World Health Organization.

The study includes a detailed critical literature review on generalised internet addiction, online gaming, and gambling addiction in Europe. Based on scientific databases, 19 empirical studies with both community and clinical samples have been selected from Denmark, France, Germany, Greece, Italy, the Netherlands, and Spain.

The majority of individuals with internet-use-related addictions were found to be educated adolescents and young males. Comorbidities with other psychiatric conditions were present as a rule, and they were more severe in the case of gaming. Cognitive behavioural therapy was the usual treatment with positive prognosis. This report provides the conceptualisation of these three internet-use-related addiction problems, together with a set of policy options, preventive actions, and evidence to support future policies in the European Union context.

PE 624.249

The STOA project 'Harmful internet use – Part I: Internet addiction and problematic use' was carried out by Nottingham Trent University (NTU) at the request of the Panel for the Future of Science and Technology and managed by the Scientific Foresight Unit (STOA) within the Directorate-General for Parliamentary Research Services (DG EPRS) of the European Parliament.

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Acknowledgements

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LINGUISTIC VERSION

Original: EN

ABOUT THE PUBLISHER

To contact STOA or to subscribe to its newsletter please write to: STOA@ep.europa.eu
This document is available on the internet at: <http://www.europarl.europa.eu/stoa/>

Manuscript completed in January 2019
Brussels, © European Union, 2019

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PE 624.249
ISBN 978-92-846-3427-9
doi: 10.2861/315951
QA-04-18-954-EN-N

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List of abbreviations

APA	American Psychiatric Association
AICA-S	Assessment of Internet and Computer Game Addiction
ADHD	Attention Deficit Hyperactivity Disorder
BMI	Body Mass Index
BSI	Brief Symptom Inventory
	Clinical assessment tool for gaming disorder problems C-VAT 2.0
CERV	'Cuestionario de Experiencias Relacionadas con los Video juegos'
CBCL	Child Behaviour Checklist
CGI	Clinical Global Impression scale
CBT	Cognitive Behavioural Therapy
COPE	Commonly used coping inventory
DSQ	Defense-Style Questionnaire
DBD	Disruptive Behaviour Disorder
DIB	Dysfunctional Internet Behaviour
EEG	Electroencephalography
ICD-11	Eleventh International Classification of Diseases
FoMO	Fear of Missing Out
DSM	Diagnostic and Statistical Manual of mental disorders
DSM-5	Fifth Diagnostic and Statistical Manual of mental disorders, 5th Edition
FPS	First-Person Shooter
FA	Food Addiction
fMRI	Functional Magnetic Resonance Imaging
GAD-7	Generalised Anxiety Disorder scale
GIA	Generalised Internet Addiction
GAF	Global Assessment of Functioning
I-POE	Index of Problematic Online Experiences
IA	Internet Addiction
IAB	Internet Addictive Behaviour
IAD	Internet Addiction Disorder
IAT	Internet Addiction Test
IGD	Internet Gaming Disorder
IGD-20	Internet Gaming Disorder scale
MMORPGs	Massively Multiplayer Online Role Player Games
MOBA	Multiplayer Online Battle Arena
NEO-FFI	NEO-Five Factor Inventory
NTU	Nottingham Trent University
OCD	Obsessive-Compulsive Disorders
OCS	Online Cognitions Scale
PET	Positron Emission Tomography
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
PGSI	Problem Gambling Severity Index
PVP	Problem Video game Playing scale
PIU	Problematic Internet Use

PIPATIC	Programa Individualizado Psicoterapéutico para la Adicción a las Tecnologías de la Información y la Comunicación
QAJV	'Questionnaire sur l'Addiction aux Jeux Vidéo'
RSQ	Relationship Scale Questionnaire
RdoC	Research domain Criteria
RPG	Role Playing Games
K-SADS-PL	Schedule for school-age children-present and lifetime version
CBCL	School scale of the Child Behaviour Checklist
CSV-S	'Skala zum Computer-spielverhalten'
s-IAT	Short Internet Addiction Test
SPECT	Single Photon Emission Computed Tomography
SNSs	Social Networking Sites
SDQ	Strengths and Difficulties Questionnaire
sMRI	Structural Magnetic Resonance Imaging
SCL-90	Symptom Checklist Questionnaire
TCI-R	Temperament and Character Inventory-Revised
TDV	Test de Dependencia de Videojuegos
GAF	The Global Assessment of Functioning
TSI	Trauma Symptom Inventory
VG	Video Game
VGA	Video Game Addiction
VGU	Video Game Use
VR	Virtual Reality
WHO	World Health Organization
ZQPQ	Zuckerman-Kuhlman Personality Questionnaire

Executive Summary

This report reviews existing scientific evidence regarding the impact of internet-use-related addiction problems on human health from a European perspective. The development of technologies and their daily usage has produced not only benefits for human societies, but may have negative impacts at an individual level, including addictive internet use.

In this report, studies assessing internet-use-related addiction problems between April 2013 and February 2018 conducted in the European framework are summarised. These studies were carried out both through clinical sampling, as well as community samples. The three problems which emerged in published empirical research to date were generalised internet addiction (GIA), online gaming addiction, and online gambling addiction, with gaming addiction the most prevalent. This is congruent with the fact that the American Psychiatric Association (APA) included 'Internet Gaming Disorder' (IGD) (i.e. problematic online gaming) in 2013 as a possible mental illness in its third appendix, to be included in future editions of the Diagnostic and Statistical Manual of Mental Disorders (DSM) if research supports it with scientific and clinical evidence worldwide. Moreover, the World Health Organization (WHO) recently announced that gaming disorder has been included as a mental illness in the eleventh revision of the International Classification of Diseases (ICD-11). These factors are the main reason for selecting this timeframe (2013-2018) in this review of the literature published in Europe on these problems.

The 19 studies analysed were conducted in three European regions: Southern Europe (i.e. Greece, Italy, Spain), Western Europe (i.e. France, Germany, the Netherlands), and Northern Europe (i.e. Denmark). Participants included were adolescents and young adults from high schools or universities for the studies which dealt with internet addiction and gaming addiction. In contrast, few studies were conducted on online gambling addiction, and participants in these studies were usually middle-aged users. It is worth noting that a majority of the studies included both males and females, but problematic behaviours were usually more prevalent in males (especially regarding online gaming and gambling addictions), except when assessing internet addiction.

1. Studies on the health effects of generalised internet addiction

To date, a number of studies have been performed that directly investigate the effects of general internet use on human health. There are indications from these studies that internet usage patterns (e.g. time spent online, young age, number of technological devices or online activities engaged in) are associated with a risk of addiction problems. Younger users who frequently go online for leisure purposes are also more likely to be excessively engaged or present addiction symptoms in their online usage compared to other users (e.g. middle-aged or older adults). However, the evidence for this effect is currently not conclusive as very few longitudinal studies have been carried out on internet addiction to date. Furthermore, it is inherently difficult to separate online use as a form of entertainment from other types of use for daily life duties (i.e. academic, professional, and family commitments), and other associated lifestyle factors where technology uses are part of our lives (e.g. home automation and the internet of things), which may affect human health.

Regarding internet addiction, research analysed suggests that general internet use can be addictive, and may be associated with a set of typical addiction symptoms: (i) conflict at intrapersonal and interpersonal levels (e.g. lack of control over online behaviours, or the difficulty of preserving regular healthy social relationships in everyday life); (ii) salience (e.g. preoccupation with generalised internet use); (iii) tolerance (e.g. need for increasing use to be satisfied); and (iv) functional impairment (e.g. when an aspect of life is detrimentally impacted because of internet use). Moreover, the presence of comorbidity (i.e. a co-occurring mental disorder) appeared to be the norm in the included studies (i.e. anxiety, depression, and obsessive-compulsive disorders). Thus, these reported addiction symptoms, together with the comorbidity reported, may be caused by several individual factors. In other words, symptomatology and comorbidity can develop as a consequence of the interplay between specific usage motivations, cognitions, coping strategies, attachment styles, among other individual factors linked to problematic internet use, which seem to be relevant when considering interventions in community samples (e.g. school-based prevention programmes) or clinical treatment approaches (e.g. cognitive-behavioural therapy).

2. Studies on health effects of online gaming addiction

Concerning problematic gaming, as previously reported, the advent of its official recognition by international health organisations has produced an increase in the clinical and scientific literature tackling potential disordered gaming behaviour in the last five years. Simultaneously, the bibliometric increment has been accompanied by the increase in the number of patients seen in the health centres and hospital units which treat addictive behaviours, as evidenced by the clinical articles included in the present report. The evidence reported in this document supports the inclusion of IGD in the fifth Diagnostic and Statistical Manual of Mental Disorders (DSM-5), published by the APA, and Gaming Disorder in the ICD-11, published by the WHO.

Another conceptual change has been observed in this report concerning problematic gaming, as it is not attached to a specific platform or device; although it seems the type of genre that has been linked to more harm, is Massively Multiplayer Online Role-Playing Games (MMORPGs), which are well-developed and often played on personal computers. One of the concerns for science in this field is the development of valid psychometric instruments to screen problematic gaming (among other internet use-related problems) with and without clinical implications using them. These tools can be used for both purposes, to support diagnosis in clinical settings and to screen potential problematic users in non-clinical settings. For instance, the psychometric instruments can be used in a clinical context to diagnose IGD together with interview protocols managed by clinicians, or alternatively, to screen community samples (e.g. high-school students). Furthermore, cognitive-behavioural therapy (CBT) has been tested with different variants with positive results when the patient, usually an adolescent who is committed to treatment, is supported by a therapist and their family during their treatment and at follow-up. Additional therapy components have been added, including techniques to manage impulsivity, which is directly related to self-control, emotion regulation, attention and inhibition of problematic behaviours.

Ten lessons have been extracted from these European findings reported in clinical research papers on online gaming addiction. First, gaming problems appear in high-school students. Second, gaming addiction usually affects males. Third, it usually affects those who play role-playing games. Fourth, it affects individuals who spend a considerable time at home alone. Fifth, individuals affected by gaming-related problems usually look for treatment through their parents. Sixth, affected individuals present addiction symptomatology which may be different depending on whether the problematic behaviour is gaming or generalised internet addiction (including symptoms such as loss of control, mood modification, conflict, craving, withdrawal, tolerance and relapse). Seventh, they present comorbidities (psychological comorbidities include the following mental disorders: mood and anxiety disorders, social phobia, hyperactivity, Asperger's, personality disorders, and somatic symptoms). Eighth, the majority of patients has problems with social relationships. Ninth, cognitive-behavioural therapy appears to produce significant improvements after three months following treatment and subsequently, and usually achieves positive and consistent results after six months. Tenth, the prognosis can be improved if family and others support the individual in the context of using a systemic approach and can be improved further if patients are committed to therapy.

Other literature including European samples has indicated that gamers, compared to general internet users, have different motivations (e.g. achievement, socialisation, dissociation and escapism), and these behaviours involve other types of cognition (e.g. preference for online social interaction, mood regulation through the videogame [e.g. choosing to play games to be tense, such as First Person Shooter (FPS) games], cognitive diversion, self-escapism, favourable attitudes towards in-game rewards, actual-ideal self-discrepancy [i.e. the difference between the user's avatar and their real-life self, including physical appearance and skill], and an intrinsic motivation to play), usage patterns (e.g. time spent on games), sociodemographic characteristics (e.g. being a male adolescent), and typical sociodemographic characteristics tend to be different across gamers and gamblers. Lastly, current policy measures undertaken internationally have been met with varying levels of success, and these include shutdown policies, fatigue systems (i.e. control mechanisms used in internet cafés to prevent addiction-related problems), and parental controls, especially in Asian countries [e.g. South Korea]).

3. Studies on the health effects of online gambling addiction

Concerning online gambling, few European studies have emerged in this review, and these studies included clinically diagnosed online gambling addiction. Policy-makers appear to rely on professional opinions and shared experience and wisdom about offline and online gambling to develop preventive actions, recommendations and policies, as problematic gambling exists, but research on it is scarce, especially on online gambling.

The most critical finding in this review indicates online gambling and gaming addictions seem to be different disorders, both in terms of their clinical presentations and users' profiles. With respect to comorbidities, in both addictions, a number of mental disorders co-occur (i.e. somatisation and depression), as well as personality traits (persistence). Concerning intrinsic motivations to gamble and/or play online games, a number of sociodemographic variables coincide (e.g. male gender); however, more differences emerged from the literature published in the European Union (EU), which are related to both addictions, such as profiles, as problematic online gamblers are usually well-educated, married and employed middle-aged men, while problematic online gamers are often younger single males, with lower education levels (or being students), with specific psychological comorbidity (i.e. depression, anxiety and social phobia), personality traits (e.g. low self-directedness, higher persistence and novelty seeking), and physical problems (e.g. weight-related problems). Accordingly, intervention strategies should also address each addictive disorder differently.

4. Policy options for internet-use-related problems at individual levels in Europe

Four policy options have been developed, based on the review of the existing European research literature. These are presented below.

Policy option 1: No action

The 'no action' policy could be considered as some studies report natural recovery for internet-use related addictions, although it may jeopardise the ability of the EU to take advantage of the therapeutic and preventive opportunities that the recognition of IGD and gaming disorder as behavioural addictions seems to offer.

Policy option 2: Promote and disseminate applied research and information on responsible internet use and prevention

Despite an increasing number of studies discussing internet addiction, only a relatively small number includes clinical trials as an instrument of research. There is a need to improve and to diversify the methodologies used (e.g. qualitative studies, quasi-experimental interventions, longitudinal studies, and experiments) and to conduct clinical studies (e.g. single case studies, multiple study-cases). It is also important for standardised measures to consistently assess the problem and to be able to compare it in definitions of treatment success and enable treatments to be compared regarding outcomes (e.g. cross-culturally and trans-diagnostics). It is also essential to invest in applied and clinical research for a better understanding of the potential effects of generalised internet use, and how it is associated with other potential online uses and health concerns (e.g. comorbidity); similarly, for gaming (e.g. based on individual factors [e.g. personality traits and comorbidity], instrumental factors [e.g. genre of the games and rewards], or external factors [e.g. parenting styles and peer pressure]); as well as for online gambling. If more active community and clinical interventions are implemented while researching their impact, it will be possible to assist those who suffer from online-addiction-related problems earlier and better. The preventive actions could be taken from research findings to provide support for decision-makers to better understand potential internet addiction from a European public health perspective, and to support them in tackling problems associated with excessive internet use.

Policy option 3: Promote knowledge on online and offline health behaviours in young populations

Given the proliferation of findings supporting problematic online gaming in European adolescents, it is surprising that there are not more programmes or campaigns to promote youth awareness of the risks of

online behaviours at an individual level, and especially in the context of online gaming. The usual user with internet-use-related problems described is an adolescent increasingly spending time gaming alone at home (i.e. up to six times longer compared to the initial play time in six months), usually on role-playing games, and because of this activity they experience negative impacts in an area of their daily life (e.g. studies), leading to loss of control over their behaviours. Research has shown that this specific profile appears to occur in several European countries; however, action at community level has only been reported in a few of the EU Member States (e.g. Spain). At a school and community level, actions to promote prevention could be undertaken, and health professionals and services should be trained to tackle these problems (e.g. using screening tools, protocols and CBT).

Offline and online activities currently engaged in by European youth (and new ones that will emerge in the future; e.g. virtual reality) could be promoted from a health perspective through campaigns and programmes for the prevention of addictive use addressing the individual online user. These communitarian actions could be undertaken together with other potential collateral problems involving technology use in schools (e.g. cyberbullying). To date, very few actions have been formally undertaken in Europe and fewer policies have been implemented, mostly at a local level (e.g. school). The few initiatives that have been presented in the published literature are outcomes from studies conducted in Asian countries, where the sociocultural circumstances are different in comparison to European societies, although the technologies used, and the games played are the same. However, the problems differ regarding the reported prevalence rates, their nature (e.g. gaming preferences [i.e. across genders]), and gaming patterns (e.g. length of gameplay, reasons to play, and context of game play).

Policy option 4: Support communities and those around online users

Although the problems reported have been studied at an individual level, these health concerns impact families and communities, as the typical profile of an individual affected by internet addiction or problematic online gaming is that of an adolescent or a young adult. In the case of online gambling, the profile is different, usually affecting middle-aged adults. Therefore, educational, social and clinical support could address individuals in the immediate context of problematic users (i.e. parents, siblings, partners, friends, peers, doctors, nurses, therapists, social workers, etc.). Thus, an option would be to foster the implementation of actions addressing individuals in the user's environment (e.g. programmes and interventions in educational, social and health settings, services for information about and detection of internet-use-related addiction problems (e.g. webpages with contact details of health care services), facilities for treatment, etc.). This may be supported by linking these actions with other initiatives that are already in place for addictive behaviours (i.e. substance use disorders). However, this promotion requires providing funding and resources for increasing knowledge, proper dissemination to general and scientific audiences, technical support, and training for educational and healthcare professionals.

1. Introduction

The first research on internet-use-related addiction problems emerged two decades ago in the United Kingdom (UK) and the United States of America (USA) (Griffiths, 1995¹; Young, 1996²). The idea that problematic internet use (PIU) meets the criteria for an addiction has been initially named 'technological addiction' (Griffiths, 1995¹) and 'internet addiction' (IA; Young, 1996²). In the present report, we will interchangeably refer to both, internet addiction and problematic internet use, as these are the main terms used by researchers and clinicians to address internet-use-related addiction problems.

Since 1995, the research area of internet addiction witnessed an exponential growth worldwide, followed by the publication of a considerable number of empirical studies, many using community samples (e.g. describing how adolescents or young adults present with addiction-related symptoms due to their internet use). Only few of the early studies used clinical samples (e.g. describing how patients experience life impairments due to a maladaptive use of the internet). Even fewer theoretical papers have been published. There is still an ongoing debate about how best to classify the behaviour, which is characterised by large amounts of time spent on non-work-related internet activities (e.g. gaming), accompanied with the experience of traditional addiction symptomatology (e.g. with symptomatic parallels in comparison to substance-related addictions and pathological gambling).

Research also indicates that a number of other mental disorders co-occur with internet-use-related addiction problems (e.g. depression, anxiety, hostility, and social phobia; Weinstein & Lejoyeux, 2010³; Yen, Ko, Yen, Wu, & Yang, 2007⁴). During the last two decades, various research studies on internet-use-related addiction problems assessed prevalence rates by using surveys, case studies of psychosocial and psychiatric variables associated with internet addiction, and validation studies of internet addiction assessment instruments (Byun et al., 2009⁵; Chou, Condrón, & Belland, 2005⁶; Griffiths, Kuss, Billieux, & Pontes, 2016⁷). Although the currently adopted classification is still contested (Kuss, Griffiths, & Pontes, 2017^{8,9}), present day research has moved the field forward considerably, resulting in clinicians and researchers recognising internet-use-related addiction problems across different online activities (e.g. online gaming, online gambling, social networking, and cybersex). Particularly gaming addiction has arisen as mental health concern (American Psychiatric Association [APA], 2013¹⁰; World Health Organization [WHO], 2018¹¹).

Patients presenting internet-use-related addiction problems are: (i) functionally impaired; (ii) in need of help from health professionals; and (iii) use certain internet applications to an extreme extent, suggesting that a clinical entity of internet addiction exists. However, not all researchers agree that a new 'disorder' is warranted at this point. Some researchers and mental health practitioners see excessive internet use as a coping strategy or a symptom of another disorder, rather than a separate entity (see e.g. Kardefelt-Winther, 2014¹²; Kuss, et al., 2017¹³). However, international health organisations have now started to introduce this problem in the diagnostic manuals to classify disorders. First, the APA introduced '*Internet Gaming Disorder*' (IGD) in the appendix of its fifth Diagnostic and Statistical Manual of Mental Disorders in 2013 (DSM-5; APA, 2013¹⁰). Recently, the WHO has proposed to include '*Gaming Disorder*' (GD) in the eleventh International Classification of Diseases (ICD-11; WHO, 2018¹¹). Both the DSM-5 and the ICD-11 aim to standardise terminology and clinical measurement. However, both are generating debate, and it has been stated that they use a confirmatory research approach, and do not clearly use open science strategies, while there is still a lack of exploring alternative conceptualizations, assessment instruments, and diagnostic criteria (Aarseth et al., 2017¹⁴; Griffiths et al., 2017¹⁵). These methodological problems have produced considerable variance in the prevalence rates reported for internet-use-related problems, which vary between countries, populations, and other factors.

A core criterion of both substance-related and behavioural addictions is loss of control over one's behaviour, which is associated with significant functional impairment over a period of time. In models deduced from Diagnostic and Statistical Manual of mental disorders (DSM) approaches, behavioural addictions have also been associated with indirect symptoms, such as salience, mood modification and the alleviation of distress through engaging in the activity, tolerance and withdrawal. An interdisciplinary European team (Billieux et al., 2017¹⁶) has proposed a definition for behavioural addictions (see Box 1). This is also in line with models which apply to both substance-related as well as behavioural addictions, namely the syndrome model of addiction

(Shaffer et al., 2014¹⁷); similar to the components model of addiction (Griffiths, 2005¹⁸), which has been applied in the context of internet addiction (Kuss et al., 2014¹⁹).

Internet addiction is:

A repeated behaviour leading to significant harm or distress, which is not reduced by the person and persists over a significant period of time (e.g. at least 12 months), producing functional impairment.

