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Online interventions for behavioural addictions: a systematic review

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Abstract

Introduction: Despite it being a scarcely researched topic, it is evident that behavioural addictions are associated with high rates of comorbidities and social problems. Online interventions offer a number of potential benefits for the treatment of behavioural addictions including easy access, anonymity, and low cost. This systematic review aimed to assess the effectiveness, feasibility, and acceptability of online interventions for behavioural addictions.

Method: Systematic searches were conducted on three electronic databases (Web of Science, PubMed, PsychInfo). Studies were included if the online intervention was the main intervention component, and if they reported quantitative data on the effectiveness of the interventions. The study quality was assessed using the Quality Assessment Tool for Quantitative Studies.

Results: A total of 23 studies were included in this review. 13 of the studies found the interventions to be effective, which was illustrated by significant reductions in behaviour-related problems as result of the intervention. Overall, acceptability and satisfaction were high, however engagement was low.

Conclusions: Online interventions for behavioural addictions are somewhat effective in reducing behaviour-related problems. Results highlight the paucity of well-designed studies and the need of primary prevention. Moreover, further research on behavioural addictions is needed to establish clear diagnostic criteria, to avoid over-pathologizing daily lifestyle choices.

Keywords: behavioural addictions, online interventions, effectiveness, feasibility, acceptability, engagement.

Einleitung: Obwohl es nur wenige Daten zur Prävalenz gibt, sind Verhaltenssüchte mit einer hohen Rate an Komorbiditäten und sozialen Problemen verbunden. Online-Interventionen werden mit einer Reihe von potenziellen Vorteilen für die Behandlung von Verhaltenssüchten in Verbindung gebracht, wie z. B. einfacher Zugang, Anonymität und geringe Kosten. Ziel dieser systematischen Literaturrecherche war es, die Wirksamkeit, Machbarkeit und Akzeptanz von Online-Interventionen für Verhaltenssüchten zu bewerten.

Methode: Als Methode wurde eine systematische Literaturrecherche auf den Datenbanken Web of Science, PubMed und PsychInfo durchgeführt. Quantitative Studien, die Ergebnisse zur Wirksamkeit einer online Intervention untersuchen, wurden eingeschlossen. Die Studienqualität wurde jeweils mit dem «Quality Assessment Tool for Quantitative Studies» bewertet.

Ergebnisse: Insgesamt wurden 23 Studien in diesem Review eingeschlossen. In 13 dieser Studien erwiesen sich die Interventionen als wirksam, was sich in einer signifikanten Reduktion der verhaltensbezogenen Probleme als Ergebnis der Intervention zeigte. Insgesamt war die Akzeptanz hoch, die Nutzung der Interventionen jedoch, war gering.

Schlussfolgerungen: Online-Interventionen für Verhaltenssüchte sind vielversprechende Therapieansätze. Es können allerdings keine konkreten Schlussfolgerungen gezogen werden, da die Studien sehr heterogen waren und lediglich vier Studien als methodisch stark bewertet wurden. Die Ergebnisse unterstreichen die Notwendigkeit von primärer Prävention sowie weiterer Forschung zu Verhaltenssüchten, um klare diagnostische Kriterien zu etablieren und eine Pathologisierung von alltäglichen Lebensentscheidungen zu vermeiden.

Keywords: Verhaltenssüchte, Online-Interventionen, Wirksamkeit, Machbarkeit, Akzeptanz, Nutzung.