Thus, a behaviour should not be conceptualised as behavioural addiction (exclusion criteria) if:

- the behaviour is better explained by an underlying disorder (e.g. a depressive disorder or impulse-control disorder);
- the functional impairment results from an activity is the consequence of a wilful choice (e.g. high-level sports);
- the behaviour can be characterised as a period of prolonged intensive involvement that detracts time and focus from other aspects of life, but does not lead to significant functional impairment or distress;
- the behaviour is the result of a temporary coping strategy as an expected response to common stressors or losses.

Box 1. Definition for behavioural addiction with the exclusion criteria. (Billieux et al., 2017¹⁶)

Internet users experience multiple layers of compounding reward and reinforcement loops when they use various online applications (e.g. web-surfing, pornography, chat rooms, message boards, social networking sites, video games, email, texting, cloud applications, and online gambling). The engagement in these activities produces both predictable and unpredictable or variable rewards (Cash, et al., 2012²⁰). Usually, the engagement in online applications creates habitual behaviour patterns in the users; however, European authors have drawn attention to the risk of over-pathologising daily online activities (Billieux et al., 2015²¹). Furthermore, the reward experienced is intensified when combined with stimulating content (e.g. pornography and sexual stimulation; dating sites and romantic fantasy; online poker and financial issues; chat rooms or message boards to achieve a sense of belonging; or video games and several rewards, such as social interaction, even social recognition, identification with a hero, being immersed in alternative virtual environments; Young & Nabuco de Abreu, 2011²²).

In summary, the present report aims to provide a detailed literature review of internet addiction and problematic internet use and the harms of such an addiction for the individual (at non-clinical and clinical levels). It is anticipated that the outcomes will provide policy options to prevent and treat harmful effects as a consequence of internet addiction. The first part of this report is dedicated to outlining the terminology and diagnosis. The following sections will introduce the prevalence and evolution of internet addiction in general, and also specifically (i.e. the respective online activities that can be engaged in); this is followed by detailing neurobiological underpinnings, providing a brief overview of problematic internet use across platforms (i.e. computer, tablet, smartphone, and virtual reality). Subsequently, the geographical and cultural context is considered by providing information on the European and the international context; and, finally, a number of policy options are briefly examined.

1.1. Terminology and diagnosis

Individuals do not become addicted to the medium of the internet, but to the respective activity they engage in online (e.g. Kuss & Pontes, 2018²³; Meerkerk et al., 2009²⁴). The activities commonly associated with addictive internet use are gaming (Lemmens, Valkenburg, & Gentile, 2015²⁵), online social networking (Müller, et al., 2016²⁶), and engaging in cybersex (Giordano & Cashwell, 2017²⁷). However, internet addiction has been usually studied as sole addictive entity and this has led to a number of controversies as the concept of internet addiction remains contested (Starcevic, 2013²⁸; Weinstein et al., 2014²⁹).

Gaming addiction or gaming disorder is the problematic online behaviour which has seen the largest evidence base across all internet-use-related addictions (Kuss & Griffiths, 2012³⁰), prompting the APA to include IGD in the appendix of the most recent edition of the DSM (DSM-5; American Psychiatric Association, 2013¹⁰) as a condition that requires additional research to be included in the main manual (see Box 2). Criticisms have abounded following this inclusion, resulting in some researchers claiming for consensus and stating there is chaos and confusion in the DSM-5 diagnosis of IGD (Griffiths et al., 2016¹⁵; Kuss, Griffiths, & Pontes, 2016^{8,9}; Dullur & Starcevic, 2017³¹). Five years after the publication of the DSM-5, the WHO have now decided to include gaming disorder in the ICD-11 (WHO, 2018¹¹) (See Box 3). This diagnosis is still contested (Aarseth et al., 2016¹⁴; Van Rooij et al., 2018³²).

Definition of Internet Gaming Disorder (IGD):

A persistent and recurrent use of the internet to engage in games, often with other players, leading to clinically significant impairment or distress as indicated by five (or more) of the following in a 12-month period:

1. Preoccupation with internet games.
2. Withdrawal symptoms when internet gaming is taken away.
3. Tolerance: the need to spend increasing amounts of time engaged in internet games.
4. Unsuccessful attempts to control participation in internet games.
5. Loss of interests in previous hobbies and entertainment as a result of, and with the exception of internet games.
6. Continued excessive use of internet games despite knowledge of psychosocial problems.
7. Has deceived family members, therapists, or others regarding the amount of internet gaming.
8. Use of the internet games to escape or relieve a negative mood.
9. Has jeopardised or lost a significant relationship, job, or educational or career opportunity because of participation in internet games.

Box 2. Definition for IGD by the APA with the nine proposed diagnostic criteria (2013¹⁰)

Gaming disorder is:

characterised by a pattern of persistent or recurrent gaming behaviour ('digital gaming' or 'video-gaming'), which may be online (i.e. over the internet) or offline, manifested by: 1) impaired control over gaming (e.g. onset, frequency, intensity, duration, termination, context); 2) increasing priority given to gaming to the extent that gaming takes precedence over other life interests and daily activities; and 3) continuation or escalation of gaming despite the occurrence of negative consequences. The behaviour pattern is of sufficient severity to result in significant impairment in personal, family, social, educational, occupational or other important areas of functioning. The pattern of gaming behaviour may be continuous or episodic and recurrent. The gaming behaviour and other features are normally evident over a period of at least 12 months in order for a diagnosis to be assigned, although the required duration may be shortened if all diagnostic requirements are met and symptoms are severe.

Thus, exclusion criteria are:

- **Hazardous gaming:** a pattern of gaming, either online or offline that appreciably increases the risk of harmful physical or mental health consequences to the individual or to others around this individual. The increased risk may be from the frequency of gaming, from the amount of time spent on these activities, from the neglect of other activities and priorities, from risky behaviours associated with gaming or its context, from the adverse consequences of gaming, or from the combination of these. The pattern of gaming is often persists in spite of awareness of increased risk of harm to the individual or to others.

- **Bipolar type I disorder:** is an episodic mood disorder defined by the occurrence of one or more manic or mixed episodes. A manic episode is an extreme mood state lasting at least one week unless shortened by a treatment intervention characterised by euphoria, irritability, or expansiveness, and by increased activity or a subjective experience of increased energy, accompanied by other characteristic symptoms such as rapid or pressured speech, flight of ideas, increased self-esteem or grandiosity, decreased need for sleep, distractibility, impulsive or reckless behaviour, and rapid changes among different mood states (i.e. mood lability). A mixed episode is characterised by either a mixture or very rapid alternation between prominent manic and depressive symptoms on most days during a period of at least two weeks. Although the diagnosis can be made based on evidence of a single manic or mixed episode, typically manic or mixed episodes alternate with depressive episodes over the course of the disorder.

- **Bipolar type II disorder:** is an episodic mood disorder defined by the occurrence of one or more hypomanic episodes and at least one depressive episode. A hypomanic episode is a persistent mood state characterised by euphoria, irritability, or expansiveness, and excessive psychomotor activation or increased energy, accompanied by other characteristic symptoms such as grandiosity, decreased need for sleep, pressured speech, flight of ideas, distractibility, and impulsive or reckless behaviour lasting for at least several days. The symptoms represent a change from the individual's typical behaviour and are not severe enough to cause marked impairment in functioning. A depressive episode is characterised by a period of almost daily depressed mood or diminished interest in activities lasting at least two weeks accompanied by other symptoms such as changes in appetite or sleep, psychomotor agitation or retardation, fatigue, feelings of worthless or excessive or inappropriate guilt, feelings of hopelessness, difficulty concentrating, and suicidality. There is no history of manic or mixed episodes.

Box 3. Definition for gaming disorder by the WHO. (2018¹¹)

In addition to excessive and pathological online gaming, research has emerged on online gambling (see Box 4).

Addictive online gambling is based on the DSM-5 classification of gambling disorder (with gambling occurring online). Gambling disorder criteria are:

A. Persistent and recurrent problematic gambling behaviour leading to clinically significant impairment or distress, as indicated by the individual exhibiting four (or more) of the following in a 12-month period:

1. Needs to gamble with increasing amounts of money in order to achieve the desired excitement.
2. Is restless or irritable when attempting to cut down or stop gambling.
3. Has made repeated unsuccessful efforts to control, cut back, or stop gambling.
4. Is often preoccupied with gambling (e.g. having persistent thoughts of reliving past gambling experiences, handicapping or planning the next venture, thinking of ways to get money with which to gamble).
5. Often gambles when feeling distressed (e.g. helpless, guilty, anxious, depressed).
6. After losing money gambling, often returns another day to get even ('chasing' one's losses).
7. Lies to conceal the extent of involvement with gambling.
8. Has jeopardised or lost a significant relationship, job, or educational or career opportunity because of gambling.
9. Relies on others to provide money to relieve desperate financial situations caused by gambling.

B. The gambling behaviour is not better explained by a manic episode.

Box 4. Definition and criteria for gambling disorder in the DSM-5 (APA, 2013¹⁰) as a basis for problem online gambling.

Furthermore, research has increasingly looked into excessive and pathological use of social media and online social networking sites (SNSs; Andreassen & Pallesen, 2014³³; Karaiskos et al., 2010³⁴; Kuss & Griffiths, 2011³⁵; Kuss & Griffiths, 2017³⁶), suggesting there appear to be different usage motivations and user profiles across different types of problematic media usages from a clinical perspective (Kuss & Griffiths, 2015³⁷). Symptoms include salience, mood modification, tolerance, withdrawal, conflict and relapse (Kuss & Griffiths, 2017³⁶). Research suggests that in a small number of extreme cases, the excessive use of social networking sites, such as Facebook, Instagram, and Snapchat, may result in symptoms which have traditionally been associated with substance-related addictions, namely mood modification, salience, withdrawal, tolerance, relapse, and conflict (Kuss et al., 2014¹⁹). In this context, recent research (Kuss & Griffiths, 2017³⁶) suggests that: (1) social networking and social media use are not the same; (2) social networking is eclectic as it may include traditional SNS such as Facebook, but can also include online games and online dating sites; (3) social networking is a way of being as online social networks have become an integral element of individuals' lives; (4) individuals can become addicted to using SNS; (5) Facebook addiction is only one example of SNS addiction (for instance, it has been shown that Instagram has a higher addictive potential than Facebook, Twitter, and Snapchat; Donnelly & Kuss, 2016³⁸; Hormes, Kearns, & Timko, 2014³⁹); (6) Fear of Missing Out (FoMO; Buglass et al., 2017⁴⁰) and (7) smartphone addiction may be part of SNS addiction (Kanjo et al., 2017⁴¹); (8) nomophobia (i.e. the fear of being without one's mobile phone) may be part of SNS addiction (Bragazzi & Del Puente, 2014⁴²); (9) there are sociodemographic differences in SNS addiction; and (10) there are methodological problems with relevant research to date. Taken together, gaming and social networking appear to be the main activities that may be engaged in online in a pathological way, which have in some instances be associated with the experience of addiction-related symptoms in individuals who are seeking support from health professionals for the resultant problems.

Furthermore, online sexual addiction (i.e. cybersex) has also been considered as specific problematic online activity. Anecdotal data and clinical cases of cybersex addiction have been covered by the scientific literature (Cooper et al., 2007⁴³), but more research is needed in this young research field to provide definite conclusions.

1.2. Prevalence and evolution of internet addiction

The prevalence rates of internet addiction and problematic internet use vary considerably across studies and countries. It has been noted that previous research has not sufficiently discriminated between internet and gaming addiction (Kuss et al., 2014⁴⁴), and it has been indicated prevalence estimates range between 0.3 per cent in female ninth graders in Germany playing video games (Rehbein et al., 2010⁴⁵) and 26.7 per cent of adolescent students in Hong Kong (Shek & Yu, 2012⁴⁶) who use the internet excessively. The noteworthy discrepancy in prevalence estimates has a number of reasons, including different populations used across different countries, various diagnostic tools and assessment criteria, as well as divergent cut-off scores across the same measurement instruments (Byun et al., 2009⁵; Kuss & Griffiths, 2012³⁰). It has been stated that the individual, cultural and media use context significantly contribute to the experience and severity of internet and gaming addiction (Karlsen, 2013⁴⁷; Kuss, 2013⁴⁸). Moreover, research indicates that the respective sociocultural environment of different countries results in differing levels of public acceptability, impacting sociocultural norms as well as applied policies and regulations (or the lack thereof; Kiraly et al., 2017⁴⁹). Terminological and methodological problems associated with early internet addiction research have been addressed by many researchers, and collected by public health organisations (Petry et al., 2014⁵⁰; WHO, 2014⁵¹). Since 2013, when the APA recognised IGD as a potential behavioural addiction alongside gambling disorder, research on specific internet addictions has evolved to include online video gaming, social networking, cybersex, online gambling, and online shopping (Lopez-Fernandez, 2015⁵²).

1.3. Neurobiological underpinnings

Despite the research field of internet addiction still being in its infancy, a number of studies have emerged over the past decade that have assessed internet addiction and the pathological engagement in different types of online activities (notably gaming) from a neurobiological perspective (e.g. Du et al., 2016⁵³; Lee et al., 2017⁵⁴; Yuan et al., 2017⁵⁵). These studies have used various neuroimaging techniques (i.e. Electroencephalography [EEG], Positron Emission Tomography [PET], Single Photon Emission Computed Tomography [SPECT], functional [fMRI] and structural Magnetic Resonance Imaging [sMRI]) to assess the extent to which internet and gaming addiction may impact upon brain structure and function. Findings advocate the use of Research Domain Criteria (RDoC), which are in favour of classifying mental disorders based on dimensions of observable behaviour and neurobiological measures. Mental disorders could be viewed as biological disorders that involve brain circuits that implicate specific domains of cognition, emotion, and behaviour. Accordingly, internet and gaming addiction should be classified based on its underlying neurobiology in addition to subjective symptom experience (Kuss et al., 2018⁵⁶).

With regards to the neurological underpinnings of PIU, it is known that similar to other addictive behaviours, internet use can activate a combination of sites in the brain associated with pleasure, known as the 'reward centre' of the brain. When activated during extended prolonged periods of gaming, the neurochemical dopamine is released in the *nucleus accumbens* (Ko et al., 2009⁵⁷), along with opiates and other neurochemicals. Over time, the associated receptors may be affected, leading to the development of tolerance or the need for increasing stimulation of the reward centre to produce a 'high' (or 'numbing effect'), whilst at the same time producing craving in order to avoid the experience of withdrawal. This leads to the individual seeking highly potent rewards (i.e. stronger than common rewards, such as food, water, and sex) in the form of internet and gaming use to recreate a balanced reward and pleasure state. On the level of neural circuitry, internet and gaming addiction can lead to neuroadaptation (i.e. changes in brain functioning) and structural changes which result from prolonged increased activity in brain areas associated with addiction. In some extreme cases, this can lead to areas of the brain changing, comparable to brain changes induced by prolonged use of psychoactive substances. On a behavioural level, individuals with internet and gaming addiction may experience deficits in their cognitive functioning in various domains (Kuss & Griffiths, 2012⁵⁸), whilst research also indicates that gaming may impact on a range of executive functions and emotional expressions, and may

indeed improve a range of cognitive skills, which is in line with recent theoretical models on the development and maintenance of addictive internet use (Brand, Young, & Laier, 2014⁵⁹).

1.4. Problematic internet use across platforms

Starting in the mid-nineties, scientific journal articles on internet-use-related problems focused on computer use (Griffiths, 1995¹; Young, 1996²). However, from the mid-2000s, research has also investigated mobile internet use, with a focus on mobile phones (Bianchi & Phillips, 2005⁶⁰), which have quickly evolved into smartphones around 2010 (i.e. mobile phones with internet and online mobile applications [apps]). This has been studied as problematic and addictive mobile phone (or smartphone) use (Kwon et al., 2013⁶¹; Lopez-Fernandez et al., 2018⁶²). Recently, excessive use of tablets has also seen research emerging (Leung & Zhang, 2016⁶³), in addition to virtual reality (VR) technology, which is starting to be considered as potentially addictive when used for engaging in cybersex (Dryer & Lijtmaer, 2007⁶⁴).

As has been stated above, although individuals do not become addicted to the internet *per se*, some research addresses the impact of internet use based on the different types of platforms that can be used (e.g. problematic mobile phone use, and computer gaming). For instance, gender differences in the use of mobile phones, computers, and the internet have been researched, and so have attitudes in adolescents, with differences found between males and females in the use of different apps, rather than differences in the use of specific platforms (Rees & Noyes, 2007⁶⁵). Thus, attention is being paid to the use of the internet and online apps (which can be engaged in through different platforms), in order to study the potentially addictive impact of internet use on individuals.

1.5. The European and the international context

Only a few cross-cultural studies on problematic internet use exist, and the majority of the existing studies have been conducted in Europe. Durkee et al. (2012)⁶⁶ estimated the prevalence of problematic internet use across citizens of ten European countries (i.e. Austria, Estonia, France, Germany, Hungary, Ireland, Italy, Romania, Slovenia, and Spain) with 11,956 adolescents, finding an overall prevalence of problematic internet use of 4.4 per cent. This was found to be higher among males than females and higher in countries such as Slovenia with 5.8 per cent in comparison to Italy with 1.2 per cent. Only one non-European country included in the study (Israel) had a high prevalence (11.8 per cent). Tsitsika et al. (2014)⁶⁷ conducted a similar cross-cultural study on internet addictive behaviours (IAB; i.e. loss of control over internet use) in seven European countries (i.e. Greece, Spain, Poland, Germany, Romania, the Netherlands, and Iceland) with 13,284 adolescents (i.e. 14-17 years old). Their findings were approximately 1 per cent of adolescents exhibited IAB and an additional 12.7 per cent were at risk for IAB; thus, in total, 13.9 per cent displayed dysfunctional internet behaviours (DIB). The prevalence of DIB was higher among boys and varied widely between countries (i.e. from 7.9 per cent in Iceland to 22.8 per cent in Spain).

Similarly, Lopez-Fernandez et al. (2017)⁶⁸ examined cross-cultural patterns of perceived dependence on mobile phones in young adults from ten European countries, grouped into regions (North: Finland and UK; South: Spain and Italy; East: Hungary and Poland; West: France, Belgium, Germany, and Switzerland) and by country in order to predict self-perceived mobile phone dependence. Their findings showed populations from the Northern and Southern regions reported the heaviest use of mobile phones, although the proportion of highly dependent mobile phone users was higher in Belgium (3.9 per cent) in comparison to Poland (1 per cent). Moreover, risk factors for increased mobile phone dependence scores were using mobile phones daily, being female, and engaging in social networking, monthly mobile phone payments, online shopping, and viewing online TV shows, chatting and messaging, and using mobile phones for downloading-related activities.

Few cross-cultural internet addiction studies have investigated more than one continent. For instance, Montag et al. (2014)⁶⁹ have looked for evidence on generalised and specific internet addiction between European and Asian countries, confirming the existence of distinct forms of specific internet addictions (e.g. online SNSs), which correlated with generalised internet addiction in almost all countries studied.

In summary, problematic internet use has not been studied sufficiently from a cross-cultural perspective yet. Few studies have been conducted that simultaneously included several countries to attain an inter-cultural and international perspective on the phenomenon. Lopez-Fernandez (2015)⁷⁰ carried out a systematic review on cross-cultural internet addiction studies conducted between 2012 and 2015. These mostly utilised cross-national intercontinental samples. The studies reviewed usually researched internet addiction in its generalised subtype (i.e. generalised internet addiction), and estimated its prevalence (i.e. how many users were potentially addicted to using the internet) with traditional and valid psychometric tools (i.e. tests, questionnaires or scales). The continents that have been studied cross-culturally with regards to internet-use-related addictions are (by order of proportion): Europe, Asia, and America. The existent cross-cultural research suggests that higher rates of internet addiction exist in male users who spend many hours online in Asian countries. Differences across countries and risk factors have however also been detected, but cultural factors are usually not analysed.

1.6. Comprehensive policy in the prevention of internet addiction

Problematic internet-use-related policies have started to emerge from the late 1990s. According to Young (2004⁷¹), managers in companies responded by posting policies detailing acceptable and unacceptable internet use to their employees (e.g. limiting time surfing the internet for non-business purposes through monitoring software and codes of good internet behaviour). Since then, acceptable internet use policies have become regular practice in North-American companies.

Problematic internet use has been recognised as a mental health concern in Asian countries in the last decade; countries such as South Korea consider internet addiction as one of its most serious public health concerns, which has resulted in developing preventive measures as early as 2007 (Block, 2008⁷²), that have been implemented by the government. Such initiatives include the following: training counsellors, enlisting hospitals and health centres, and introducing policies into schools. Thus, South Korea was the first country to develop a national policy to deal with problematic internet use (Koh, 2015⁷³) based on prevention, screening, counselling, and treatment. In 2011, the South Korean government implemented an online game shutdown policy (i.e. lasting from 12:00 am to 6:00 am) to prevent internet addiction in adolescents aged 15 years or younger. However, although this policy resulted in an initial decrease in internet use hours, the latter increased to pre-policy levels within the period of a year (Choi et al., 2018⁷⁴).