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1 Introduction

The term "behavioural addictions" was first introduced in the 1990s by Isaac Marks, and described as repeated urges to engage in counter-productive behaviours (Starcevic, 2016). Examples of behavioural addictions are gambling, gaming, shopping, social networks, Internet, kleptomania, work, exercise, and pornography (Grant et al., 2010). Given that the term was introduced roughly three decades ago, behavioural addictions are thus not a novel phenomenon, however awareness and concerns of the health consequences and social costs associated with behavioural addictions have only recently emerged (Bundesamt für Gesundheit, 2020a). Particularly the Covid-19 pandemic and the corresponding lockdown measures in March 2020 have created conditions, which are expected to have a significant impact on certain behaviours and disorders. This is primarily due to the closing of terrestrial services, social isolation, inactivity, a lack of daily routines, and an increase in the number of online services available (e.g. online gambling, shopping and pornography) (Rumpf et al., 2020). While the Covid-19 pandemic may have intensified certain behavioural addictions and/or contributed to their increase, behavioural addictions have nevertheless been receiving increased attention over the last decade. In recent articles behavioural addictions are described as "the plague of the era" and as "a rising tide" (Starcevic, 2016). One reason for this, is their co-occurrence with substance use disorders (Grant et al., 2010). For example, a study on older teens, found the co-occurrence rate of gambling with alcohol, marijuana, or other illicit drugs to be 36% (Sussman et al., 2011). Another study found that the relative risk for an alcohol use disorder increased 3.8-fold when problematic gambling was present (Bland et al., 1993). A study with 2,453 college students illustrated that an internet addiction was associated with harmful alcohol use (Yen et al., 2009). Similarly, among a sample of young adults in Norway, 13.6% of those with an internet addiction reported past year alcohol and substance abuse. This is particularly relevant from a public health perspective as substance use disorders alone are responsible for the highest mortality among all mental and behavioural disorders (WHO, 2015).

Clinical and epidemiological data have also demonstrated a relationship between behavioural addictions and mental disorders. For example, a review by Carli et al.

(2013) found high comorbidities between internet addiction and depression, anxiety, obsessive-compulsive disorder, and ADHD. Furthermore, a study investigating the prevalence of compulsive buying and its associations with demographic characteristics and depressive symptoms, reported that those participants with compulsive buying reported higher depressions scores than non-compulsive buyers (Mueller et al., 2010). Wang et al. (2017) found similar results, namely that adults with generalized anxiety disorder were more likely to have internet gaming disorder. Similar comorbidities can be observed for sex addiction and exercise addiction (Sussman et. al. 2011). These findings are also relevant to public health, as untreated mental health disorders account for 13% of the total global burden of disease (WHO, 2011). Furthermore, according to the Swiss Federal Office of Public Health, mental disorders generate costs of up to 7 billion Swiss Francs per year (Bundesamt für Gesundheit, 2020c).

Behavioural addictions can not only place burdens on one's health but are also linked to social problems. For example, multiple studies have found that problematic pornography use can negatively affect relationships, sexual satisfaction, intimacy, and encourage use of paid sexual services (Koós et al., 2020; Kraus et al., 2016). Similarly, 53% of people with an internet addiction report marital discord, separation, or even divorce. This is primarily caused by online affairs, which lead to a declining investment in the relationship and a loss of interest in sex. An internet addiction can also impact sleep patterns, lead to social alienation, and a loss of productivity. These subsequently also affect work and academic performance (Young, 2004). Buying-shopping disorder can lead to an accumulation of debt, family discord, work impairment, criminal proceedings due to spending-related deception and embezzlement, and reduced quality of life (Müller et al., 2019). Comparably, problematic gambling is associated with strained relationships, debt, employment consequences (e.g. loss of productivity), or even crime (e.g. theft) (Fong, 2005; Latvala et al., 2019).

The findings summarized above illustrate the extensive consequences of behavioural addictions. Despite being scarcely researched phenomenon, behavioural addictions deserve increased public health attention, as they are

associated with significant burdens that may, in the long term, cause substantial health-related, economic, and social impact.

1.1 Prevalence and demographics

The WHO (2020a) estimates that 350 Million gamblers display a problematic pattern each year. Higher rates of pathological gambling are typically observed in male, unemployed, divorced, or retired individuals, or people with lower education and income (Castrén et al., 2018). Prevalence estimates of gaming disorder vary greatly, and this partly due to the lack of standardized assessment instruments (WHO, 2020a). For example, a scoping review exploring the prevalence of gaming disorder and internet gaming found prevalence rates ranging from 0.21–91% depending on the type of population. In addition, in the 160 studies included in the review, 35 different methods were used to measure internet gaming disorder (Darvesh et al., 2020). Furthermore, a meta-analysis that pooled data from several adult representative studies, found that shopping addiction affects 4.9% of the population, and arises predominantly in wealthier countries such as the United States, United Kingdom, and Canada, and affects mostly younger females (Maraz et al., 2016; Müller et al., 2019). A meta-analysis on the prevalence of social media addictions across 32 two nations, found prevalence rates ranging from 0% to 82% with a resulting pooled-prevalence of 5% (Cheng et al., 2021). With regards to pornography use, rates of hypersexuality are estimated around 3-5-% of the general population and roughly 80% of those affected are adult Caucasian males (Kraus et al., 2016).

In Switzerland, around 4.8% of the Swiss population is pathologically addicted to buying, and around 1.1% of the population is addicted to gambling, whereas the past-year gambling rate is 46.6% (Baumgartner et al., 2019; Wenger & Schaub, 2020). Approximately 1% of the population aged 15 and over is affected by problematic internet use, which corresponds to about 10,000 people. Most of them are between 15 and 34 years old (Bundesamt für Gesundheit, 2020b).

Overall, it is apparent that the data and statistics on behavioural addictions are scarce, and this is primarily due to the lack of standardized diagnostic criteria and psychometric measures. The data illustrate that there is no urgent need for action,

however it is necessary to monitor future developments and improve the data basis in order to be able to react quickly and appropriately to changes regarding behavioural addictions (Bundesamt für Gesundheit, 2020a).

1.2 Characteristics of behavioural addictions

1.2.1 Relationship to substance use disorders

The most prominent characteristic of behavioural addictions is the failure to resist an impulse to perform an act that is harmful to the person or others (American Psychiatric Association, 2013). This is comparable to substance use disorders, as people with substance addictions commonly report failure to resist an urge to consume. Additionally, both behavioural addictions and substance addictions share ego-syntonic natures, meaning that the addictions are often preceded by feelings of tension and arousal, and followed by pleasure, gratification, and relief. Substance addictions and behavioural addictions become increasingly more ego-dystonic over time, meaning that the substance or the behaviour become less pleasurable and more of a habit (Grant et al., 2010). Behavioural addictions and substance addictions both display similarities in natural history, phenomenology, and adverse consequences. Both addictions begin to develop in adolescence, with males typically starting earlier in life. A phenomenon referred to as “telescoping” can be observed in both types of addictions, which means that women usually begin to engage later in life but experience a foreshortened time period between initial engagement and addiction. Lastly, individuals with substance addictions, like those with behavioural addictions, commonly report financial and marital problems, and will commit illegal acts such as theft or embezzlement to fund their addiction (Grant et al., 2010).

1.2.2 Causes and development

The extent to which people are susceptible to developing an addiction can be best explained according to the biopsychosocial model. The biopsychosocial model was first introduced in 1977 by George Engel in response to widespread criticism of the biomedical model. The biomedical model depicts an addiction as a chronically relapsing brain disease with genetic/biomedical cause. The more contemporary biopsychosocial model, however, proposes that the causes/influences are

multifactorial, and places equal importance on the psychological, biological, and social factors that can influence or cause an addiction (Skewes & Gonzalez, 2013).

Psychological factors include the following: risk factors during childhood, personality and temperament, conditioning (e.g., reflexive involuntary behaviour or positive reinforcement), outcome expectancies (e.g., escape negative mood states), as well as a lack self-efficacy and coping (Skewes & Gonzalez, 2013). The principle of “negative reinforcement” plays an important role in the development of a behavioural addictions. Negative reinforcement means that a behaviour is more likely to show when it ends or reduces an unpleasant state or feeling. People affected by behavioural addictions often report that they feel better when they are busy gambling or shopping (Arnhold & Hoppe, 2019). It is also possible to develop an addiction as a method of “self-medication”. This term is often used to explain substance use disorders and can be transferred to behavioural addictions. A person attempting to “self-medicate” through their behaviour i.e., their addiction, tries to treat their anxiety or depression by himself/herself through a particular behaviour, such as excessive internet use or gambling (Arnhold & Hoppe, 2019).