Recently a systematic review on prevention of internet addiction by Vondráčková and Gabrhelík (2016)⁷⁵ used the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Their findings resulted in the following main outcomes: (i) some target groups may benefit from prevention (e.g. children and adolescents, college students, parents and individuals in the environment of those affected, gambling employees and employees with regular access to the internet), specifically when it is selective and indicated prevention (e.g. focusing on psychopathological factors, personality characteristics, physiological characteristics, patterns of Internet use, sociodemographic factors, and the affected individual's current situation); (ii) the improvement of specific skills (i.e. researchers recommend counsellors, teachers, or employers to focus on the development of specific skills in individuals who are at risk of internet addiction, but also on their significant others, particularly parents, teachers, and peers); (iii) programme characteristics (i.e. three dimensions were identified: information-provision versus interactive interventions, single versus complex interventions, and empirical studies of internet addiction prevention); and (iv) environmental interventions (i.e. countries in which internet addiction is considered a serious health problem start introducing internet addiction prevention interventions on environmental level, particularly regulations related to internet use and internet addiction (e.g. the Chinese government has implemented control mechanisms on internet cafés and an anti-addiction or fatigue system; King et al., 2018⁷⁶).

The main findings suggested an urgent need to introduce and implement new interventions, which need to be rigorously evaluated and subsequently published for different at-risk populations. These interventions should primarily target children and adolescents who are at risk of internet addiction, but also others who are

part of their formative environment (e.g. parents, teachers, and peers). In summary, there is a need to develop comprehensive policies to assist in the prevention of and education about internet addiction (Young, 2015⁷⁷).

2. Methodology

The aim of this literature review is to map recent research published on problematic internet use and internet addiction. The period selected refers to the APA including IGD in the DSM-5 in 2013. Attention was paid only to empirical studies conducted using international or national community or clinical samples within Europe. Further, this report endeavours to examine whether preliminary results have arisen from the areas of research focused on internet-related addictive behaviours to provide policy options and advice for future policies in Europe.

2.1. Search Strategy

In February 2018, a literature search was conducted at Nottingham Trent University (NTU) using the scientific databases PsycINFO and Web of Science. These databases were selected as they include research in Psychology and related disciplines. Web of Science contains various multidisciplinary databases from other disciplines (e.g. medicine), which also covers disciplines that may not be included in the first database.

The review contained scientific papers which have been published between April 2013 and February 2018 as the preliminary IGD diagnosis was included in the DSM-5 in April 2013.

The following search terms (and their derivatives) were entered to perform a search by titles in the respective databases: ("internet" OR "online" OR "game*" OR "gaming" OR "video gam*" OR "videogame*" OR "video-game*" OR "social network*" OR "social media") AND ("Addict*" OR "compuls*" OR "problem*" OR "disorder" OR "pathology*" OR "excess*") AND ("clinic*" OR "treat*" OR "therap*" OR "harm*" OR "risk factor" OR "prevent*"). The search was performed in the title of the papers for the following reasons: (i) searching in the title was the only option available across both search engines; and (ii) it was assumed that searching in the title limited the number of appropriate papers to the most relevant ones.

After duplicates were removed, studies were selected in accordance with the following inclusion criteria: (1) contain quantitative, qualitative and mixed methods approaches (empirical data); (2) assess internet, gaming, gambling, or other online addictions (e.g. social networking) in the EU; (3) be published from April 2013-February 2018; (4) include community samples, clinical samples, and/or clinical interventions; (5) provide a full-text article; (6) be published in English, German, Polish, Spanish, Italian, Portuguese, or French, as the present authors speak these languages.

Alternatively, studies were excluded based on the following exclusion criteria: (i) theoretical research papers (e.g. reviews, meta-analyses); (ii) assess other behavioural addictions that do not involve internet use (e.g. offline gambling) or substance-related addictions (e.g. alcoholism) outside the EU; (iii) published before April 2013; (iv) derive from sources other than peer-reviewed journals (e.g. non-peer-reviewed journals, conference abstracts, chapters, books, errata/corrections, editorials, dissertations); (v) published in other languages the present authors do not speak. Following a thorough inspection of the articles' titles and abstracts, the articles that did not meet the inclusion criteria were excluded.

2.1.1. Studies selected

A total of 19 studies were deemed eligible for this review after meeting all the above criteria. Figure 1 provides a visual representation of the current review's methodology.

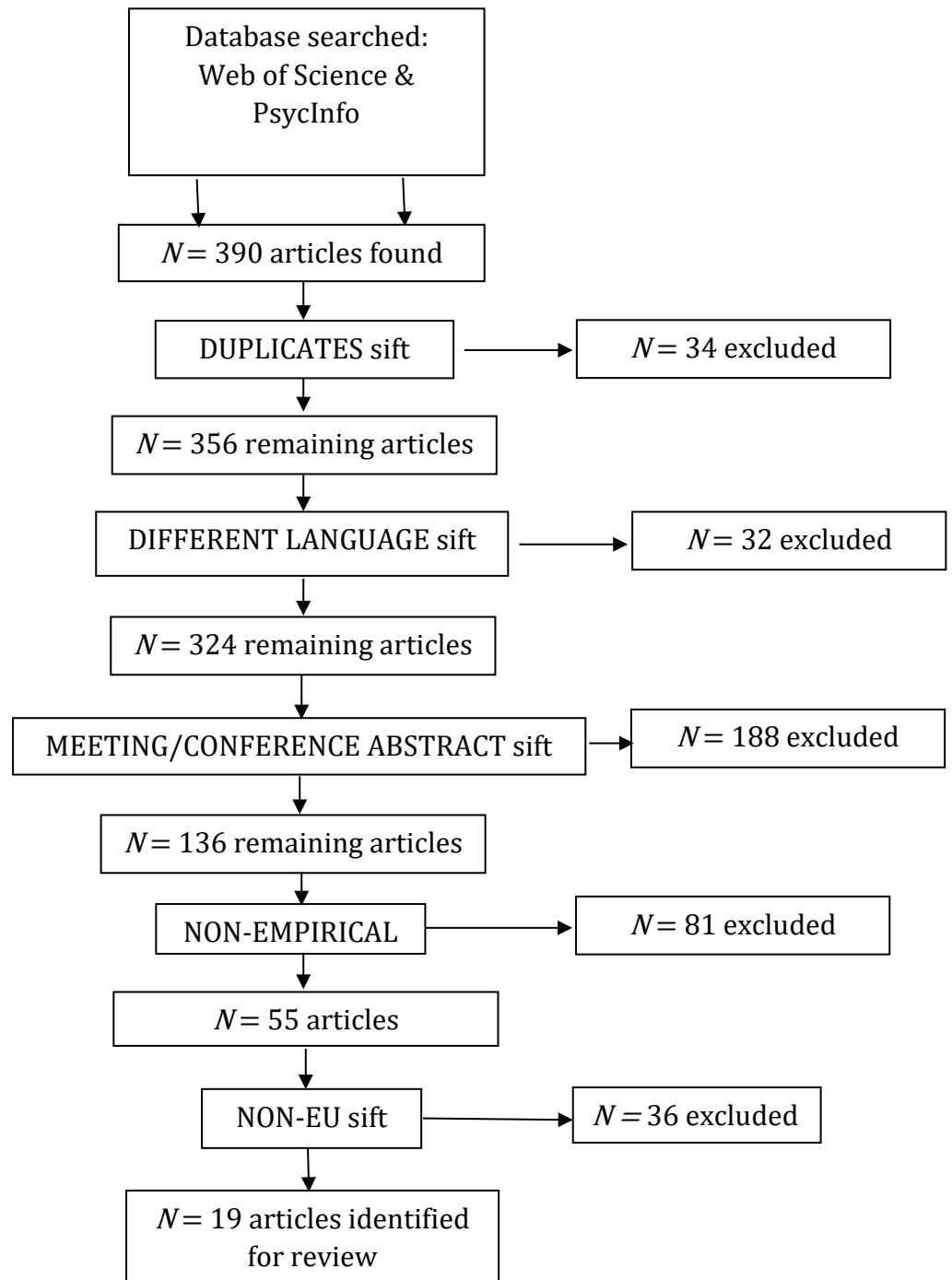


Figure 1. Flow chart displaying the search process

3. Results

A total of 19 studies met the inclusion criteria. These studies are presented in the boxes below. The included studies used community samples and clinical samples and met the main criteria of being empirical studies of internet addiction, gaming and online gambling, using all methodological approaches (i.e. quantitative, qualitative, and mixed methods). After reviewing the content of the papers, four main types of categories were identified, namely research involving: (1) the characteristics of adolescents and adult users of internet-enabled devices; (2) generalised internet addiction explored and screened at clinical and community levels; (3) specific addiction problems (i.e. online gaming or gambling) diagnosed and treated at individual level in clinical samples or screened at community level; (4) policy options on internet-use-related addiction problems in Europe.

Title & journal	Internet Addiction: a prevention action-research intervention. <i>Epidemiology, Biostatistics and Public Health.</i>
Authors & country	Andrisano, Santoro, De Caro, Palmieri, Capunzo, Venuleo, & Boccia (2016) ⁷⁸ . ITALY
Sample	<i>N</i> = 90 young subjects (45 males; mean [<i>M</i>] = 13 years). [No standard deviation [<i>SD</i>] or range reported]
Design	Pre-experimental research design to assess a peer education programme as a treatment.
Aim	To present an evaluation of an action-research intervention prevention of IA in schools.
Measures	Internet Addiction Test [IAT] (Young, 1998 ⁷⁹) – assessed internet addiction. Intervention using active methods – e.g. brainstorming. Then asked to create video for peers to prevent IA in school. Weekly 3-hour interventions for one year.
Results	Considerable reduction of IAT scores. Severe level: 4 per cent to 2,2 per cent. Moderate level: 62 per cent to 42,3 per cent. Mild level increases from 34 per cent to 55,5 per cent (i.e. scoring <49 on Young's Internet Addiction Test).
Implications	Few studies deal with prevention of IA, therefore more research on IA prevention is needed.
Conclusions	The paper suggests more attention should be paid to prevention, and it should be focused on the relationship between normal and pathological internet use in the context of cultural dynamics.

Title & journal	A qualitative analysis of online gaming addicts in treatment. <i>International Journal of Mental Health and Addiction.</i>
Authors & country	Beranuy, Carbonell, & Griffiths (2013) ⁸⁰ . SPAIN
Sample	<i>N</i> = 9 online gaming addicts seeking treatment for their problematic playing of Massively Multiplayer Online Role Player Games [MMORPGs] were interviewed in Spain (<i>n</i> = 7) and a further 2 requested treatment in Chile (<i>n</i> = 2) (9 males; age <i>M</i> = 20.5 years) [no <i>SD</i>].
Design	Descriptive analytical-relational study designed with a qualitative methodology based on Grounded Theory (Glaser & Strauss, 1967 ⁸¹), which has systematic guidelines for gathering and analysing data to generate theory.
Aim	To understand the problem of MMORPG playing, to explore its functions, and compare the symptoms and consequences to more established addictive behaviours.
Measures	Semi-structured interview with a focus on key areas such as: socio-demographics; family; reason for visit and demand; family and social relationships; personal and family precedents; the amount of time spent online; symptom function; exploration of symptoms.
Results	Six most reported phenomena were: entertainment search, virtual friendship, escapism and/or disassociation, game context, control versus non-control, and conflict. This suggests the main initial gaming motivating factors are: entertainment, escapism and/or disassociation, and/or virtual friendship. Can lead to psychological dependence and serious life conflicts
Implications	MMORPG addiction has similar side effects to more established addictions, including, in some cases, evidence of tolerance and relapse.
Conclusions	A closer focus on defining gaming addiction is needed. The authors state that motivations for playing MMORPGs facilitate the problem which may result in psychological dependence and severe conflicts when time spent on the internet increases, control is lost, and the behaviour becomes maladaptive. Its detection was based on five common substance use disorder criteria (i.e. salience, mood modification, loss of control, craving, and adverse effects). More research is needed on MMORPG gamers, correlating qualitative and quantitative results, to explain course, prevalence and differential diagnosis for gaming addiction (e.g. comparing these patients with those who have another related disorder).

Title & journal	Internet addiction: coping styles, expectancies, and treatment implications. <i>Frontiers in Psychology.</i>
Authors & country	Brand, Laier, & Young (2014) ⁸² . GERMANY
Sample	<i>N</i> = 1,019 participants recruited through Facebook, advertisements, email lists to students at the University of Duisburg-Essen and via flyers in local pubs and bars as well as word-of-mouth options. (385 males; 625 females; age <i>M</i> = 25.61; <i>SD</i> = 7.37 years).
Design	Comprehensive online survey that involved a number of validated questionnaires and a new scale that the researchers had created themselves to explore internet use expectancies.
Aim	To test statistically a new theoretical model illustrating cognitive mechanisms contributing to development and maintenance of IA, differentiating between Generalised internet addiction [GIA] and specific forms. However, they specifically tested GIA.
Measures	Short Internet Addiction Test [s-IAT] (Pawlikowski et al., 2013 ⁸³) – assessed symptoms of IA. Brief Symptom Inventory [BSI] (Subscale Depression) (Franke, & Derogatis, 2000 ⁸⁴) – assessed symptoms of depression. BSI (subscale interpersonal sensitivity) (Franke, & Derogatis, 2000 ⁸⁴) – assessed symptoms of social anxiety and interpersonal sensitivity. Self-Esteem Scale (von Collani & Herzberg, 2003 ⁸⁵) – assessed self-esteem. Self-Efficacy Scale (Schwarzer & Jerusalem, 1995 ⁸⁶) – assessed self-efficacy. Trier Inventory for Chronic Stress (Schlotz, & Becker, 2004 ⁸⁷) – assessed stress vulnerability. Loneliness Scale (De Jong Gierveld & Van Tilburg, 2006 ⁸⁸) – assessed feelings of loneliness. Brief Commonly used coping inventory [COPE] (Knoll, Rieckmann, & Schwarzer, 2005 ⁸⁹) – assessed coping styles using denial, substance use and behavioural disengagement. Internet Use Expectancies Scale – scale created by the researchers within this study to assess internet use expectancies.
Results	The authors found that their model explained 63.5 per cent of the variance in GIA symptoms, measured by the short version of the IAT. Results suggest a person's specific cognitions – poor coping (i.e. maladaptive ways of dealing with problems) and cognitive expectations – increased the risk for GIA. However, these cognitions had an impact on the extent to which depression, social anxiety and self-esteem predicted GIA. The authors also found that those with high coping skills and no expectations of the internet's ability to positively or negatively affect their mood were less likely to have PIU.
Implications	Implications for treatment of IA involve a cognitive component to the development of GIA.
Conclusions	There is a need to assess patients' coping styles and cognitions in order to improve faulty thoughts, which can lead to reduced symptoms and recovery from GIA.

Title & journal	Self-disclosure on the Net: a risk factor for problematic use of the Internet among insecure persons. <i>L'Encéphale</i>.
Authors & country	Danet & Miljkovitch (2016) ⁹⁰ . FRANCE
Sample	$N = 200$ (54 males; age $M = 30.31$; $SD = 9.95$; range 18-61 years).
Design	Online survey evaluating IA, attachment, and self-disclosure on the internet and not on the internet.
Aim	To have a better understanding of the link between insecure attachment and PIU by examining the mediating role of self-disclosure.
Measures	IAT (Young, 1998 ⁷⁹) – assessed IA. Relationship Scale Questionnaire [RSQ] (Griffin, & Bartholomew, 1994 ⁹¹) – assessed attachment. Real Me Questionnaire (Bargh, McKenna, & Fitzsimons, 2002 ⁹²) – assessed increased self-disclosure on the internet compared with face-to-face interactions.
Results	There is an association between PIU and preoccupied and fearful attachment styles, particularly the preoccupied one (i.e. as preoccupied individuals feel anxious in interpersonal relationships). The fearful-avoidant style is uncomfortable getting close to others, because these persons find it difficult to trust others or to depend on them. Contrarily, the preoccupied style wants to be emotionally connected with others, but others are reluctant to get close as close as these persons would like. Thus, both attachment styles are characterised by a negative model of the self and a positive model of others, suggesting online self-disclosure could be easier for them, which plays a role in their PIU.
Implications	Individuals who have these two attachment issues have a negative model of self, which may cause issues with face-to-face contact. Being themselves on the internet mediates the link between negative models of the self and PIU.
Conclusions	Different activities online (e.g. gaming, gambling, social networks, dating sites, blogs, etc.) may be more likely to cause PIU in insecure individuals, so further research is needed on the connection between insecure individuals and different online activities.

Title & journal	Comorbidity of psychiatric disorders with internet addiction in a clinical sample: the effect of personality, defense style and psychopathology. <i>Addictive Behaviors.</i>
Authors & country	Floros, Siomos, Stogniannidou, Giouzevas, & Garyfallos (2014) ⁹³ . GREECE
Sample	$N = 50$. A clinical sample of internet addicted college students in Greece. (39 males; age $M = 21.03$; $SD = 3.15$ years).
Design	Cross-sectional study of a clinical sample of internet addicted college students, employing both clinical diagnosis and results from a test battery of self-report measures.
Aim	To contribute to the understanding of underlying causes for the development of IAD and to assess comorbidity with other mental disorders.
Measures	Demographics questionnaire, questions on online activities. Online Cognitions Scale [OCS] (Davis, Flett, & Besser, 2002 ⁹⁴) – assessed PIU. Defense-Style Questionnaire [DSQ] (Hyphantis, 2010 ⁹⁵) – assessed behaviour indicative of conscious derivatives of defensive styles Zuckerman-Kuhlman Personality Questionnaire [ZQPQ] (Zuckerman, Kuhlman, Joireman, Teta, & Kraft, 1993 ⁹⁶) – described personality traits with biological-evolutionary roots. Symptom Checklist Questionnaire [SCL-90] (Donias, Karastergiou, & Manos, 1991 ⁹⁷) – self-reported symptom inventory.
Results	Results indicate that there is high comorbidity of other Axis I diagnoses (i.e. mental disorders as defined in the DSM IV-TR [APA, 2000], to be distinguished from Axis II disorders which refer to personality disorders), with half of all patients having at least one additional diagnosis. Anxiety disorders typically predated the onset of Internet Addiction Disorder [IAD], while emotional disorders could both predate or appear following diagnosis of IAD.
Implications	When clinicians diagnose and treat cases of IAD, they should carry out a comprehensive psychiatric evaluation to identify any comorbid disorders. Having a comorbid disorder can be a more serious clinical issue because it can exacerbate the presentation of IAD, regardless of personality structure.
Conclusions	Individual differences are very important when diagnosing IAD and a comorbid disorder. In terms of policy, this can result in early prevention where at-risk individuals are specifically targeted, depending on the identified risk factors (such as the presence of comorbid disorders).

Title & journal	Computer game misuse and addiction of adolescents in a clinically referred study sample. <i>Computers in Human Behavior.</i>
Authors & country	Frölich, Lehmkühl, Orawa, BrombaWolf, & Görtz-Dorten (2016) ⁹⁸ . GERMANY.
Sample	<i>N</i> = 183, all from a child and adolescent psychiatric clinic in Cologne, Germany. (114 males; age <i>M</i> = 14.9 years).
Design	Cross-sectional survey-based study.
Aim	To investigate whether specific psychiatric disorders, especially emotional disorders and Attention Deficit Hyperactivity Disorder [ADHD], impact the pathogenesis of computer game misuse.
Measures	„Skala zum Computer-Spielverhalten“ [CSV-S] (in English: Assessment of Pathological Computer Gaming) (Wölfling, Müller, & Beutel, 2011 ⁹⁹) – assessed addictive computer gaming habits. Strengths and Difficulties Questionnaire [SDQ] (Mathai, Anderson, & Bourne, 2003 ¹⁰⁰) – assessed positive and negative behavioural attributes of children and adolescents.
Results	Male patients with the highest gaming addiction score spent more time on computer gaming and presented more school performance problems and other comorbidities. However, no specific psychiatric disorders posed an increased risk for addictive computer gaming.
Implications	Clinicians need to consider time spent with computer games, male gender, and a lack of external parental control as important risk factors for the development of computer game addiction or misuse.
Conclusions	The study provides different findings to previous research, suggesting that there may be a need to differentiate between IA and computer game addiction in future research. For instance, the prevalence in gaming addiction seems to be lower in comparison to IA. When it occurs in children, it is associated with lack of external parental supervision regarding the child's computer game habits; computer game addiction was detected when parents became aware of this problem at a later stage. From a clinical perspective, the literature shows parents of adolescents developing internet or gaming addictions often become aware of these problems too late. Finally, psychosocial consequences of gaming addictions seem severe, including increased conduct and emotional problems (e.g. absenteeism and problematic social relations).

Title & journal	Use of the strengths and Difficulties Questionnaire as an outcome measure in a child and adolescent mental health service. <i>Australasian Psychiatry.</i>
Authors & country	González, & Orgaz (2014) ¹⁰¹ . SPAIN
Sample	<i>N</i> = 493 college students from the University of Salamanca, Spain, were recruited through a survey request by e-mail (125 males; age <i>M</i> = 24, <i>SD</i> = 5.6 years).
Design	Online survey that included questions on internet use.
Aim	Aimed to replicate Mitchell et al.'s (2009) ¹⁰² research by applying the Index of Problematic Online Experiences [I-POE] to a sample of Spanish university students and examining: the prevalence of diverse problematic online experiences and the associations between such experiences and students' internet use characteristics and clinical symptoms.
Measures	Internet use characteristics– age of first internet use, internet expertise, or the experience they had using the internet, importance of using the internet or how relevant the internet was in their lives, type of internet use, and amount of internet use. I-POE (Mitchell, Sabina, & Finkelhor, 2009) ¹⁰² – assessed PIU across six domains: overuse, problems with family and friends, problems with daily obligations, problems related to interactions with people online, upset or concern about own Internet use, and online behaviour concerns. Trauma Symptom Inventory [TSI] (Briere, 1995) ¹⁰³ – test of posttraumatic stress and other psychological issues of traumatic events. Marlow-Crowne Social Desirability Scale (Crowne & Marlowe, 1960) ¹⁰⁴ (short version) – assessed social desirability.
Results	Most Spanish college students use the internet healthily, although there is a concerning minority, around 1/10, who may develop problematic online patterns. There is also a broad range of problematic online experiences related to overuse, family or friends, daily obligations, interactions with people online, concerned feelings about own internet use, and online behaviour, which affects a portion of students (7-22 per cent) – suggests that a wider range of problems can arise from overusing the internet.
Implications	This study provides more evidence of PIU in a college population, with the rates being a cause for concern in future considerations of policies which should promote the healthy, safe and ethical use of the internet in this population.
Conclusions	Policies may benefit from modelling school-based programmes that have been effective in reducing problems associated with internet use.

Title & journal	Perceived problems with computer gaming and internet use among adolescents: measurement tool for non-clinical survey studies. <i>BMC Public Health.</i>
Authors & country	Holstein, Pedersen, Bendtsen, Madsen, Meilstrup, Nielsen, & Rasmussen (2014) ¹⁰⁵ . DENMARK
Sample	<i>N</i> = 2,100 participants aged between 11 and 15 from Denmark. (1031 males) [no <i>M</i> or <i>SD</i> reported].
Design	Cross-sectional survey of schools in Aarhus, Denmark.
Aim	To develop and present a new and short non-clinical measurement tool for perceived problems related to computer use and gaming among adolescents and to study the association between screen time and perceived problems.
Measures	Used own questionnaire – distinguished between the outcome measure of three indexes on perceived problems related to computer gaming, console gaming, and internet use (i.e. online communication and surfing).
Results	Three new indexes showed high face validity and acceptable internal consistency. Most schoolchildren did not experience problems related with long computer use, but there was a strong association between time spent on computers and perceived problems relating to computer gaming, console gaming (for boys only), and internet use.
Implications	These three measures do not assess IGD as it is in the DSM-5, so cannot be used in a clinical setting, and this may be why most schoolchildren who spent a lot of their time gaming or using the internet were perceived as not having problems.
Conclusions	Gaming as a potential disorder (according to the DSM-5) should be reviewed. The authors conclude there is a need for a brief and non-pathological measure, similar to the one validated through the three indexes used in order to make this measure applicable to young people's everyday life and behaviour (i.e., family structure, social relations, and health behaviours). Thus, these new measures do not assess IGD and do not list any of the DSM-5 criteria. However, it was found that there was an increased risk of perceived problems with increasing time spent online, but most schoolchildren who spent much time gaming, surfing or communicating online did not experience addiction problems.

Title & journal	Video game addiction in gambling disorder: clinical, psychopathological, and personality correlates. <i>BioMed Research International.</i>
Authors & country	Jiménez-Murcia, Fernández-Aranda, Granero, Chóliz, La Verde, Aguglia, & del Pino-Gutiérrez (2014) ¹⁰⁶ SPAIN
Sample	<i>N</i> = 193 gambling disorder patients in a pathological gambling unit (167 males; age <i>M</i> = 42.4; <i>SD</i> = 13.4 years).
Design	Survey on video game use [VGU] and video game addiction [VGA].
Aim	To study the prevalence of VGU and VGA in gambling disorder patients.
Measures	Symptom Checklist Questionnaire [SCL-90] (Derogatis, 2002 ¹⁰⁷) – assessed a broad range of psychological problems and psychopathology symptoms. Temperament and Character Inventory-R. South Oaks Gambling Screen (Lesieur and Blume, 1987 ¹⁰⁸) – assessed tolerance, problems caused by excessive use and lack of control. Stinchfield's Diagnostic Questionnaire for Pathological Gambling (Stinchfield 2003 ¹⁰⁹) – assessed the 10 DSM-IV criteria for gambling. Video Game Dependency Test (Chóliz & Marco, 2011 ¹¹⁰) – assessed withdrawal, tolerance, problems caused by excessive use and lack of control. Temperament and Character Inventory-Revised [TCI-R] (Cloninger, 1999 ¹¹¹) – assessed seven dimensions of personality – four temperaments, and three characters.
Results	Individuals with gambling disorder had a prevalence rate of 37.3 per cent of video game [VG] addiction (15 per cent) or use (22.3 per cent). From these three scores three groups of gamblers were created: non-VGU, VGU, and VGA. There was also a linear trend for VG level and gambling disorder severity and other measures of general psychopathology. After structural modelling, higher VG total scores were associated with younger age, general psychopathology, and specific personality traits, but not with gambling disorder severity. Patients' sex and age were involved in the mediational pathways between specific personality traits and VG impairment. To assess the pathways for outcomes for VG severity and the severity of gambling disorder, additional variables were introduced: patients' age, TCI-R persistence and self-directedness as predictors of VG, and age as predictor for gambling. Thus, VG was high for patients with low self-directedness and high persistence, and age mediated the relationship between persistence and VG (i.e. younger individuals had higher persistence, which was positively associated with VG), and sex mediated the relationship between self-directedness and VG (i.e. men had higher self-directedness, which was negatively associated with VG).
Implications	Gambling disorder patients using VG are younger and present more dysfunctional personality traits, and more general psychopathology, but the presence of VG did not affect the severity of gambling disorder. Because of this, intervention strategies must focus on these personality traits and deal with them better.
Conclusions	To look for prevention programmes that target younger children screening for VGU and VGA is needed, as probably those diagnosed young with VGA have more dysfunctional personality traits and general psychopathology.

Title & journal	Neural correlate of internet use in patients undergoing psychological treatment for internet addiction. <i>Journal of Mental Health.</i>
Authors & country	Lai, Altavilla, Mazza, Scappaticci, Tambelli, Aceto, & Tonioni (2017) ¹¹² ITALY
Sample	$n = 16$ males with IA diagnosis (age $M = 32$ years; $SD = 13.5$) and $n = 14$ healthy males (age $M = 27.1$ years; $SD = 5.1$) recruited at the hospital-based psychiatric service for IAD of the A. Gemelli University Hospital Foundation in Rome, Italy.
Design	Experimental design.
Aim	To test the neural correlates in response to the internet cue in patients with IA.
Measures	Stimuli – 40 images related to the internet (social network, gambling, porn and role-playing games) and 30 emotional images (positive, negative and neutral). Interview – focused on 8 items (absence/presence of 8 behaviours and feelings): excessive time devoted to internet use, difficulty cutting down on online time, lack of sleep, fatigue, declining grades or poor job performance, apathy and racing thoughts, decreased investment in social relationships and activities, and irritability.
Results	Source (sLoreta) (standardised low-resolution brain electromagnetic tomography) analyses were used and it was found that patients from the clinical group presented with a higher primary somato-sensorial cortex and lower paralimbic, temporal and orbito-frontal activation in response to both internet and emotional images compared to those in the control group.
Implications	These findings suggest a generalised impairment in emotional and cognitive processing abilities in those with IA.
Conclusions	It is possible that a neural pathway could be used as a biological marker for diagnosis and outcome of psychological treatments in patients with IA in the future. Moreover, the findings indicate that internet addiction may be associated with symptoms of dissociation.

Title & journal	The Efficacy of Three Modalities of Internet -Based Psychotherapy for Non-Treatment-Seeking Online Problem Gamblers: A Randomized Controlled Trial. <i>Journal of Medical Internet Research.</i>
Authors & country	Luquiens, Tanguy, Lagadec, Benyamina, Aubin, & Reynaud (2016) ¹¹³ . FRANCE
Sample	<i>N</i> = 1,122 participants all active, problem, poker gamblers on the poker gambling service provider Winamax that were not seeking help (1033 males; age <i>M</i> = 34.7; <i>SD</i> = 10.1 years). Then randomised into 4 groups: waiting list (control), personalised normalised feedback on their gambling status by email, an email containing a self-help book to be downloaded with a Cognitive Behavioural Therapy (CBT) programme without guidance, and the same CBT programme emailed weekly by a trained psychologist with personalised guidance.
Design	Mixed methods design of a clinical trial for intervention methods and an online survey.
Aim	To assess the efficacy of three modalities of internet-based psychotherapies with or without guidance, compared to a control condition, among problem gamblers who play online poker.
Measures	Problem Gambling Severity Index [PGSI] (Holtgraves, 2009) – assessed gambling behaviour. Adapted Ladouceur Self-Help book (Ladouceur & Lachance, 2007 ¹¹⁴) – therapeutic CBT program – 6-step program.
Results	There was no between-group difference of efficacy of internet -based interventions compared to placebo. All groups had high attrition rate of 83 per cent, but the group with the highest was the group with guidance. All groups had a decrease of 1.35 on the PGSI, but this was not significant. 1/3 of the problem gamblers fell below the problem gambling threshold at 6 weeks.
Implications	This research provides a basis for future internet-based trials for individuals with gambling disorders, as the natural course of gambling disorders is still poorly researched and documented.
Conclusions	The authors suggest considering intrinsic motivational aspects if researchers' use of internet-based CBT (in any modality: with or without guidance) in future gambling addiction research in order to increase engagement. Intrinsic motivation is positively associated with more learning, greater persistence in a process such as learning or being in therapy, and greater engagement in learning or therapeutically activities. In this sense, a gamification approach of the modalities tested for problematic online poker players could enhance CBT efficacy.

Title & journal	Internet gaming disorder and online gambling disorder: Clinical and personality correlates. <i>Journal of Behavioral Addictions.</i>
Authors & country	Mallorquí-Bagué, Fernández-Aranda, Lozano-Madrid, Granero, Mestre-Bach, Baño, & Jiménez-Murcia (2017) ¹¹⁵ . SPAIN
Sample	<i>N</i> = 288 adult patients, <i>n</i> = 261 online gambling disorder patients (249 males; age <i>M</i> = 35.98; <i>SD</i> = 12.24 years), <i>n</i> = 27 IGD patients (24 males; age <i>M</i> = 25.7; <i>SD</i> = 12.86 years).
Design	Mixed Methods Design combining interviews and a survey.
Aim	To better conceptualise IGD by comparing it with gambling disorder.
Measures	Semi-structured face-to-face clinical interviews. Yale Food Addiction Scale (Gearhardt, Boswell, & White, 2014 ¹¹⁶) – assessed addictive food behaviours. Symptom Checklist-90-R (Derogatis, 2002 ¹⁰⁷) – assessed psychological and psychiatric symptoms. Temperament and Character Inventory-R (Cloninger et al., 1994 ¹¹⁷) – assessed four dimensions of temperament (harm avoidance, novelty seeking, reward dependence and persistence and three-character dimensions (Self-directedness, cooperativeness, and self-transcendence).
Results	Both clinical groups presented higher psychopathological scores and less functional personality traits when compared with a normative Spanish population. Patients with IGD, who were younger, were more likely single and unemployed and reported a younger age of disorder onset. In addition, IGD patients displayed lower somatisation and depressive scores together with lower prevalence of tobacco use, but higher Food addiction [FA] scores and higher mean Body mass index [BMI]. They also presented lower novelty seeking and persistence traits.
Implications	Gambling disorder and IGD patients share similar emotional distress and personality traits; however, IGD patients also display some differential characteristics compared to gambling disorder patients. This suggests that it is important to differentiate the two and to research further in a clinical setting into these specific characteristics
Conclusions	Policies for IA need to have different subgroups. This study suggests that different areas of IA present differently. Internet-use-related addiction problems in adulthood (i.e. young adulthood, middle-age, or older adulthood) have different profiles, especially when comparing IGD with gambling disorder. Both subgroups seem to provide different information to future treatment policies. IGD patients are usually young adults, and do not have the same personality traits (e.g. novelty seeking) or comorbidity (e.g. depression) compared with gamblers.

Title & journal	Eficacia de las técnicas de control de la impulsividad en la prevención de la adicción a videojuegos. <i>Terapia Psicológica.</i>
Authors & country	Marco & Chóliz (2017) ¹¹⁸ SPAIN
Sample	<i>N</i> = 1,110 Spanish Valencian adolescents (<i>M</i> = 12.37, <i>SD</i> = 1.875; range 9-16).
Design	Experiment (mixed design) with two conditions: a) conventional prevention programme, and b) programme with impulsiveness control techniques. Data collection in four stages (repeated measures): baseline, pre-test, post-test and follow-up. Results were compared with a control group (waiting list).
Aim	Analyse the effectiveness of some impulsivity control techniques to prevent videogame addiction.
Measures	'Test de dependencia de Videojuegos' [TDV], in English 'Dependency test of video games' (Chóliz & Marco, 2011 ¹¹⁰).
Results	While groups that remained on the waiting list did not present changes in the pattern of video game use (i.e. frequency and time using videogames), those for whom the programme was applied witnessed a significant decrease in these variables (i.e. less video game use and less dependence on video games).
Implications	The two modalities of prevention programme were effective in the reduction of the analysed variables, but the changes produced by the implementation of impulsive control techniques were more consistent and lasting over time. This tested programme has shown to be relevant for preventive actions as the good results were maintained at follow-up, especially in the group receiving the programme with impulsiveness control techniques.
Conclusions	Impulsivity is a relevant variable in the prevention and treatment of video game addiction, and this result can probably be extended to other technological addictions. Assessing impulsivity required simple guidelines (e.g. before playing, participants were asked to wait between 5-10 minutes while reflecting about the time they played or alternatives to video games; they were asked to set an alarm to monitor their playing time). This study highlights that it could also be beneficial to undergo training in behavioural techniques at clinical and community levels. Provision of information to facilitate awareness of preventive programmes is also an option. It seems that alternative behaviour training or therapy could strengthen self-control when using video games, and also guidelines could be important to support the problematic user in changing and acquiring new patterns and habits of playing video games.

Title & journal	Adolescents with Internet Gaming Disorder (IGD): profiles and treatment response. Adolescentes con Trastorno por juego en Internet (IGD): perfiles y respuesta al tratamiento. <i>Adicciones</i>
Authors & country	Martín-Fernández, Matalí, García-Sánchez, Pardo, Lleras, Castellano-Tejedor (2017) ¹¹⁹ SPAIN
Sample	<i>N</i> = 59 adolescent patients in an Addictive Behaviour Unit in a Spanish hospital who met criteria including being under the age of 18 and presenting with maladaptive use of the internet for video games and meeting the DSM-5 criteria for IGD (age <i>M</i> = 124.83, <i>SD</i> = 1.45 years).
Design	Experiment: first, a clinical interview (IGD). Treatment (psychotherapeutic approach, plus pharmacological, if needed). Two groups by mental disorders: internalising (i.e. inhibition, unease, avoidance or timidity, depressive, anxiety and personality Cluster C disorders) and externalising (i.e. control of aggression, impulsivity, negativity or hyperactivity, and displayed Disruptive Behaviour Disorder [DBD], ADHD and non-specific DBD).
Aim	To describe profiles of adolescents with IGD according to comorbidity and analyse treatment response at 3 and 6 months.
Measures	Kiddle-sads-present Lifetime [K-SADS-PL] (Kaufman, Birmaher, Brent, Rao, Flynn, Moreci, Williamson, & Ryan, 1997 ¹²⁰) – interview for mental disorders, and assessed internet gaming Disorder according to the DSM-5 criteria. Clinical Global Impression Scale [CGI-I]–assessed participants treatment progress. Treatment – participants received treatment following the psychotherapeutic approach which follows behavioural addiction models proposed by Echeburúa and Corral (2010) ¹²¹ .
Results	68.6 per cent (<i>n</i> = 59) met diagnostic criteria for IGD. Of these, the 45,7 per cent matched an internalising profile, presenting comorbidity with mood disorders (44,4 per cent), anxiety disorders (44,4 per cent) and personality disorders (11,1 per cent). The externalising profile comprised 52.5 per cent with DBD (48,4 per cent), ADHD (29 per cent) and DBDs not otherwise specified (22.6 per cent). The internalising patients had a family history of psychiatric problems (63 per cent), difficulties in social relationships (77.8 per cent) and use video games to escape discomfort (66.7 per cent).
Implications	After 3 months the externalising profile showed improvements. Comorbid disorders allowed discriminating IGD profiles in adolescents and these could influence treatment response.
Conclusions	To assess comorbidities to design a more accurate intervention focused on the specificities of each profile is suggested.

Title & journal	A contribution to the clinical characterization of internet addiction in a sample of treatment seekers: Validity of assessment, severity of psychopathology and type of co-morbidity. <i>Comprehensive Psychiatry</i>
Authors & country	Müller, Beutel, & Wölfling (2014) ¹²² GERMANY
Sample	<i>N</i> = 290 German treatment seekers (93,8 per cent males; age <i>M</i> = 26.4; <i>SD</i> = 8.22 years).
Design	Mixed methods design combining a survey and diagnostic interviews to assess symptoms of IA and level of functioning.
Aim	To conduct a first clinical validation of the Scale for the Assessment of Internet and Computer Game Addiction [AICA-S], to validate cut-offs of the AICA-S, to provide an extensive clinical description of treatment seekers, and to present the most common subtypes of IA behaviour within a clinical sample.
Measures	SCL-90 (Derogatis, Lipman, & Covi, 1977 ¹²³) – assessed psychological distress Patient Health Questionnaire (Spitzer, Kroenke, Williams, & Patient Health Questionnaire Primary Care Study Group, 1999 ¹²⁴). – assessed mental disorder and psychosocial stress-related symptoms. Generalised Anxiety Disorder Scale [GAD-7] (Löwe, Decker, Müller, Brähler, Schellberg, Herzog, & Herzberg, 2008 ¹²⁵) – assessed symptoms of generalised anxiety disorder. Cambridge Depersonalisation Scale (Michal, Zwerenz, Tschan, Edinger, Lichy, Knebel, & Beutel, 2010 ¹²⁶) – assessed symptoms of depersonalisation. AICA-S (Wölfling, Jo, Bengesser, Beutel, & Müller, 2013 ¹²⁷) – assessed internet and computer game addiction with items related to DSM-criteria of substance-use disorders and gambling disorders. Global Assessment of Functioning GAF (Söderberg, Tungström, & Armelius, 2005 ¹²⁸) – expert rating concerning psychosocial impairment.
Results	71 per cent of treatment seekers met the clinical diagnosis for IA, and displayed higher levels of psychopathology, especially depressive and dissociative symptoms. The clinical interviews suggested that half of the patients met the criteria for one further psychiatric disorder, especially depressive disorders. The level of functioning was decreased in all domains. The AICA-S showed promising results.
Implications	IA was associated with high levels of psychosocial distress, mainly related to depressive symptoms, with co-morbid disorders more common among those patients.
Conclusions	Comorbidity should be studied with IA.

Title & journal	Prise en charge TCC d'une addiction aux jeux vidéo: l'expérience de jeu contribue à la thérapie. <i>Journal de Thérapie Comportementale et Cognitive.</i>
Authors & country	Taquet & Hautekeete (2013) ¹²⁹ FRANCE
Sample	<i>N</i> = 1 male patient from France (Age 19 years old; he played offline and online video games since the age of 9.
Design	This article gives a detailed presentation of a case of video game addiction treated by CBT in practice specialised in video game addiction.
Aim	Case study of one male.
Measures	Protocol – assessed gaming behaviour. Semi-directive interview – assessed type of game and modalities of the game. Problem Video Game Playing Scale [PVP] – assessed problem video game playing behaviour (Tejeiro Salguero and Bersabé Morán, 2002 ¹³⁰ ; Bioulac et al., 2010 ¹³¹). 'Questionnaire sur l'addiction aux jeux video' [QAJV] (in English: Addiction video games questionnaire) – assessed the cognitive-emotional and behavioural processes in video game use.
Results	The problem became apparent three years earlier when the patient decided to drop out of school. The average playing time per week was 77 hours. The PVP was 7/9 and the QAJV was 187/380. The excessive gaming behaviour met the criteria of behaviour addiction. QAVJ: pursuit of positive emotions, relaxation, immersion and cognitive avoidance of the negative aspects of daily life. Five consultations (over three months) were necessary for treatment of addictive videogame behaviour with auto-observation of game behaviour and cognitive-emotional experience, support in reducing playing time, control of the stimulus, setting up alternative activities and working on relationships. Six months into the treatment, satisfactory game control enabled the subject to enter into a phase of maintenance and relapse prevention, which corresponded to three consultations (two months). The risk of relapse was worked on (release of new games, video game expansion packs, relief-oriented use of videogame, procrastination, online games). Ten months after the initial evaluation, the PVP score was 0/9, the QAJV 6/380 and playing time 14. A significant social anxiety, masked by excessive game behaviour and obsessions, appeared as a comorbidity during the therapy and was then eliminated.
Implications	Good knowledge of the world of video games by the therapist seems to improve the therapeutic alliance in the treatment of video game addiction. This case study shows a video game player who has excessive game behaviour, which resembles addiction. Without treatment focusing on the video games, it would have been impossible to treat the social anxiety. The treatment of emotional and behavioural cognitive processes linked to video games was shown to be an adapted therapeutic method.
Conclusions	This article presented an example of how video game addiction can be treated using CBT.