Social factors that influence behavioural addictions can vary greatly, however commonly include relationships (family, peers, spouses, or partners) and the quality

of them (lack of social support or peer pressure), ethnicity, culture, beliefs, migrant background, and socioeconomic status. Important to emphasize is that the availability of substances or services (in the case of behavioural addictions) is a major factor in the initiation and development of an addiction (Skewes & Gonzalez, 2013).

With regards to biological factors, there is substantial empirical evidence illustrating that genetic predisposition can greatly influence the manifestation of an addiction. For instance, male children of an alcohol-dependent mother or father have four (three in female children) times the risk of becoming alcohol-dependent themselves. Other biological factors include neurobiological processes within the serotonergic, dopaminergic, noradrenergic or opioidergic systems (Grant et al., 2010; Skewes & Gonzalez, 2013).

1.3 Treatment

In terms of treatment, studies have found that both behavioural addictions and substance use disorders react positively to psychosocial treatments such as 12-step self-help approaches, motivational enhancement, and cognitive behavioural therapy (Brand et al., 2020). These interventions typically include relapse prevention methods or exposure and response prevention strategies. There are currently no medications approved for the treatment of behavioural addictions, however a few (e.g. Naltrexone) have been effective in treating certain addictions (Brand et al., 2020).

While both psychosocial and pharmacological treatments have shown promise in the treatment of behavioural addictions, digital or online-based interventions provide new opportunities and resources for public health interventions. Online interventions are associated with a number of potential benefits for public health, such as their easy access and low cost. Interventions delivered online can be accessed anywhere and anytime, and can therefore also reach more isolated population groups, with less or no access to terrestrial treatments. Additionally, due to the anonymity of the internet, more individuals, specifically those who are hesitant to seek treatment or who fear stigmatization, are inclined to seek help (Rogers et al., 2017). A number of studies

have shown promising results in the treatment or prevention of addictions and mental disorders through web-based interventions. For instance, Gainsbury and Blaszczynski (2007) conducted a systematic review of internet-based therapy for the treatment of addictions and concluded that internet-based therapies for addictions are effective in achieving positive behavioural changes for tobacco-cessation, gambling, and opioid-use. Furthermore, Boss et al. (2017) investigated the efficacy of a web-based intervention with and without guidance for employees with risk drinking and found a reduction in the mean weekly alcohol consumption, improved mental health, and improved work-related outcomes as a result of the intervention. Considering the evidence in support of online interventions and given the similarities between substance-use disorders and behavioural addictions (see chapter 1.2.1), it can be expected that online interventions for behavioural addictions may be equally as effective.

1.4 Research questions and aim

Current systematic reviews on behavioural addictions commonly address the epidemiology, neurobiology, and phenomenology of behavioural addictions (De Alarcón et al., 2019; J. Kuss et al., 2014; Luijten et al., 2014). There is substantial evidence in support of the effectiveness of online interventions for both substance use und mental disorders, which subsequently raises the question of whether or not similar effectiveness can be found in favour of online interventions for behavioural addictions. Therefore, the primary aim of this systematic review is to assess the effectiveness of online interventions for the treatment or prevention of behavioural addictions. Furthermore, the objective is to answer questions regarding the acceptability, feasibility, engagement/adherence of these interventions, how they are implemented, and what theories they base on. The following research questions were derived from the aim:

- How effective are these interventions in treating or preventing behavioural addictions?
- What is the feasibility, acceptability, and engagement of these interventions?
- What theories and/or theoretical models are the interventions based on?
- How are these interventions implemented?

As a concluding step, this thesis aims to illustrate the relevance of the topic for the health promotion and prevention field and make recommendations for future interventions for behavioural addictions.

1.5 Thesis structure

In the following chapter, “theoretical background”, individual terms as well as the reasoning for their use in this thesis will be explained. In the methodology, the inclusion and exclusion criteria for the selection of studies, as well as the procedure used for the selection, data extraction, and quality assessment will be illustrated. Subsequently, the main results of the included studies are presented in tabular format and summarized narratively. This includes a summary of the study and intervention characteristics, the effectiveness, acceptability and feasibility of the interventions, as well as a summary the study quality. In the discussion, the results are summarized in an appropriate way, in order to answer the research questions, and formulate recommendations for health promotion and prevention, and for future research. Additionally, the limitations of this thesis and the reliability of the results will be discussed. As a conclusion the implications and suggestions for current practice and research will be explained.

1.6 Theoretical framework

1.6.1 Diagnostic criteria

Recent expert meetings of the WHO have prompted the inclusion of gambling and gaming disorder in the current version of the International Classification of Diseases (ICD-11) (Rumpf & Brandt, 2020). These disorders have been newly classified as “other specified disorders due to addictive behaviours” and are defined as “clinically significant syndromes associated with distress or interference with personal functions, which develop as a result of repetitive rewarding behaviours” (WHO, 2019). Gambling is currently the only behavioural addiction listed as a “non-substance related behavioural addiction” in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) (Albrecht et al., 2007). On the other hand, excessive game use and Internet gaming disorder (IGD) are included in the DSM-5 as conditions warranting further study (Zajac et al., 2017). Gaming and gambling

disorders are included in this thesis because of their inclusion in the ICD-11 and DSM-5.

The WHO (2019) uses the following three diagnostic guidelines in the description i.e., definition of both gambling and gaming: impaired control, increasing priority and continuation, or escalation despite negative consequences. While buying-shopping disorder, pornography use disorder, and social networks use disorder have not yet been included in the ICD-11 or DSM-5, they are included in this thesis on the basis of a publication by Brand et. al. (2020), which illustrates how these types of addictions fit the category of “other specified disorders due to addictive behaviours” in the ICD-11, based on three meta-level criteria: clinical relevance, theoretical embedding, and empirical evidence. Clinical relevance refers to the existing evidence, which illustrates that the observed phenomenon, i.e., the potential addictive behaviour, is related to functional impairment that justifies treatment. The second criterion, theoretical embedding, describes that if a potentially addictive behaviour should be considered a “disorder use to addictive behaviours”, neuroscientific theories should be applicable to the phenomenon. These theories could include (among others) the incentive sensitization theory, reward deficiency syndrome, or dual process approaches of addiction. The third criterion, empirical evidence, is described as follows “data based on self-reports, clinical interviews, surveys, behavioural experiments, and, if available, biological investigations (neural, physiological, genetic), suggest that psychological and neurobiological mechanisms involved in other addictive behaviours are also valid for the candidate’s phenomenon.” Brand et. al. (2020) stress the importance of not over-pathologizing everyday-life, however buying-shopping disorder, pornography use disorder, and social networks use disorder are three disorders, which meet the conditions of the category “other specified disorders due to addictive behaviours” based on the aforementioned criteria (Brand et al., 2020).

Some authors argue that it may be premature to refer to problematic internet use as a behavioural addiction, due to the paucity in data and evidence on its course, prognosis, temporal stability, and response to treatment (Pies, 2009). Others argue that it should be considered a behavioural addiction, as it shares characteristics of

an addictive behaviour including craving, tolerance, and withdrawal (Spada, 2014). Despite the controversy, problematic internet use (PIU) will also be included in this thesis, as findings relevant to the topic may provide valuable answers to the question of whether or not it should be considered an addiction.