Title & journal	The treatment of internet gaming disorder: A brief overview of the PIPATIC program. <i>International Journal of Mental Health and Addiction.</i>
Authors & country	Torres-Rodríguez, Griffiths, Carbonell, Farriols-Hernando, & Torres-Jimenez (2017) ¹³² . SPAIN.
Sample	N = 4 adolescents with IGD, from Spain (4 males; aged 13, 16, 17, and 18 years) [no SD].
Design	Case study to investigate a treatment programme.
Aim	Briefly outline the cases of treatment-seeking male adolescents and carry out a case study using an A-B-A withdrawal design.
Measures	'Programa Individualizado Psicoterapéutico para la Adicción a las Tecnologías de la información y la comunicación' [PIPATIC] (in English: Individualized Psychotherapeutic Program for Addiction to Information and Communication Technologies) (Torres-Rodríguez et al. 2017 ¹³²) – specialised psychotherapy for adolescents with symptoms of IGD and comorbid disorders. Video Game-Related Experiences Questionnaire & Internet Gaming Disorder Test (Charmarro, Carbonell, Manresa, Muñoz-Miralles, Ortega-Gonzalez, López-Morron, 2014 ¹³³) – assessed IGD symptoms. SCL-90 & The Global Severity Index– assessed psychological distress. Youth Self-Report (Achenbach and Rescorla, 2001 ¹³⁴) – assessed behavioural and emotional functioning. Millon Adolescent Clinical Inventory (Millon, 1994 ¹³⁵) – assessed personality patterns, expressed concerns and clinical syndromes. Family Conflict subscale of the Family Environment Scale (Moos & Moos, 1994 ¹³⁶) – assessed family conflict. Social Problem Scale (Achenbach & Rescorla, 2001 ¹³⁴) – assessed social problems. Child Behaviour Checklist [CBCL] (Achenbach & Rescorla, 2001 ¹³⁴) – evaluates the school situation. Working Alliance Theory of Change Inventory (Horvath & Greenberg, 1986 ¹³⁷) – assessed the alliance and the level of therapeutic change.
Results	Clinical characteristics at the start of treatment indicated that all four participants had clinical problems regarding online gaming, based on IGD scores. Three of the participants were shown to have conflicts with their families, with one participant having a clinical social problem score, and two others having borderline scores, while one was not given this questionnaire due to them not being in school. After treatment, there is a decrease in online video gaming in phases A, B, and A. This decrease is seen immediately within a few weeks of the start of the treatment.
Implications	Despite all four participants having different etiology leading to their problematic video game playing, the PIPATIC treatment was still able to significantly reduce the negative symptoms and effects of IGD. This includes the fact that three out of the four patients had comorbid disorders. This finding is vital to future interventions for IGD as it can work across numerous different types of people with IGD.
Conclusions	Further research needs to be carried out on a larger sample to test this emerging theory. Programmes such as PIPATIC could be a good treatment method as it is a type of CBT introducing psychosocial components (e.g. psychopathology, emotional and behavioural regulation, family relations, conflicts, social problems, and school problems) to ensure an integrative approach tailored for the individual under treatment.

Title & journal	Clinical validation of the C-VAT 2.0 assessment tool for gaming disorder: A sensitivity analysis of the proposed DSM-5 criteria and the clinical characteristics of young patients with 'video game addiction'. <i>Addictive Behaviors.</i>
Authors & country	Van Rooij, Schoenmaker, & van de Mheen (2017) ¹³⁸ . NETHERLANDS.
Sample	<i>N</i> = 32 clinical youth sample in treatment for VGD (32 males; age <i>M</i> = 17.6; <i>SD</i> = 2.5 years).
Design	Longitudinal study consisting of a test assessing video game addiction, and a follow-up survey month after assessment (average 5.7 months after assessment is conducted).
Aim	To develop and test a clinical tool to identify video gaming problems.
Measures	Clinical assessment tool for gaming disorder problems [C-VAT 2.0]– assessed video game addiction, created by the researchers. Demographics – age and gender. Video game Addiction Test (van Rooij, Schoenmakers, Van den Eijnden, Vermulst, & van de Mheen, 2012 ¹³⁹) – assessed problematic behaviour in relation to video game addiction. Clinical impression, DSM-IV axes, and Global Assessment of Functioning – assessed the 5 DSM-IV axes (clinical disorders, personality disorders, somatic problems, psychosocial/environmental factors, general functioning), also assessed using a specific form and GBF.
Results	C-VAT 2.0 correctly identified 91 per cent of the sample at the proposed cut off point, which is in line with the DSM-5 proposal.
Implications	This study gives a reference point and data on the performance of the new DSM-5 compliant item; however, the DSM-5 criteria need to be further validated and tested more widely.
Conclusions	The study's findings suggest that a review of the DSM-5 criteria for IGD should be carried out by using expert judgement (e.g. a psychiatrist, clinical or health psychologist) in order to ensure that functional impairment is present in each case. Classifying individuals as problematic gamers should be avoided if they are healthy, enthusiastic gamers without problems (i.e. over-inclusion of non-problem gamers). In summary, the tool (e.g. C-VAT 2.0) should be accompanied with the direct involvement of a treatment professional in any diagnostic process to validate if functional impairment is present in screened problematic gaming.

Title & journal	Treatment outcomes in patients with internet addiction: a clinical pilot study on the effects of a cognitive-behavioral therapy program. <i>Biomed Research International.</i>
Authors & country	Wölfling, Beutel, Dreier, & Müller (2014) ¹⁴⁰ GERMANY.
Sample	<i>N</i> = 42 patients from the Outpatients Clinic for Behavioural Addictions in Germany from IA (37 males; age <i>M</i> = 26.1; <i>SD</i> = 6.6 years).
Design	Trial of AICA-S.
Aim	To gather first data on the effectiveness of AICA-S, and to characterise the patients included regarding psychosocial symptoms, comorbidity, and personality features that can play a role in therapeutic treatment regarding building up a therapeutic alliance and differences in the treatment response.
Measures	AICA-S (Wölfling, Müller, & Beutel, 2010 ⁹⁹) – assessed computer and internet game addiction, including six core criteria for IA – preoccupation, loss of control, withdrawal, negative consequences, tolerance, and craving). The General Self-Efficacy Scale (Scwarzer & Jerusalem, 1995 ⁸⁶) - assessed the construct of generalised self-efficacy expectancy. NEO-Five Factor Inventory [NEO-FFI] (Costa, & McCrae, 2008 ¹⁴¹) – assesses personality factors using the five domains of the Five-Factor model. SCL-90 (Derogatis, Lipman, & Covi, 1977 ¹²³) – assessed psychopathological distress using 90 items.
Results	After application of a standardised cognitive-behavioural treatment, there were significant changes in symptoms of IA, time spent online, negative repercussions following internet use, and associated psychopathological symptoms, with these effects being largest on depressive and obsessive-compulsive symptoms.
Implications	Future research needs to investigate predictors of therapy completion in patients with IA, to ensure patients continue with the therapy needed, including internet addiction status, psychopathological symptoms, and perceived self-efficacy.
Conclusions	It is suggested to attend to predictors of successful treatment completion in IA interventions, including internet addiction status, psychopathological symptoms, and perceived self-efficacy.

3.1. Internet user characteristics

All 19 studies examined either a community sample or a clinical sample. The following paragraphs outline the characteristics of the samples who experienced gaming addiction, internet addiction, and gambling addiction.

3.1.1. Internet addiction

In the included internet addiction studies, sample sizes ranged from 16 internet addicted patients with their 14 control participants investigating potential biological causes of internet addiction (Lai et al. 2017¹¹²), to studies with as many as 1,019 participants who carried out an online survey to test a new model for generalised internet addiction (GIA) in Germany (Brand et al., 2014⁸²). Thus, samples of internet addiction vary considerably, and so tend to be split based on whether participants were high school students or adolescents (Andrisano et al., 2016⁷⁸; Brand et al., 2014⁸²; Floros et al., 2014⁹³; González & Orgaz, 2014¹⁰¹), and had other comorbid disorders or personality differences, such as attachment problems (Danet & Miljkovitch, 2016⁹⁰). Studies also focused on individuals who were clinically diagnosed (Müller et al., 2014¹²²; Wölfling et al., 2014¹⁴⁰), or were a combination of clinical and community samples (Lai, et al., 2017¹¹²).

As can be seen from the papers referenced above, students and adolescents are the most studied group of individuals in relation to internet addiction, which many suggest is due to their heightened risk (Gonzalez et al., 2014¹⁰¹). Research into internet addiction has been carried out worldwide; however, research into internet addiction within the EU, which met the criteria for this review, was carried out in five countries: Germany (Brand et al., 2014⁸²; Wölfling et al., 2014¹⁴⁰), France (Danet & Miljkovitch, 2016⁹⁰), Greece (Floros et al., 2014⁹³), Italy (Andrisano et al., 2016⁷⁸; Lai et al., 2017¹¹²), and Spain (González & Orgaz, 2014¹⁰¹).

3.1.2. Online gaming addiction

In the included gaming addiction studies, sample sizes ranged from a case study of one male adolescent completing Cognitive Behavioural Therapy (CBT) treating for gaming disorder (Taquet & Hautekeete, 2013¹²⁹) to case studies of four male adolescents who were seeking treatment for their problematic online gaming (Torres-Rodríguez, Griffiths, & Carbonell, 2017¹³²) to large questionnaires with 2100 participants from Denmark, with the aim to develop a new non-clinical measurement tool for problems related to computer use and online gaming (Holstein et al., 2014¹⁰⁵). The majority of online gaming addiction studies focused on adolescents (Beranuy, Carbonell, & Griffiths, 2013⁸⁰; Taquet & Hautekeete, 2013¹²⁹; Holstein et al., 2014¹⁰⁵; Jiménez-Murcia et al., 2014¹⁰⁶; Frölich et al., 2016⁹⁸; Marco & Chóliz, 2017¹¹⁸; Martín-Fernández et al., 2017¹¹⁹; Torres-Rodríguez et al., 2017¹³²; Van Rooij et al., 2017¹³⁸), with these then being split up into general online gaming addiction, and gaming addiction related to role playing games, such as MMORPGs (Beranuy et al., 2013⁸⁰).

Within the EU, research into gaming addiction has been carried out in four countries, including Spain (Beranuy et al., 2013⁸⁰; Mallorquí-Bagué et al., 2017¹¹⁵), Germany (Frölich et al., 2016⁹⁸), The Netherlands (Van Rooij et al., 2017¹³⁸), and Denmark (Holstein et al., 2014¹⁰⁵).

3.1.3. Online gambling addiction

Within the included studies in this review, online gambling addiction, when compared with IA and gaming addiction research, was far less prevalent within the literature. The few research papers that were included, had very different sample sizes, with one paper focusing on 193 gambling disorder patients within a pathological gambling unit (Jiménez-Murcia et al., 2014¹¹⁵), while another presents a wide-scale study on 1,122 participants assessing psychotherapies for online poker players (Luquiens et al., 2016¹¹³).

Both of these papers mostly used male participants, although females were included. This research also varied in the clinical aspects of the sample, as Jiménez-Murcia et al. (2014)¹¹⁵ focused only on participants from a pathological gambling unit, while Luquiens et al. (2016)¹¹³ had a wider sample group, with the main inclusion criteria being that participants were signed up to the gambling site Winnamax; however, were not seeking

help for their gambling. This online gambling addiction research was carried out in France (Luquiens et al., 2016¹¹³) and Spain (Jiménez-Murcia et al., 2014¹¹⁵; Mallorqui-Bague et al., 2017¹¹⁵) only. Further research may need to be done in the area of online gaming addiction in more EU countries.

Summary

As this previous section of the results demonstrates, a wide variety of individuals from the Southern, Western and Northern regions of Europe has been researched to investigate internet-use-related addiction problems across different types of internet addictions (i.e. generalised internet addiction, online gaming or online gambling). The focus of current research in the area has been on secondary and higher education student samples, which appear to be the most prevalent samples that have been differently researched; except in the case of online gambling, where the sample were adults.

3.2. Generalised internet addiction: at clinical and community levels

Three papers (15.8 per cent of the overall papers identified) on generalised internet addiction (Danet & Miljkovitch, 2016⁹⁰; Gonzalez & Orgaz, 2014¹⁰¹; Lai et al., 2017¹¹²), referred to internet use that was not specific, i.e. not reliant on the engagement with a particular online activity. These papers investigated generalised internet use using comprehensive research designs (including online surveys [Danet & Miljkovitch, 2016⁹⁰; Gonzalez & Orgaz, 2014¹⁰¹] and an experimental design [Lai et al., 2017¹¹²]) that offered in-depth insight into specific behaviours and usage motivations, allowing for a thorough understanding of problematic and addictive internet use to emerge.

Gonzalez and Orgaz (2014)¹⁰¹ specifically looked at internet use characteristics and associated variables, including age of first internet use, internet expertise, or the experience participants in their study had when using the internet, the importance of using the internet or how relevant the internet was in their lives, type of internet use, as well as the amount of internet use. This comprehensive approach appeared particularly beneficial as it allowed the researchers to assess the extent to which a proportion of their university student participants experienced a broad range of problematic online experiences. These latter ones were related to six domains assessed over the period of the past year, namely: (i) overuse, (ii) a neglect of family or friends, (iii) problems with daily obligations, (iv) problems related to interactions with people online, (v) upset or concern about own internet use, and (vi) online behaviour concerns. The findings suggested that a wider range of problems can arise from overusing the internet.

Similarly, Lai et al. (2017)¹¹² investigated generalised internet usage behaviour with interviews, showing that some of their participants spent an excessive amount of time using the internet, had difficulty cutting down on their online time, and lacked sleep due to their internet usage, leading to fatigue, irritability, declining grades or poor job performance, apathy and racing thoughts, decreased investment in social relationships and activities. The participants' experiences suggest the presence of symptoms traditionally associated with substance-related disorders, namely tolerance, and significant impairment in daily functioning across various domains (i.e. mental and physical health, social relationships, professional and academic pursuits), purporting the view that generalised internet addiction may be considered a distinct diagnostic category warranting further research and clinical treatment.

Danet and Miljkovitch (2016)⁹⁰ focused their online survey-based study on the assessment of attachment styles (i.e. secure, preoccupied and fearful) and the extent of online self-disclosure (i.e. via representation of self-online) in order to provide a more comprehensive picture as to the risk factors associated with generalised internet addiction. Attachment theory postulates that there are three different types of attachment, namely: secure attachment (i.e. characterised by distress when the attachment figure leaves, avoidance of strangers, and positive behaviours upon reunion with attachment figure), resistant attachment (i.e. characterised by intense distress when the attachment figure leaves, avoidance of strangers, and resistance to get back in contact with the attachment figure upon their return), and avoidant attachment (i.e. characterised by lack of distress when the attachment figure leaves, no fear of strangers, and limited interest during reunion with the attachment figure; Ainsworth & Bell, 1970¹⁴²). Participants with preoccupied and fearful attachment styles were

found to have a negative model of the self, which may lead to problems in relationships offline, heightening the risk of spending increased amounts of time invested in social interactions on the internet. Moreover, increased online self-disclosure was found to mediate the relationship between negative models of the self and problematic generalised internet use. Accordingly, the affordances of the internet, including anonymity, may facilitate the expression of identity and representation of self, which may have positive repercussions especially for individuals.

A couple of papers (10.5 per cent) focused on the clinical assessment and treatment of individuals with generalised internet addiction (Floros et al., 2014⁹³; Wölfling et al., 2014¹⁴⁰), as well as a school-based study on the design of a peer education programme for internet addiction (Andrisano et al., 2016⁷⁸). Overall, these studies showed that there is a high comorbidity with a number of other mental disorders, specifically including anxiety disorders, as well as depressive and obsessive-compulsive symptomatology. Moreover, it appeared CBT was effective in leading to significant changes in symptoms of internet addiction, time spent online, negative repercussions following internet use, and associated psychopathological symptoms with these effects being largest on depressive and obsessive-compulsive symptoms. Finally, the included school-based prevention programme (Andrisano et al., 2016⁷⁸) was beneficial in reducing internet addiction symptomatology and the results of this study suggested that a preventive approach rather than a treatment approach is of particular relevance, with the benefit of engaging young individuals in relevant conversations and active considerations, leading to awareness-raising and healthier usage behaviours.

In support of often and successfully applied CBT for treating GIA, Brand et al. (2014)⁸² validated a theoretical model illustrating underlying cognitive mechanisms contributing to the development and maintenance of internet addiction. The results of their analyses using self-selected samples suggested that a person's specific cognitions, i.e. poor coping (i.e. suppression, maladaptive problem solving and avoidance) and cognitive expectations (i.e. positive expectancies and avoidance expectancies), increased the risk for GIA. In addition to this, this research also indicated that high coping skills and lack of internet usage expectations functioned as preventative factors, decreasing the risk of experiencing symptomatology associated with generalised internet addiction.

Summary

The papers described in this section provided detailed information regarding concrete insights into specific behaviours and internet use motivations, which may support a comprehensive understanding of problematic and addictive internet use. Research has indicated that maladaptive cognitions are predictive of internet addiction, suggesting therapeutic approaches that target these, such as cognitive behavioural therapy, may be effective in treating associated problems.

3.3. Specific addiction problems: online gaming and gambling

3.3.1. Online gaming: at individual level in community and clinical samples

Two studies (10.5 per cent) screened addictive video gaming in community samples in Denmark and Spain (Holstein et al., 2014¹⁰⁵; Marco & Cholz, 2017¹¹⁸). Both measured self-perceived problematic video gaming engaged in through different devices (i.e. computer, console, internet) to study offline and online gaming problems through cross-sectional school-surveys.

Holstein and colleagues (2014)¹⁰⁵ developed a new short non-clinical measure of gaming (via computer or consoles) and internet problems (i.e. internet communication and surfing) for young adolescents (i.e. 11-15 years old) in order to study their screen time and self-perceived problems related to these technology uses. Findings showed gender differences in online gaming: boys played video games for more hours per week than girls (e.g. 31.5 per cent of boys played three or more hours, while only 6.2 per cent of girls played for this period of time); regarding time spent using the internet on weekdays, both girls and boys had comparable patterns (e.g. 17 per cent used the internet for surfing or online communication for three or more hours), and use

increased with increasing age. With respect to perceived problems, boys played computer and console games more than girls (i.e. 22 per cent computers vs. 7 per cent consoles, and 7 per cent males vs. 2 per cent females), particularly with increasing age.

Marco and Cholí (2017)¹¹⁸ designed an experiment to test the effectiveness of impulsivity control techniques to prevent video game addiction in three groups of adolescents (i.e. 9-16 years old): (i) a conventional prevention programme [PrevTec 3.1] (i.e. first experimental group), (ii) programme with impulsiveness control techniques (i.e. second experimental group), and waiting list (i.e. control group). All of the groups consecutively passed through four phases: baseline (i.e. data were collected without doing anything in relation to treatments), pre-test (i.e. equal data collection across groups without any action), post-test (i.e. data collection after actions in each group: i.e. conventional programme, programme about impulsivity, and no action in the control group), and follow up (i.e. data were collected again without any action in all groups). This is recognised as a mixed design (i.e. A B A). Data collected were: sociodemographics, patterns of video game use (e.g. weekly frequency, time gaming each weekly or weekend day), online gaming patterns (e.g. a part of time, also number of daily connections to online games, and games more frequently played), subjective perception of dependency, and video game dependence assessed psychometrically with the 'Test de Dependencia de Videojuegos' (TDV; Cholí & Marco, 2011¹¹⁰). Participants in the experimental groups significantly decreased their video game use (especially the group with the implementation of impulsive control techniques had more consistent changes lasting longer), while the control group maintained previous patterns of use.

In summary, although using different strategies to measure addictive gaming in 'healthy' adolescent populations, both studies discovered: (i) when paying attention to gender issues, gaming is more prevalent in boys and increases with age, and (ii) when testing how to reduce gaming usage, programmes usually work and are more consistent across time if these programmes include impulsivity control techniques are included.

Six studies (31.6 per cent) focused on problematic gaming in clinical samples. Three studies were Spanish (Beranuy, Carbonell, et al., 2017⁸⁰; Martín-Fernández et al., 2017¹¹⁹; Torres-Rodríguez et al., 2017¹³²), one was French (Taquet & Hautekeete, 2013¹²⁹), another one was conducted in The Netherlands (van Rooij et al., 2017¹³⁸), and the last one in Germany (Frölich et al., 2016⁹⁸).

Beranuy and colleagues (2013)⁸⁰ conducted the only qualitative study on problematic online gaming which has been identified in the present research, analysing online gaming addicts in treatment in Spain and Chile. Through interviews with nine single young adult male players (i.e. 17-26 years old) who underwent treatment for the addictive game play of MMORPGs (i.e. World of Warcraft, Final Fantasy XI, Guild Wars, Lineage). Gaming was their primary health concern to commence treatment, and no other addiction was reported; all participants were students in secondary or higher education, living with at least one parental figure (who took them to the treatment; usually the mother) and half of them with a sibling/nephew.

The method of data analysis was grounded theory (Glaser & Strauss, 1967¹⁴³), which is based on coding extracts through three processes: (i) open coding (i.e. identification of concepts with dimensions and properties), (ii) axial coding (i.e. connection of categories and subcategories), and (iii) selective coding (i.e. integrating and refining the theory developed through this procedure). An explanatory model for the phenomenon of MMORPG addiction was elaborated through internal (i.e. two of the participants) and external (i.e. two professional psychologists and experts in addictions) corroboration. The findings showed there were three factors that MMORPGs fulfil for the sample: dissociation (e.g. a psychological mechanism of stepping out of oneself to be protected from external harm), entertainment (i.e. enjoyment, escapism), and virtual friendship (e.g. social relationships in the game without any need to know these gamers face-to-face; the 'clan' or the 'guild'). However, clinical symptoms of MMORPG addiction included: (i) loss of control (e.g. not being able or aware of how many times one is gaming), (ii) mood modification (e.g. guilt, depression), and (iii) craving (e.g. longing for playing when not gaming). These promote psychological dependence and severe conflicts when gamers keep on playing, entering a cycle which increases gaming time together with addiction symptomatology (some cases presented all substance use criteria; e.g. tolerance, relapse).

Taquet and Hautekeete (2013)¹²⁹ conducted a single case study of a French male video game addict (i.e. who primarily played MMORPGs among other games, such as offline role-playing games, simulation, combat in multiple technologies, both online and offline) who was 19 years old, and played as of the age of nine years old (10 years in total), who was treated by CBT specifically developed for this specific internet-related problem. The protocol comprised: (i) a semi-structured interview, (ii) a set of initial and treatment sessions, and (iii) a follow-up.

Firstly, the interview included questions about the type of game and modalities of gaming (e.g. online, offline, technologies), average playing time per weekday or weekend day (i.e. in the morning, afternoon, and evening), psychometric scales: the problematic video game playing scale (PVP; Tejeiro Salguero & Bersabe Moran, 2002¹³⁰; adapted to French by Bioulac et al., 2010¹³¹), and a new measure of video game addiction (Questionnaire sur l'Addiction aux Jeux Vidéo' - QAJV) developed by the authors of this paper.

Secondly, the treatment was performed during 11 months, through 17 sessions divided into four periods: (i) an initial phase included four sessions (across three months) to analyse the gaming behaviour to assess the motivation to change (e.g. 'if you continue gaming like this during a decade, what will happen to you?'), motivational work (e.g. playing time was double the usual adult working time per week), and a functional analysis (e.g. to support the patient to treat himself regarding their anxious-depressive symptoms associated with gaming); (ii) treatment phase using five sessions for treating the gaming behaviour (three months), with auto-observation and cognitive-emotional experience, support in reducing gaming time, control of the stimulus, setting up alternative activities (e.g. watch anime, read manga, watch YouTube videos, dog-walking, playing football, cooking, and participating in a design course) and working on relationships (e.g. parents); (iii) phase of maintenance and relapse prevention in three sessions (two months); and a (iv) final phase of re-evaluation (follow-up; three months).

During the initial phase it was detected the problem appeared three years ago, when the patient decided to drop out of school because of his gaming activity, which occurred offline and online. At present, he was gaming 77 hours per week and reached almost the highest scores in both problematic gaming questionnaires (pre-test), and criteria for behavioural addictions (Goodman, 1990¹⁴⁴). During the treatment with CBT, he progressively gained control over his gaming.

Finally, during the last phase, the situations that presented a risk for relapse were worked on (e.g. release of new games, video game expansion packs, and procrastination). Both questionnaires were administered again (post-test) and scores were low (e.g. PVP = 0 out of 9), as was playing time (i.e. 14 hours per week). Moreover, a significant social anxiety masked by excessive gaming was reduced. Thus, the treatment of emotional and behavioural cognitive processes linked to video gaming appeared an effective therapeutic method, but the most effective approach was to tackle the characteristics of the video games, the motivations to play, and the psychological experience.

Frölich and colleagues (2016)⁹⁸ studied computer game misuse and addiction in German psychiatric adolescent patients (i.e. 13-18 years old), and aimed to demonstrate an association between addictive gaming and other emotional and behavioural difficulties (i.e. emotional, conduct, peer problems, and hyperactive symptoms [ADHD]). Participants were psychiatric out- and inpatients with no other addictive behaviours and an intelligence quotient over 85. The measure used for excessive gaming was the 'Skala zum Computerspielverhalten' (CSV-V; Wölfing, Müller, & Beutel, 2011⁹⁹) and for positive and negative behavioural attributes for children from parents and older children's perspectives was the short Strengths and Difficulties Questionnaire (SDQ; Mathai, Anderson, & Bourne, 2003¹⁰⁰; in its German version by Goodman, Ford, Corbin, & Meltzer, 2004¹⁴⁵). Findings showed no specific psychiatric disorders posing an increased risk for addictive computer gaming (neither ADHD, anxiety nor depression), which supported the argument that online/computer game addiction might be a discrete psychiatric entity but was usually combined with emotional and social problems and related to ADHD and internal disorders, such as anxiety and depression (i.e. comorbidity).

The prevalence of excessive gaming in this sample was 8.2 per cent, and for gaming addiction 1.6 per cent, which matched the proportion found in other non-clinical samples. The only association found was between time spent gaming and addiction (i.e. with six-fold longer computer gaming times between the high vs. lower addiction group). With respect to parents, they were only involved in their children's gaming when this was

highly addictive, applying more parental supervision to this behaviour. Lastly, males appeared to be more addicted than females.

Torres-Rodriguez and colleagues (2017)¹³² researched a psychological treatment for IGD in Spain through a programme named 'Individualized Psychotherapeutic Program for the Addiction to the Information and Communication Technologies' (PIPATIC). This is a programme of 22 sessions (i.e. 45 minutes per session) to treat IGD in Spanish adolescents tested with four male gamers (12-18 years old, without other mental disorders or intellectual disabilities) diagnosed with this specific internet related-problem. A multiple case study with three phases (i.e. withdrawal design): baseline, treatment, and follow-up (i.e. A B A') was performed to test the efficacy of the PIPATIC, which led to a reduction of time spent gaming and less IGD symptoms and other comorbid clinical symptoms. Similar to the CBT programme used by Taquet and Hautekeete (2013)¹²⁹, the PIPATIC offered psychotherapy for six months, initially for all technological addictions, but addressed online gaming specifically in this study.

The programme included techniques related to empathy, active and reflexive learning, acceptance, trust, mid-directivity, paraphrasing, clarification, synthesis, confrontation, interpretation, feedback, abilities development and responsibility, encouraging self-efficacy, insight, and therapeutic alliance. These resources are organised in six modules with therapeutic objectives: (i) psychoeducation (three sessions; including individual and family therapy); (ii) standard IGD intervention (five sessions; including stimulus control, and coping strategies); (iii) intrapersonal (five sessions targeting self-control and self-esteem); (iv) interpersonal (two sessions; targeting assertiveness, and communication skills); (v) family (three sessions; working on limits and affect); (vi) new life style (two sessions; including self-observation, alternative activities, and relapse prevention), and two sessions developed depending on the patient's needs.

All patients suffered from loneliness and being at home for longer periods for different reasons (e.g. bullying in school, and loss of someone loved), and presented comorbidity (e.g. depression, social phobia, Asperger, or ADHD) and difficulties interacting with family members (e.g. anhedonia, high tiredness, low self-esteem, insecurity, and discussions with parents). They were heavy gamers (i.e. they played 8-12 hours per day of different types of online games (e.g. MMORPG, multiplayer online battle arena [MOBA], First-Person Shooter [FPS], and other role playing games [RPG] or mini-games; e.g. World of Warcraft, Legend Online, League of Legends, Call of Duty, and Minecraft); had addiction symptomatology, such as withdrawal (i.e. irritability when they could not play because a family member asked them to stop or the internet connection was lost) or conflict (they left their hobbies, friends, dropped grades, and dropped out of school).

To measure gaming addiction the 'Cuestionario de experiencias relacionadas con los video juegos' (in English: video game-related experiences questionnaire) (CERV; Chamarro et al., 2014¹³³) and the IGD test (IGD-20; Pontes et al., 2014¹⁴⁶) were used. Results showed that during the treatment phase, the gameplay hours were reduced by approximately 40 hours per week. The main drop off in gaming hours occurred after three months of treatment, which was maintained during follow-up.

Van Rooij and colleagues (2017)¹³⁸ performed a clinical validation of a second version of a psychometric tool to assess gaming disorder based on IGD criteria (American Psychiatric Association, 2013¹⁰), named the Clinical assessment tool for gaming disorder problems (C-VAT 2.0). It is valuable to have a scale clinically validated, as this is not usual in the existing questionnaires on gaming disorder. The clinical sample was young male patients (i.e. 13-23 years old) in treatment for video gaming disorder, half of them playing only online games and the majority with comorbidity (e.g. social anxiety, pervasive developmental disorders, ADHD or attention deficit disorder, parent-child relationship problem, depression, obesity, cannabis use, autism, and tiredness, etc.). They spent seven hours on weekdays and 8.5 hours on weekend days on gaming on average (their free time and part of their school time), with usual comorbidity (e.g. depression, anxiety, and ADHD), and problems with their social environment (e.g. school and family). They reported to be heavy gamers through the C-VAT 2.0 with moderate problems with functions (e.g. clinical and personality disorders, somatic problems, psychosocial factors, and general functioning).

Thus, this gaming test identified 91 per cent with five out of the nine IGD criteria, which shows high sensitivity (i.e. capacity to detect real clinical cases of IGD; true positive rate). The only difference with IGD proposed in

the DSM-5 (APA, 2013¹⁰) is that gaming disorder detected by the C-VAT 2.0 encompassed both offline and online gaming.

Martin-Fernandez and colleagues (2017)¹¹⁹ described profiles of Spanish adolescent (i.e. under 18 years old) outpatients with IGD according to their comorbidity and response to treatment at three and six months. The clinicians reported demand for treatment for problems related to video games have increased significantly in adolescents seeking help in public hospitals.

From these IGD patients, 45.8 per cent presented an internalised profile characterised by comorbidity (i.e. mood, anxiety, and personality disorders), while the 52.5 per cent externalising profiles presented were: disruptive behaviour disorders (e.g. ADHD), or other non-specified disorders. Of the internalised profiles, 78 per cent had difficulties in social relationships, 63 per cent had family histories of psychiatric disorders, and 67 per cent used video games to escape discomfort caused by their interpersonal problems, showing high levels of loneliness; while the externalised profiles showed more recreational play despite the consequences in terms of family and friendships. After three months of treatment, the externalising profile patients showed improvements; while with the internalised treatment it usually took longer and required a combined and comprehensive approach, which prioritised comorbidity. In both profiles, family issues were highly prevalent for different reasons, and there were also problems in the academic sphere.

Thus, the authors suggested that comorbidity associated with IGD may be able to discriminate between these two IGD profiles (externalised vs. internalised), which may be able to influence treatment response.

Summary

These studies highlight that clinicians should consider that time spent on gaming, age, and gender (being a young male), type of games (role-playing games), type of comorbidities (i.e. internalising vs. externalising profiles), and lack of external parental control (or lack of relationship with parental figures) as important risk factors for developing gaming addiction problems. Furthermore, they point out that gaming disorder is a unique clinical entity which requires recognition and can be treated by CBT approaches independently of the etiology leading to this problem and the comorbidities involved (including learning how to spend time differently, developing new skills, and preventing relapse). This intervention has worked well in European countries (e.g. Spain and France) when applied between six months and a year when the problem is detected early.

3.3.2. Online gambling: at individual level in clinical samples

Three studies (15.8 per cent) addressed gambling disorder in relation to behavioural addictions based on clinical samples. Two papers came from Spain (Jimenez-Murcia et al., 2014¹⁰⁶ and Mallorqui-Bague et al., 2017¹¹⁵) and the other one from France (Luquiens et al., 2016)¹¹³. For the Spanish studies, the purpose was to connect gambling disorder with the proposed IGD, while for the French study the main interest was to test if different modalities of an internet-based therapy for non-treatment seeking online poker gamblers could show efficacy in this addictive behaviour.

These studies were cross-sectional surveys performed with outpatients from gambling units in public hospitals (Jimenez-Murcia et al., 2014¹⁰⁶; Mallorqui-Bague et al., 2017¹¹⁵) or potential patients based on at-risk gamblers screened on an online gambling website (Luquiens et al., 2016¹¹³). The latter was performed as an experiment (i.e. a randomised controlled trial) to check the efficacy of four online interventions to reduce gambling disorder (with a pretest –baseline- and two post-tests [at six and 12 weeks]).

Firstly, Jimenez-Murcia and colleagues (2014)¹⁰⁶ studied the prevalence of video game use and video game addiction in gambling middle-age Spanish patients to observe the potential connection between these behavioural addictions from a gambling perspective. They selected the 'Test de dependencia de Videojuegos' (in English: video game dependency test) (TDV; Choliz & Marco, 2011¹¹⁰) to assess four addiction symptoms (i.e.

withdrawal, tolerance, problems regarding excessive video game use, and lack of control) to estimate the prevalence of potential video game addicts. 37.3 per cent of the patients used video games, but only 15 per cent could be classed as video game addicts. Interestingly, a linear relationship between both disorders in terms of severity was initially observed, together with more general psychopathology (e.g. paranoid ideation, distress, obsessive-compulsive symptoms, and interpersonal sensitivity), but not with gambling symptomatology. Thus, this potential association between both addictive behaviours was finally not established (i.e. both behavioural addictions were independent problems). In summary, only higher video game scores were associated with younger gamblers, general psychopathology (e.g. depression, anxiety, and social phobia) and few personality traits (e.g. low self-directedness, and higher persistence).

Secondly, Luquiens and colleagues (2016)¹¹³ surveyed online problem poker gamblers on a poker gambling service to divide them into groups in order to offer them online treatments for their gambling. They used the Problem Gambling Severity Index (PGSI; Holtgraves, 2009¹⁴⁷) to assess users' gambling behaviour to offer one of these four interventions to at-risk gamblers only: psychotherapies (i) with or (ii) without guidance (email with a self-help book with a CBT programme with or without guidance by a trained psychologist), (iii) personalised feedback on their gambling status by email, and a (iv) control condition (waiting list). The attrition rates were high (83 per cent), especially for the group with guidance. No difference was found between the groups, although a third of the gamblers surveyed in the pre- and post-tests fell below the problem gambling threshold at six weeks.

Third, Mallorqui-Bague and colleagues (2017)¹¹⁵, similar to Jimenez-Murcia et al. (2014)¹⁰⁶, researched the connection between gambling disorder and IGD to conceptualise both from the gamblers' perspective. However, the approach was different as the authors focused only on online gambling. Thus, the sample of patients had two groups: online gamblers (90.6 per cent) and online gamers (9.4 per cent). Findings showed gamblers were middle-aged men, with secondary or tertiary education, married and employed, while gamers were young male adults, immigrants, with lower education and single. The clinical profiles were also different with online gambling being more severe: this disorder displayed higher: mean age of disordered onset (after controlling for age as covariate), disorder severity (i.e. more criteria met), somatisation and depression symptoms, as well as specific personality traits (i.e. novelty seeking and persistence), and tobacco use. On the other hand, only IGD patients showed higher body mass index (BMI) and food addiction (FA). In summary, although both addictive online behaviours share some emotional distress and personality traits, gambling disorder is more severe.

Jimenez-Murcia and colleagues (2014)¹⁰⁶ highlighted that when a younger male gambler who seeks treatment is also a heavy video gamer, the psychopathology and personality traits associated are more severe, which suggests intervention strategies should target the comorbid disorders. Accordingly, Luquiens and colleagues (2016)¹¹³ discovered that when affected gamblers do not seek help, offering them support periodically in the form of personalised interventions can be counter-productive (i.e. leading to a reluctance to complete homework) or have an aversive effect, as it may be perceived to be too time consuming or too intrusive. Mallorqui-Bague and colleagues (2017)¹¹⁵ found that both addictive online gambling and gaming problems have some commonalities in relation to general psychopathology and personality traits, but differential sociodemographic characteristics, and in the case of gamers, eating problems appear to play a role in their health concerns.

The three studies described above were based on participants with problematic gambling behaviours, but two studies were based on individuals who sought treatment in health centres for gambling and gaming as primary health concern, which is somewhat unusual in the case of gambling, as usually only 7 per cent to 12 per cent of gamblers actively look for treatment (Jimenez-Murcia et al., 2014¹⁰⁶; Mallorqui-Bague et al., 2017¹¹⁵), while another study (Luquiens et al., 2016)¹¹³ was based on non-treatment seekers, which discovered that 'more is not always better' when trying to offer support to those who have not requested help (i.e. those who receive a brief treatment with or without booster obtained the same results).

With respect to comorbidities, all studies showed that experiencing comorbidities are the norm in addictive gambling and gaming (i.e. somatisation, and depression), as well as personality traits (i.e. persistence). Moreover, a similar aspect is probably present in both addictive behaviours in relation to the intrinsic motivations to gamble and/or play online games. However, sociodemographics related with age and other health issues (e.g. food and weight problems) have only emerged as more severe in online gaming addicts.

Summary

It seems gambling disorder is a different clinical entity with respect to gaming disorder, although both share some type of emotional distress together with higher harm avoidance and reward dependence traits than normative groups. However, when gambling is the main behavioural addiction and the patient also plays video games, the severity of the comorbidity and specific personality traits seem to be higher, probably because of the severity of online gambling. Moreover, in the case of gambling, it seems clear that online interventions are probably only effective when the gambler seeks treatment, and a commitment with a health professional is made, even if it is for a short intervention. However, it seems that CBT should be personalised to the type of gambling activity, such as online poker.

3.4. Preventive actions and treatment for internet-use-related addiction problems in Europe

The included studies refer to preventive actions and treatment on internet-use-related addictions in Europe. In what follows, these will be summarised as based on the presented European studies. Specific populations should be targeted with prevention campaigns. Research (Gonzalez & Orgaz, 2014)¹⁰¹ showed that the rates of problematic internet use in college populations are a cause for concern. There appear to be distinctive addictive patterns of behaviour on the internet, such as online gaming addiction (Fröhlich et al., 2016)⁹⁸. For instance, Beranuy and colleagues (2013)⁸⁰ suggest MMORPG addiction specifically has similar side effects to substance-related addictions, including evidence of tolerance and relapse.

From a clinical perspective, the included studies also suggest that individuals who seek treatment for internet addiction should be screened for possible underlying or comorbid psychiatric disorders and associated symptomatology. Therefore, treatment should be chosen based on profiling, severity of symptoms, and comorbidity (Floros et al., 2014⁹³; Martin-Fernandez et al., 2017¹¹⁹; Müller et al., 2014¹²²; Torres-Rodríguez et al., 2017¹³²; Wölfling et al., 2014¹⁴⁰), including type of internet use (Danet & Miljkovitch, 2016⁹⁰), and high levels of psychosocial distress, mainly related to depressive symptoms (Müller et al., 2014¹²²), and bipolar disorder (Wölfling et al., 2014¹⁴⁰). The presence of comorbid disorders points to more severe clinical pictures because it can exacerbate the presentation of internet addiction, regardless of personality structure.

In addition to considering the presence and severity of co-occurring mental disorders from a clinical perspective, research (Brand et al., 2014⁸²) has also pointed to the need to involve a cognitive component in the treatment of internet-use-related addiction problems. There appears to be a need to assess patients' coping styles and cognitions in order to improve faulty thoughts, which can decrease internet addiction symptoms and improve recovery. Neurobiological evidence supports these findings: using brain source sLoreta analyses, a generalised impairment in emotional and cognitive processing abilities was found in individuals diagnosed with internet addiction in Italy (Lai et al., 2017¹²²). This suggests that it is possible that a neural pathway could be used as a biological marker for diagnosis and outcome of psychological treatments in patients with internet addiction in the future.

Another important factor that may support treatment response has been shown to be the specific client profile. One of those factors was shown to be the age of the client (Jiménez-Murcia et al., 2014¹⁰⁶). Clients who present with gaming addiction are younger than clients with gambling disorder and present more dysfunctional personality traits, and more general psychopathology; although gambling is still considered to be the most severe behavioural addiction. Intervention strategies must focus on these personality traits and

how to address these in treatment. Research has indicated that one of the important characteristics to consider regarding the individual client are externalising versus internalising profiles of adolescent clients with IGD in Spain (Martin-Fernandez et al., 2017¹¹⁹).

Internalising profiles referred to clients presenting with inhibition, unease, avoidance or timidity, depressive, anxiety and personality (Cluster C disorders as identified in the DSM), whereas externalising profiles referred to clients with problems controlling levels of aggression, impulsivity, negativity or hyperactivity, and who displayed Disruptive Behaviour Disorder (DBD), ADHD and non-specific DBD. This research indicated that after three months of psychotherapy including psychopharmacotherapy for those clients who required medication, the externalising profile showed improvements.

The researchers found that comorbid disorders allowed to demarcate IGD profiles in adolescents and these could influence treatment response. Comparable results were found in a study (Senormanci et al., 2013¹⁴⁸) using adult outpatients with internet addiction in Turkey. This research found that internet addiction treatment benefits from considering the levels of anger a client has whilst validating their feelings. In this study, anger was found to be an important predictor of internet addiction. Another study conducted in Norway showed that it is important to consider the client's individual case and profile (Palleesen et al., 2015¹⁴⁹). This study suggested that manualised treatment for video game addiction may not always be the best approach, and clinicians should devise treatment approaches based on the individual client's profile, as such an individualised approach may lead to better therapy outcomes and improved recovery.

Other clinical research (Mallorquí-Bagué et al., 2017¹¹⁵) also supported the need for differentiating between different patterns of addictive behaviours. Gambling disorder and IGD clients in Spain were found to share similar emotional distress and personality traits. However, IGD patients also display some different characteristics compared to clients with gambling disorder. This suggests that it is important to differentiate between the two and to research specific characteristics in both gamers and gamblers further in a clinical setting. In addition to these different treatment approaches, the included research papers have also pointed out that considering family structure is vital in the treatment of addictive online gaming as lack of parental control has been linked to the development of computer game addiction or misuse in child and adolescent inpatients (Frölich et al., 2017⁹⁸). From the perspective of the clinician or psychotherapist providing treatment for online gaming addiction, research (Taquet & Hautekeete, 2013¹²⁹) has indicated that good knowledge of the world of video games by the therapist seems to improve the therapeutic alliance in the treatment of video game addiction. Without treatment focusing on video games, it may be difficult to treat social anxiety that often accompanies gaming addiction. The characteristics specific to video games, the motivations to play and the psychological experience of the player seem to be essential variables to take into account to maximise the efficiency of CBT applied to videogame addiction.

A video game addiction prevention programme for adolescents in Spain (Marco & Choliz, 2017¹¹⁸) also indicated that the inclusion of impulsiveness control techniques over and above more traditional prevention programmes appears effective in reducing video game addiction symptoms. The changes produced by the implementation of impulsive control techniques were more consistent and lasting in time in comparison to the more traditional prevention approach applied. Accordingly, considering impulsivity in online gaming addiction prevention programmes appear a viable approach.

Summary

Young populations, including children, adolescents, and university students should be targeted specifically as they appear to be populations particularly at risk for developing problems as a consequence of their problematic and addictive internet use. More research is needed in order to assess the effectiveness of particular treatment ingredients and the factors that contribute to reducing the risk to developing internet-use-related addiction problems in the first place. Useful prevention and treatment approaches should take into account the correct diagnosis of internet addiction (specifically internet gaming addiction), the client's individual profiles, the presence of comorbidities, and factors contributing to both risk as well as recovery.

4. Discussion

The literature review performed has sought to map recent research published on problematic internet use and internet addiction in Europe between April 2013 (i.e. when the APA decided to include IGD in the appendix of the DSM-5) until February 2018. This report has examined results from the areas of research focused on internet-related addiction behaviours, including internet addiction, gaming and gambling addiction. The purpose was to provide a set of policy options and advice for the European Parliament. In total, 19 empirical community and clinical studies were identified, which focused on:

- i) online users' characteristics;
- ii) the concern on general online uses;
- iii) the profile of patients with gaming disorders, their clinical treatment;
- iv) the differentiation between gaming and gambling patients.

Each of these will be discussed subsequently.

4.1. Online users' characteristics

The studies analysed came from seven countries, most from Southern (i.e. Italy, Spain, Greece) and Western European regions (i.e. Germany, France, The Netherlands), and only one from Northern Europe (i.e. Denmark), viewed from the divisions regarding sub-regions in the United Nations geosphere for Europe (2007¹⁵⁰).

With respect to the samples, the included studies ranged from case studies of online gaming to studies including large samples (i.e. thousands of participants). With regards to participants' age, studies primarily included adolescents and young adults as participants. Moreover, usually high-schools or university students (i.e. both age groups: adolescents and young adults) were the most studied group of individuals. Many developmental researchers suggest this is because these age groups are subject to high-risk behaviours (Arnett, 1992¹⁵¹; Bachman et al., 1996¹⁵²), a process involved on developing their identity, characterised by self-reflection and sensation seeking before settling down into the roles and responsibilities of adult life. Indeed, research suggests contemporary youth are usually involved in a broad range of problematic online experiences. For this reason, the majority of the studies analysed have focused on gaming addiction. Online gaming was found to be more prevalent in the adolescent groups in comparison to adult groups. Contrarily, individuals with online gambling addiction were found to be middle-aged males and some females, suggesting there are different sociodemographic profiles associated with specific types of behavioural addictions. Problematic behaviours were usually more prevalent in males in comparison to females (especially regarding gaming and gambling addictions), except when measuring generalised internet addiction.

4.2. Internet addiction

Regarding general internet use, the research presented indicated a proportion of undergraduate university students was confronted with a broad range of problematic online experiences over the period of the past year, which were not exclusively related to overuse of the internet. It also included 'conflict' as a classical component of addiction within a biopsychosocial framework developed by Brown in 1993 and later updated by Griffiths (2005¹⁸). The component of 'conflict' refers to the problem between the person with the addiction and those around them (interpersonal conflict) or from within the individual themselves (intrapsychic conflict), which are concerned with the particular activity (e.g. internet use, online gaming or online gambling). In this review, both aspects of the conflict were reported: interpersonal (i.e. a neglect of family or friends, problems related to interactions with people online) or intrapersonal (i.e. difficulties cutting down online time, lacking sleep due to internet usage, leading to fatigue, apathy, and irritability, and problems with daily obligations, declining grades or poor job performance). Another addictive symptomatology classed by Griffiths which has emerged in this review was 'salience' (i.e. when the online activity becomes the most important thing in the user's life; e.g. preoccupation with one's own internet use, which may be associated with cognitive distortions). Brand et al. (2014)⁸² have linked these specific cognitions with poor coping (i.e. suppression – suppressing unwanted thoughts related to online behaviours, maladaptive problem solving – substance use, or avoidance – using the internet to take one's mind off of things) and cognitive expectations (i.e. positive or avoidance,

such as experiencing pleasure and fun versus being distracted or escaping from real problems, respectively) to show they increased the risk for internet addiction. Regarding psychological therapy for internet addiction, the impact of maladaptive coping styles and the interplay with psychopathological symptoms has been considered in previous work (Cole & Hooley, 2013¹⁵³; Kuss, Dunn et al., 2017¹³; Kardefelt-Winther, 2014¹²; Taquet & Hautekeete, 2013¹²⁹) and suggests internet use motivations are an important factor when considering effective and efficacious treatment approaches.

Another finding is internet addiction is associated with preoccupied and fearful attachment styles, problems in offline relationships, heightening the risk of spending increased amounts of time invested in social interactions on the internet. This suggests the presence of some of the same symptoms traditionally associated with substance-related disorders, specifically 'tolerance' (i.e. an increased amount of time spent using the internet) and significant impairment in daily functioning (i.e. conflicts reported in daily life because of internet use). According to Grant et al. (2010)¹⁵⁴, each behavioural addiction is characterised by a recurrent pattern of behaviour (e.g. internet use), and the repetitive engagement in this behaviour interferes with functioning in other domains. Furthermore, although not many studies in this review exclusively focused on internet addiction, and fewer used a clinical approach, the presence of comorbidities was frequently observed in this behavioural addiction, specifically with three mental disorders (i.e. anxiety, depression, and obsessive-compulsive disorders [OCD]).

This is in line with the results set forth by Kuss and Lopez-Fernandez (2016)¹⁵⁵ who reported in a previous systematic review that comorbidities appear to be the norm rather than the exception for those who present with the problem of internet addiction. They emphasised the need for considering comorbidity in different types of treatment for internet-use-related disorders. In this review, anxiety and mood disorders, and also OCD, appeared to be particularly common in individuals with internet-use-related problems and internet addiction. The compensation hypothesis can provide an explanation for the presence of comorbidities, as internet activity can be considered a compensatory activity for poor social skills, interpersonal difficulties, or the lack of pleasure in adolescents' or young adults' daily lives (Yoo et al., 2004¹⁵⁶). A link between internet addiction and Axis I (e.g. major depression, generalised anxiety disorder, ADHD, dysthymia, social phobia, hostility, substance use disorders, and psychotic disorder) and Axis II disorders (e.g. narcissistic or borderline personality disorder, and obsessive-compulsive personality disorder) has been reported in previous research (Floros et al., 2014⁹³; Ha et al., 2006¹⁵⁷; Ko et al., 2012¹⁵⁸).

Moreover, only CBT has been reported to be effective in leading to significant changes in internet addiction (i.e. symptoms, time spent online, negative consequences, and comorbid symptoms). Following the research results presented in the current report, in relation to internet addiction, other traditional addiction components (Griffiths, 2005¹⁸), such as withdrawal (i.e. unpleasant feeling states and physical effects, which occur when the online activity is discontinued or suddenly reduced) and relapse (i.e. a tendency for earlier patterns of the online activity to reoccur following abstinence periods) have not emerged as significant addiction symptoms. Only a few clinical studies have been detected in relation to internet addiction.

Accordingly, policies should promote the healthy, safe, and ethical use of the internet in high-school and university students. Policies may benefit from modelling school-based programmes that have been effective in reducing problems associated with internet use (see e.g. Lindenberg et al., 2017¹⁵⁹). Finally, it is worth noting that school-based prevention programmes were shown to be effective to reduce internet addiction symptomatology.

Furthermore, mirroring other previous research on high school and university student populations in Northern, Southern, Western, and Eastern European regions during the period studied (e.g. Kuss et al., 2013¹⁶⁰; Lopez-Fernandez et al., 2013¹⁶¹; Lopez-Fernandez et al., 2014¹⁶²; Wąsiński, & Tomczyk, 2015¹⁶³), similar methodologies (e.g. survey cross-sectional studies using self-screening tools) and findings (e.g. a small proportion of problematic internet users) were found. Interestingly, several cross-cultural studies have been conducted to compare internet addiction across countries (Mak et al., 2014¹⁶⁴; Montag et al., 2015¹⁶⁵), almost all of them in Europe using adolescent student samples (Durkee et al., 2016¹⁶⁶; Tsitsika et al., 2014⁶⁷), where the

main purpose was to estimate the prevalence per country (e.g. with prevalence ranging between 1 and 13 per cent in adolescents (Tsitsika et al., 2014¹⁶⁷), with higher prevalence found in the South (e.g. Spain) and among males; and 14 and 55 per cent internet addiction prevalence in adults (Laconi et al., 2018¹⁶⁷), with higher prevalence for this population in Northern countries [e.g. UK] and in females). In addition to this, research has found associations between internet addiction and psychopathology (Durkee et al., 2013¹⁶⁸; Kaess et al., 2014¹⁶⁹; Kuss, Dunn et al., 2017¹³; Laconi et al., 2018¹⁶⁷; Young, 1999¹⁷⁰). The findings related to comorbidities are similar to those reported in this review (i.e. internet-related problems were associated with OCD, hostility, paranoia and phobic anxiety). However, the findings related to prevalence could hardly be compared due to the different sampling methods and sample characteristics, and instruments used to measure internet addiction, among other differences.

Two review papers on internet-use-related addiction problems showed complementary findings. Firstly, Kuss and colleagues (2014)⁴⁴ found no gold standard of internet addiction classification exists and all scales identified in their study adopted official criteria for substance use disorders or pathological gambling, with a few criteria relevant for an addiction diagnosis, time spent online, or resulting problems. Furthermore, prevalence rates differ as a consequence of different assessment tools and cut-offs (e.g. from 0.8 per cent in Italy to 26.7 per cent in Hong Kong). Internet addiction was found to be associated with sociodemographics, internet uses, and psychosocial factors, as well as comorbid symptoms (i.e. compulsive use, negative outcomes, and salience) in both adolescents and adults. On the other hand, another review performed by Lopez-Fernandez (2015)⁵² to assess the increase of scientific papers published following the advent of IGD within a short term period (2013-2014) found a steady increase in publications related to general aspects of internet addiction (e.g. its clinical components, its prevalence, and psychometric measures), and a growing interest in the contextual factors associated with this addictive behaviour, scientific progress in its conceptualisation based on existing theoretical models, and neuropsychological studies. However, the most interesting finding was almost a quarter of the studies published focused on specific addictive online behaviours, showing heterogeneity across several internet addictions, with online gaming addiction being the most common one, followed by cybersex, and online social networking. Notwithstanding the foregoing, in this systematic review, apart from internet addiction, only gaming and gambling addictions have emerged as addictive behaviours in European internet users.

4.3. Online gaming addiction

Regarding online and offline gaming addiction in community samples, only one North and one South European study covered this issue. Both studies assessed self-perceived problematic video gaming independently of the device used, which is a novel approach as the researchers did not restrict themselves to study gaming on computers. However, both studies were conducted in different settings, as the study by Holstein and colleagues (2014)¹⁰⁵ aimed to create a short non-clinical tool to measure gaming-related and other online problems, while Marco and Choliz (2017)¹¹⁸ assessed whether treatments including techniques to regulate impulsivity were more effective than those without this approach in terms of reducing problems associated with problematic video gaming. Screening adolescents for potential behavioural addictions has been reported several times in the literature, usually associated with a concern that this technology use may negatively impact on students' grades. For instance, Skoric and colleagues (2009)¹⁷¹ assessed the relationship between video gaming habits and elementary school students' academic performance, and they found a negative association between addictive gaming tendencies and poor school performance, but associations between addictive gaming tendencies and time spent on games or games engagement were not found. On the other hand, the link between addictive behaviours, such as gaming and impulsivity, has been studied relatively frequently, as higher levels of impulsivity seem to be related to lower levels of self-regulation, which in turn is associated with more time spent video gaming (Liau et al. 2011¹⁷²). Thus, impulsivity has been identified as a risk factor for online gaming addiction (Bargeron & Hormes, 2017¹⁷³; Billieux et al., 2015¹⁷⁴), and has been found to be associated with dysfunctions in brain areas which are involved in behaviour inhibition, attention, and emotion regulation (i.e. right dorsomedial prefrontal cortex, together with the bilateral insula and the orbitofrontal cortex, the right amygdala, and the left fusiform gyrus were found to be smaller in adolescent IGD patients; Du et al., 2016¹⁷⁵; Fauth-Bühler & Mann, 2017¹⁷⁶).

It is worth noting that almost all papers on online gaming addiction in Europe, which constituted 42 per cent of the present systematic review, were conducted in clinical settings with out- and in-patients in health centres and hospital units from Southern and Western European regions, with Spain being the country that has produced the largest number of published papers on clinical research on gaming addiction. Ten lessons have been learned from these European findings reported in clinical research papers on online gaming addiction: (i) gaming problems appear in adolescent high-school students, and there is a smaller prevalence of online gaming addiction in young adults; (ii) it usually affects males; (iii) who play role-playing games (e.g. MMORPGs); (iv) who spend a considerable time at home alone; (v) they look for treatment (e.g. through one of their parents) because the gaming problem is the first motive for seeking help (and not other comorbidities); (vi) they present addiction symptomatology (i.e. loss of control, mood modification, conflict, craving, withdrawal, tolerance, and relapse); (vii) they present comorbidities which usually appear after the gaming problem (i.e. psychological comorbidities include the following: mood, anxiety, social phobia, ADHD, Asperger's, personality disorders, and somatic problems); (viii) the majority of these patients has problems with social relationships; (ix) and CBT appears to produce significant improvements (e.g. reduction of time spent gaming and addiction symptomatology) after three months following treatment (e.g. if patients have an externalising profile), and usually achieves positive and consistent results after six months (e.g. for both externalising and internalising profiles, if the accompanying comorbidity is treated as well); (x) the prognosis can be improved if support from family and significant others is provided (e.g. via a parent or a sibling) using a systemic approach, and can be improved further if patients are committed to therapy.

The presented evidence supports the inclusion of IGD in the DSM-5 (American Psychiatric Association, 2013¹⁰) and gaming disorder in the ICD-11 (World Health Organisation, 2018¹¹) as a distinctive pattern of addictive behaviours on the internet, separate from other possibly addictive behaviours (such as generalised internet addiction and online gambling). According to Petry and colleagues (2013)⁵⁰, an international consensus is needed to assess IGD in order to provide scientific evidence for this new clinical entity classed as behavioural addiction. Petry et al. requested cross-cultural collaboration and the studies included in this report have provided this to a certain extent. This has been achieved through studies that have validated different instruments that emerged prior or subsequent to the appearance of IGD in the DSM-5 and matched the nine proposed criteria (e.g. the PVP [Tejeiro & Bersabe, 2002¹³⁰] was developed before the emergence of IGD in the DSM-5, and subsequently, the IGT-20 [Pontes et al., 2013¹⁴⁶], the C-VAT.02 [van Rooij et al., 2017¹³⁸], and the CERV [Chamarro et al., 2014¹³³] were published). The addiction criteria proposed for IGD measure traditional addiction symptomatology (i.e. preoccupation, withdrawal, tolerance, reducing or stopping engagement, giving up other activities, continuing despite problems, deceiving/covering up, escaping adverse moods, risking/losing relationships/opportunities), and coincided with the five components of the addiction model adapted by Griffiths (2005¹⁸; i.e. salience, mood modification, tolerance, withdrawal, conflict and relapse). Thus, these studies provide empirical evidence for this potential disorder in European samples from Southern and Western regions.

Moreover, another relevant difference that was detected in this review was that when comparing internet addiction with gaming addiction, the latter covers all the traditional components of addiction, while the former only covers them partially. This may be another argument in favour of the similarity between gaming addiction as a behavioural addiction and other substance-related disorders (Alavi et al., 2012¹⁷⁸; Grant et al., 2010¹⁵⁴). Another aspect which is slightly different in both potential behavioural addictions (i.e. generalised internet addiction vs. gaming addiction) is that the motivations for general internet use are different in comparison to those for gaming, especially if the game is an RPG. Several researchers (Fuster et al., 2014¹⁷⁸; Kuss, 2013⁴⁸; Yee, 2006¹⁷⁹) provide useful insights into the motivations for playing the very popular MMORPGs, with the motivations of achievement, socialisation, dissociation, and escapism having been linked to gaming addiction over and above any other motivations, as well as time spent gaming and male gender (Frölich et al., 2016⁹⁸; Kuss et al., 2012¹⁸⁰), and high absorption has been found to be a risk factor for problematic MMORPG use (Cole & Hooley, 2013¹⁵³). This indicates that use motivations and coping styles should be inquired into during initial clinical assessment.

Other systematic reviews have been performed focusing on online gaming addiction. First, Kuss and Griffiths (2012)¹⁸¹ argued that online gaming addiction follows a continuum, with antecedents in etiology and risk factors, through to the development of an overall addiction, followed by ramifications in terms of negative consequences and potential treatment. Similarly, another systematic review by Pontes and Griffiths (2015)¹⁸² found that distinct cognitions (i.e. preference for online social interaction, mood regulation, cognitive diversion, self-escapism, positive attitudes towards in-game rewards, actual-ideal self-discrepancy, and intrinsic motivation to play) and cognition-related impairments (i.e. deficient self-regulation, preference for a virtual life, cognitive bias, decision bias, impaired cognitive control ability, cognitive deficits, poor cognitive error processing, decision-making deficits, maladaptive cognitions, and cognitive distortions) were associated with IGD, which is in line with the motivations and copying styles reported in the present review. Finally, Kiraly and colleagues (2017)¹⁸³ performed a systematic review of current and potential policies on internet and video game use, classifying the policies in three groups: policy measures limiting availability of video games (e.g. shutdown policy, fatigue system, and parental controls), measures aiming to reduce risk and harm (e.g. warning notifications), and measures taken to provide help services for gamers. However, all findings from these three recent reviews are based on research which was primarily performed outside of Europe (i.e. in Asia). Thus, caution should be taken when generalising these findings to European countries and gaming behaviours within Europe. Indeed, at present, it appears cross-cultural studies on gaming addiction are particularly insightful, as merely few exist yet. The ones published have screened adolescent student samples to estimate the prevalence of addictive gaming and its symptomatology using a cross-country strategy (e.g. Lopez-Fernandez et al., 2014¹⁸⁴; Müller et al., 2014¹⁸⁵).

4.4. Online gambling addiction

Finally, a small number of studies have addressed clinically diagnosed online gambling addiction in Europe, which has usually been associated with IGD in Spain. This fact is not unusual as online gambling (i.e. internet gambling) research is still scarce (Griffiths, 2003¹⁸⁶; Shaffer et al., 2008¹⁸⁷), which is why policy makers rely on professional opinions and conventional experience and wisdom about offline gambling to develop policies, as an international concern related to this type of gambling exists and it is recommended that jurisdictions will progressively take action to harmonise gambling public health policies including this online behaviour (Gainsbury et al., 2014¹⁸⁸).

The interest in studying IGD in relation to gambling addiction has emerged in public hospitals with units that attend to gambling outpatients, and these studies have estimated the prevalence of other mental disorders which are comorbid with gaming disorder. However, the most critical finding is that the studies have evidenced gambling and gaming addictions are different clinical entities with different user profiles. Thus, individuals with both addictions have more severe symptoms than individuals with one only (i.e., psychopathology and personality traits are more severe), although online gambling still seems the most severe behavioural addiction. This evidence suggests intervention strategies should target the comorbid disorders, especially if both behavioural addictions are present in the patient. The profiling of these groups is also different: online gamblers are often well-educated, married and employed middle-aged men (i.e., with income to invest in gambling), while online gamers are often younger single males, with lower education and psychological comorbidity (i.e., depression, anxiety, social phobia, and somatisation), specific personality traits (e.g. low self-directedness, higher persistence, novelty seeking), and with overweight. In any case, it seems clear only those who look for treatment (by themselves or with their families) may have a positive prognosis. This is a low proportion of gamblers and probably online gamers as well, whilst the number of online gaming addicts who seek treatment is increasing, although natural recovery exists.

This strategy to look for clinical evidence to distinguish behavioural addictions (e.g. commonalities and differences between gambling and gaming disorders) is a new approach adopted to study behavioural addictions, which has been used by only a few researchers (Choi et al., 2014¹⁸⁹; Fauth-Bühler & Mann, 2017¹⁷⁶). However, more should be done to be able to conceptualise, diagnose, treat and prevent behavioural addictions, especially the one that appeared to be the most prevalent in this European review: gaming use-related addiction. Accordingly, Müller and colleagues (2014)¹⁹⁰ proposed a model which could be helpful for

the theoretical understanding of addictive gaming, public health campaigns, and psychoeducation within therapeutic settings.

5. Policy options

This final section assesses different policy options (Figure 2) derived from the analysis presented in this report. Each option is summarised whilst paying attention to the risk factors involved and the possible preventive actions.

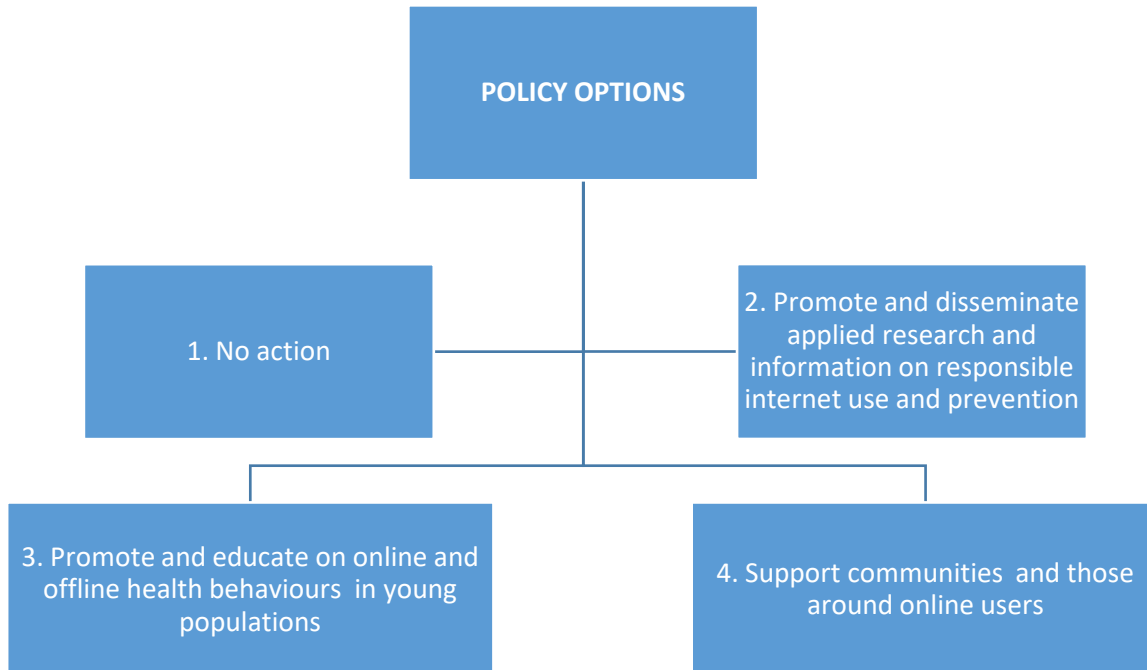


Figure 2. Policy options.

5.1. Policy option 1: No action

Risk factors are: (i) being an excessive online user with addiction symptomatology using the internet for general purposes (i.e. without a clear specific pattern; e.g. messaging, searching, streaming, etc.) or with a specific use (i.e. gaming and/or gambling) for a number of months without stopping; (ii) using the internet for these generalised or specific activities, causing negative repercussions in daily life (i.e., functional impairment and distress).

Preventive actions are: excessive internet use can (or cannot) be a short-term problem; it can develop as a consequence of diverse factors (e.g. excessively engaged in online activities, coping with a stressful situation, a maladaptive coping mechanism, engaging in new exciting entertainment, etc.); and in some cases can be overcome if the affected individual becomes aware of their problem, and has the skills and/or support to change the problematic online usage pattern into a healthy usage pattern.

Policy option 1: The 'no action' policy is not the position that has been adopted by many researchers whose work has been cited in this report. The 'no action' policy may be unsustainable because it may jeopardise the ability of the EU to take advantage of the opportunities that new diagnostic tools, treatments, and preventive approaches (e.g. guidelines) on internet-use-related addictions seem to offer. The policy option 'no action' also does not permit to properly address the criticalities at public health level represented by this new modality of behavioural addiction.

Lessons learned: The majority of problematic online users do not seek help, as reported by online gambling clinicians; indeed, the proportions of other online users (i.e., problematic internet or gaming users) may be similar. However, action needs to be taken to offer information, support, and intervention to individuals who experience the reported problems, and may require knowledge and help to tackle these problems before developing into a full-blown addiction. As the WHO states: 'Prevention is better than cure' (WHO, 2018¹⁹¹). In other words: 'scientific uncertainty should not be used as a reason to postpone preventive measures'.

5.2. Policy option 2: Promote and disseminate applied research and information on responsible internet use and prevention

In relation to European online users' characteristics:

Risk factors are: (i) being an adolescent or young adult in the EU; thus, target groups for internet addiction and problematic gaming are high school students and university students; in the case of online gambling, at risk populations are adults; (ii) using the internet, video games or online gambling excessively and problematically could cause negative repercussions in daily life.

Preventive actions are: (i) to promote information (e.g. in the form of a EU webpage with information, contact details for support, websites designed and delivered by respective EU countries, etc.), research by action (e.g. quasi-experimental studies to promote healthy attitudes and behaviours or measuring the impact of campaigns, qualitative studies with patients who seek clinical help for disordered MMORPG gaming), and prevention policies in the EU for target groups (e.g. formal and informal online resources to be informed and online activities to learn about the associated problems). Indeed, informing at educative, health, and community levels and in public and private sectors and organisations about the risks, detection, and reversed processes concerning these maladaptive behaviours (e.g. CBT with other alternative psychological techniques); (ii) to screen for internet-related problems in health, academic, and informal settings (e.g. clinics, hospitals, schools, universities, and in the home), especially in children and adolescents.

Policy option 2: (i) to promote actions to provide information through an EU webpage with public resources (i.e., open to everybody), and categories by users (e.g. user types (e.g. adolescent/young user, adult user), relatives (e.g. parents, partner), or professionals (e.g. teachers, clinicians)); with contact details for relevant organisation in Europe; (ii) to promote and disseminate applied research with the aim of solving problems reported and to promote responsible internet use, online gaming and gambling from early adolescence until late adulthood, in both community and clinical samples. These actions could be undertaken in the framework of other European initiatives addressing similar issues, such as other risks associated with using the internet (e.g. cyberbullying), or these initiatives could be stand-alone initiatives (i.e. addressing problematic internet use only).

Lessons learned: The majority of the research on internet-use-related addiction problems is still in the process of establishing a proper conceptualisation, operationalisation, measurement, and intervention. Indeed, information is available (i.e. factual information concerning its negative consequences, especially addressed to clinicians and the scientific community) and should be properly disseminated publicly for users with risk of developing a problematic use (e.g. through seminars, workshops, or other individual or group activities in school settings, such as inviting experts to explain the problems and how to tackle them, as it has been reported in previous policy options included in this report).

Other options are media advertisements and public campaigns that can reach the public via media, such as internet, television, and radio. Research should continue and support solving these problems (e.g. through qualitative, experimental, cross-cultural, and longitudinal approaches). Prevention approaches should be developed further, although some lessons have been learned. Specifically, more information is needed

through channels used by the citizens, especially the young ones (e.g. web sites, TV campaigns, educative or clinical programmes), as well as resources to detect or treat the problem should only be offered if the user (or the individuals in their immediate environment) looks for support, as 'more is not always better' (as research has also found in this report).

Similarly, as policy options in Asian countries have demonstrated, for instance, limiting internet use does not seem to be a solution to the problem of excessive use; as it may unnecessarily limit individual freedoms. However, providing information and active prevention approaches (e.g. action-research) for this health concern at a national level seems to promote an optional way of tackling these problems by the targets, such as children and adolescents, university students, parents and other individuals in the environment of those affected (e.g. employees with regular access to the internet, and others). In summary, a number of simple and likely effective actions can be undertaken: information-provision, single interventions, and empirical studies to solve internet-use-related addiction problems to promote prevention.

5.3. Policy option 3: Promote and educate on online and offline health behaviours in young populations

In relation to promoting online and offline health in young Europeans:

Risk factors are: (i) a user's specific motivations and cognitions (e.g. systematically prioritising online activities over other pastime activities), poor coping (i.e. suppression, maladaptive problem solving and avoidance; using online activities to compensate for other problems, such as difficult relations with parents/friends/partners), and cognitive expectations (i.e. positive expectancies related to online wellbeing and avoidance expectancies related to offline life difficulties), increase the risk for generalised internet addiction; (ii) the increase of internet use appears to be associated with comorbidities observed in recent European studies (e.g. anxiety, depression, and OCD); (iii) an increased amount of time spent gaming or gambling online, which is often accompanied with emotional distress, higher harm avoidance, and reward dependence traits; (iv) and experiencing a number of personality traits and other health problems.

Preventive actions are: (i) to promote the development of alternative motivations, coping skills, and reduce internet usage expectations as these can function as preventative factors, decreasing the risk of experiencing symptomatology associated with generalised internet addiction; (ii) the three disorders found in European studies should be detected together with internet addiction screenings early on and interventions should be carried out to prevent both, internet addiction and psychiatric disorders in adolescents and young adults; (iii) online video or gambling games should provide alerts about the risks associated with these behaviours if they are engaged in frequently; (iv) to inform the user through notifications about the risks of these games (involving bets or not) in order to avoid negative health consequences in the future (e.g. functional impairment and distress).

Policy option 3: through collective actions professionals from the health, social, and educational sciences and practitioners are needed to develop a set of options to tackle this third set of policy options; (i) could be to engaging young individuals in relevant conversations and active considerations about healthy internet use motivations and coping strategies, leading to awareness-raising and healthier usage behaviours (i.e. promoting alternative pastime activities; e.g. team sports and artistic activities); (ii) attending to each individual case, including internet-addiction-related problems as well as specific comorbidities, while determining which functions the maladaptive excessive internet use which fulfils in the life of the affected individual; (iii) could be to engage in other activities and to be aware of organisations or professionals who can help; (iv) to receive information about the possible negative consequences (and not only the benefits) of being an excessive online gamer or gambler (e.g. information campaigns or social programmes for the general

public); to know and test other potential offline activities (and learn about their benefits at short and long-term commitments) alternatively to the usual online.

Lessons learned: Health should be promoted online and offline, paying attention to how European citizens usually use the internet, for which purposes, how many times, and whether this use causes concern for the user, his or her daily life, or those around the user. Specifically, time spent using screens seems to be a problem affecting EU adolescents and young populations, as almost all their usual activities (i.e. academic and entertainment) are conducted using technologies which require attention and commitment to time spent on various applications on the internet.

For this reason, offline behaviours should be protected and promoted, such as outdoor activities (e.g. extracurricular activities, group activities, and spare-time activities with peers or family, such a team sports or going out for an evening with friends or relatives), and limiting online time (e.g. through creating technology-free zones in the home, such as the kitchen and the bedroom, and technology-free times, e.g. during dinner). Health concerns have been highlighted and prevention approaches have proven successful in other countries when focusing on psychopathological factors, personality characteristics, physiological characteristics, patterns of internet use, sociodemographic factors, and the affected individual's current situation (i.e. external factors; e.g. parenting styles).

Only some Asian countries have considered internet addiction as a public health problem, and implemented environmental interventions, particularly regulations related to internet use and internet addiction, e.g. control mechanisms on internet cafés to guarantee internet cafes have a sufficient geographical distance from school settings, or systems which monitor how many hours a user spends on online game playing, and when the user exceeds these hours, leading the user's virtual character to lose stamina whilst gaining fewer experience points. This requires a close collaboration with the gaming industry.

Some Eastern countries, such as South Korea or China, have urged policy-makers and regulators to become more involved in corporate social responsibility practices of online gaming and gambling. Indeed, it is recommended the EU collaborate with the gaming and gambling industry on protecting users from potential harm at an individual level. However, overall European internet use appears to be somewhat different in comparison to internet use in Asian countries, the severity of the reported problems does not seem to be as high in the European context, and online applications are usually used at home or when commuting (rather than in internet cafes). Cultural differences need to be researched further in order to understand the ways in which policies adopted in other geographical regions in the world may be beneficial in the European context.

Policy option 4: Support communities and those in the immediate context of online users

In relating to gaming addiction:

Risk factors are: (i) if a user increases gaming time within the period of six months, and usually at home, this may suggest a cause for concern; (ii) to be a male adolescent who plays MMORPGs resulting in functional impairments (e.g. in the areas of school/university, family or peer relations) is another cause for concern.

Preventive actions are: (i) family and peer supervision (e.g. parents, siblings, partner, or friends 'keeping an eye') on time spent engaging in the addictive behaviour or mood changes when disconnecting or not being able to connect, whilst observing addiction symptoms (e.g. withdrawal and relapse); (ii) to inform children, youth, and their environments (e.g. families, schools, and communities) about the risks of engaging in online role-play games or gambling, implying a commitment to avoiding detrimental health consequences in the future (i.e. functional impairment, distress) or financial problems in the case of gambling.

Policy option 4: (i) is to implement better communication with parents, other family members, friends, and teachers or general healthcare providers regarding gaming-related problems to provide information about the consequences (apart of the benefits) of gaming, engaging in heavy game use, etc., and playing in groups instead of playing alone; (ii) persons around the gamer (e.g. family members, teachers or peers in the school/university) or the gambler (e.g. partner, relatives, colleagues at university/work) as well as the gamer or gambler themselves should be aware of possible problems. They should seek clinical help and/or support provision on changing (part of) the gaming or gambling activity into, for instance, other group activities (with the family, or with peers), outside of the home environment to promote interpersonal communication, relationships, and offline contacts.

Lessons learned: Support at a community level is another way to tackle and prevent these types of problems. In this report, researchers have recommended improving early detection, and the development of specific skills with the support of individuals in the immediate environment of the problematic user (e.g. family, peers, counsellors, and teachers or employees). The users' close formative surroundings are another critical factor for prevention as familial support significantly reduces the harms reported. Individuals in the immediate environment of problematic users may recognise addiction-related problems earlier than the user themselves and may keep an eye on them.

Their empathy may be crucial to support the at-risk-user, by promoting the reduction of the positive outcome expectancy of internet use (using effective techniques, such as motivational interviewing), encouraging self-control and self-efficacy, or abstinence from addictive online applications (e.g. during a couple of days out of the home/school or similar environment).

Secondly, being able to maintain conversations to identify maladaptive thoughts connected with addictive behaviour (e.g. the unhealthy or unrealistic cognitions, such as being able to control the time spent gaming).

Thirdly, learning to cope with emotions, stress, among other negative feelings (e.g. high hostility, low self-esteem) is a key to prevention.

Fourth, working on skills linked to social relationships (e.g. reduce interpersonal sensitivity, reinforce emotional intelligence, and social or communicative competence in a face-to-face basis) is important to foster non-internet-related interaction.

Fifth, supporting healthy circadian rhythms and rules for internet use (e.g. enough and regular hours to sleep, to maintain time for meals, periodic offline leisure activities, periodic online entertainments with a schedule if needed) will support healthy internet use.

At different levels, these actions can be supported by those in the immediate environment of the user (e.g. relatives and peers), or professionals (e.g. teachers and clinicians). For instance, school interventions have been tested with positive outcomes to reduce and prevent internet-use-related addiction problems, as well as clinical treatments have shown a favourable prognosis when treating problem gamers. Europe has limited research on preventive treatments focused on the user, and more action is needed to concentrate on individuals in the immediate environment of the user, particularly in the cases of children, adolescents and young adults.

6. Limitations and Conclusions

The present review is the first to ascertain that the empirical literature base on internet-use-related addiction problems at an individual level in Europe to date focuses on generalised internet addiction, online gaming addiction, and online gambling addiction. Moreover, the clinical presentations, patients' profiles, comorbidities, instruments, interventions, and prognosis appear different across these three potential addiction disorders. Empirical research on these three internet use-related addiction problems during recent years (2013-2018) has been presented based on 19 empirical studies from Italy, Spain, Greece, Germany, France, the Netherlands, and Denmark

A number of limitations should be highlighted in this review. Concerning its methodology, this review was undertaken based on a set of parameters that facilitated conducting this systematic review within the period of six months, meaning technical decisions were needed to enable managing the recent scientific knowledge on internet-use-related addiction problems reported in European research papers. For instance, the present review only considers scientific papers published within a specific timeframe, i.e. a period which has been important in the field of behavioural addictions related to technologies (i.e. from April 2013, when APA introduced internet gaming disorder in the appendix of the DSM-5), and it only focused on empirical papers reporting research conducted in European Union countries. However, research on other internet-use-related problems (e.g. social networking addiction) exists. Also, the search was performed using general and more frequent terms reported in the titles of scientific papers. This means that future searches using other specific terms (such as 'cybersex') and not searching only in the titles of papers may result in obtaining other studies on existing internet-use-related specific addiction problems. Moreover, the selected databases, although they are the principal ones used in international scientific research on this topic, are not the only ones addressing these issues (e.g. *Eric* is another scientific database which contains research in this field from an education perspective; similarly, *Medline* contains biomedical research). Concerning the 19 studies included in this review, the majority were psychometric studies, secondly qualitative or mixed methods studies, and only four experimental studies were included, three of which were experiments with a comparison group. This limits the internal validity of the findings reported and the knowledge about the causes of internet addiction, as potential confounding factors may have impacted some of the conclusions reported.

Furthermore, the majority of the papers analysed addressed problematic gaming (independently or together with generalised internet addiction or online gambling). Indeed, this could be due to the clinical interest initiated by the advent of IGD published in the DSM-5 (American Psychiatric Association, 2013¹⁰) and the subsequent announcement of the inclusion of Gaming Disorder in the ICD-11 (World Health Organisation, 2018¹¹). Gaming disorder treatment is currently addressed in European health centres and hospitals, as the majority of the research on problematic gaming reviewed comes from clinical samples instead of community samples. In all reviews, limitations exist, but concerning these, online gaming use-related addiction has now been officially recognised, which has changed the research and clinical landscape over time, particularly following the inclusion of Internet Gaming Disorder and Gaming Disorder in the diagnostic manuals.

Regarding the community and clinical samples included in the reviewed studies, a range of methodologies and sample strategies and sizes have been used, with most using adolescent and young adults at high-schools or universities. Generalised internet addiction was found to contain a part of the addiction symptomatology typically found in substance-related addictions, while gaming and gambling addiction were usually more severe problems covering all addiction criteria. Apart from being a young internet user, being male seems to be another risk factor, especially when playing MMORPGs for long periods of time. Comorbidities tend to be present but tend to be more severe in the case of online gaming addiction relative to other internet addictions, especially if the user has an internalising profile, which may negatively impact on the length of recovery following treatment. For all internet-use-related addiction problems, cognitive behavioural therapy is the most common psychological intervention tested, although it is known that natural recovery exists and that the intervention is more successful if the addiction is detected early and properly diagnosed, the patient is committed to treatment, relatives and significant others support the treatment and recovery process, and

specific strategies are added (e.g. techniques to control impulsivity traits, increasing empathy, and self-esteem). Based on the reviewed research papers, prognosis seems to generally be positive following six months of intervention.

Finally, a set of policy options, preventive actions, and evidence to support future policies have been proposed. Firstly, in relation to the users' profiles, it has been stated that it is beneficial to offer information, activities, screening tools, and campaigns to students in secondary schools and at universities regarding internet-use-related addiction problems, especially on gaming addiction for adolescent populations. This will require research, support, and resources for schools and their staff, families, as well as the establishment of working relationships with other health professionals and services (health centres and hospital units), as well as researchers. Health professionals (i.e. psychiatrists and psychologists) should be aware cognitive behavioural therapy seems to be effective, but gaming experiences, motivations, cognitions, and behaviours related to gaming (such as coping strategies), comorbidities (anxiety, depression, and obsessive compulsive disorder) should be prioritised, while habits, such as spending more time at home alone, should be reduced through engaging in alternative pastime activities in groups outside of the home, and to improve communication patterns (with parents, other relatives, and peers). For online gambling addiction, intervention procedures should be different from those developed for online gaming addiction as the profiling and etiology of both of these addictive behaviours differs. In summary, the present report has contributed to the behavioural addictions field of internet-use-related addiction problems at an individual level in Europe with recent evidence to support future policies on preventing generalised internet addiction, online gaming addiction, and online gambling addiction.

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In spite of all its benefits to society, it is increasingly recognised that the internet can also be correlated with significant negative effects on individuals and society. Some of these harmful effects have been studied extensively, particularly harm to privacy, harm associated with security and cybercrime, and harm resulting from digital divides. This report covers less studied but equally important harmful aspects: harm associated with internet use that concerns the health, well-being and functioning of individuals, and the impact on social structures and institutions.

Part I of the study addresses the issue of the maladaptive use the internet at individual level, including virtual social networks, video games and other potentially addictive types of interactive media content. The three problems which emerged from the study were: generalised internet addiction, online gaming addiction and online gambling addiction.

The ultimate aim of the study is to develop concrete policy options for EU policy-makers' consideration in acting to mitigate the harmful effects of the internet on European citizens.

This is a publication of the Scientific Foresight Unit (STOA)
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ISBN 978-92-846-3427-9 | doi: 10.2861/315951 | QA-04-18-954-EN-N