1.6.2 Definitions

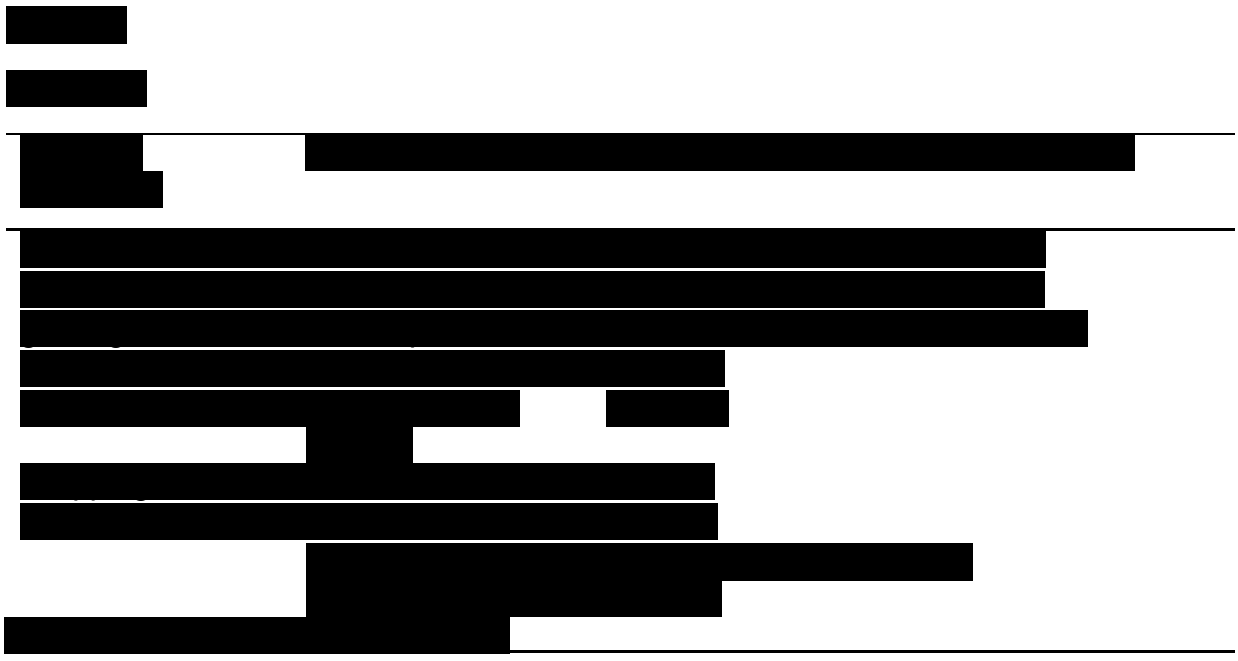
Online interventions, commonly also referred to as e-health or m-health, include interventions delivered through the internet (e.g., websites), smartphone applications and, SMS/text messages, and may also include guidance provided by a therapist or social worker (Moss et al., 2019). With regards to the term “effective”, in the context of this thesis, it is defined as changes in behaviour-related outcomes from pre- to post-intervention and at follow-up (Singal et al., 2014). These changes refer to both a decrease in the severity and frequency of the behaviour, and a decrease in the health-related and social consequences of behaviour (e.g., symptoms of depression, anxiety, debt, quality of sleep, etc.). Definitions of acceptability and feasibility are variable and overlap in aspects. For example, Bowen et al. (2010) propose the following focus areas to define feasibility: acceptability, demand, implementation, practicality, adaption, integration, and expansion. Engagement is defined as the depth of involvement with the intervention (e.g. number of modules or activities completed) (Short et al., 2018). Implementation refers to, if an intervention is a stand-alone treatment or if it serves as a supplement to a psychotherapeutic or pharmacological treatment.

2 Methodology

2.1 Research databases and keywords

The research question was addressed by means of a systematic literature review. This method was used to answer the proposed research question, because reviews offer a clear and comprehensive overview of the current research on the topic and demonstrate gaps in the current body of research. Systematic reviews also improve the generalizability of results, which is especially helpful when making further recommendations on a specific topic (Mulrow, 1994). This aligns with the overarching aim of this thesis.

The initial search was conducted in February 2021. Electronic databases including Pubmed (Medline), PsychInfo, and Web of Science were searched with the following Keywords:

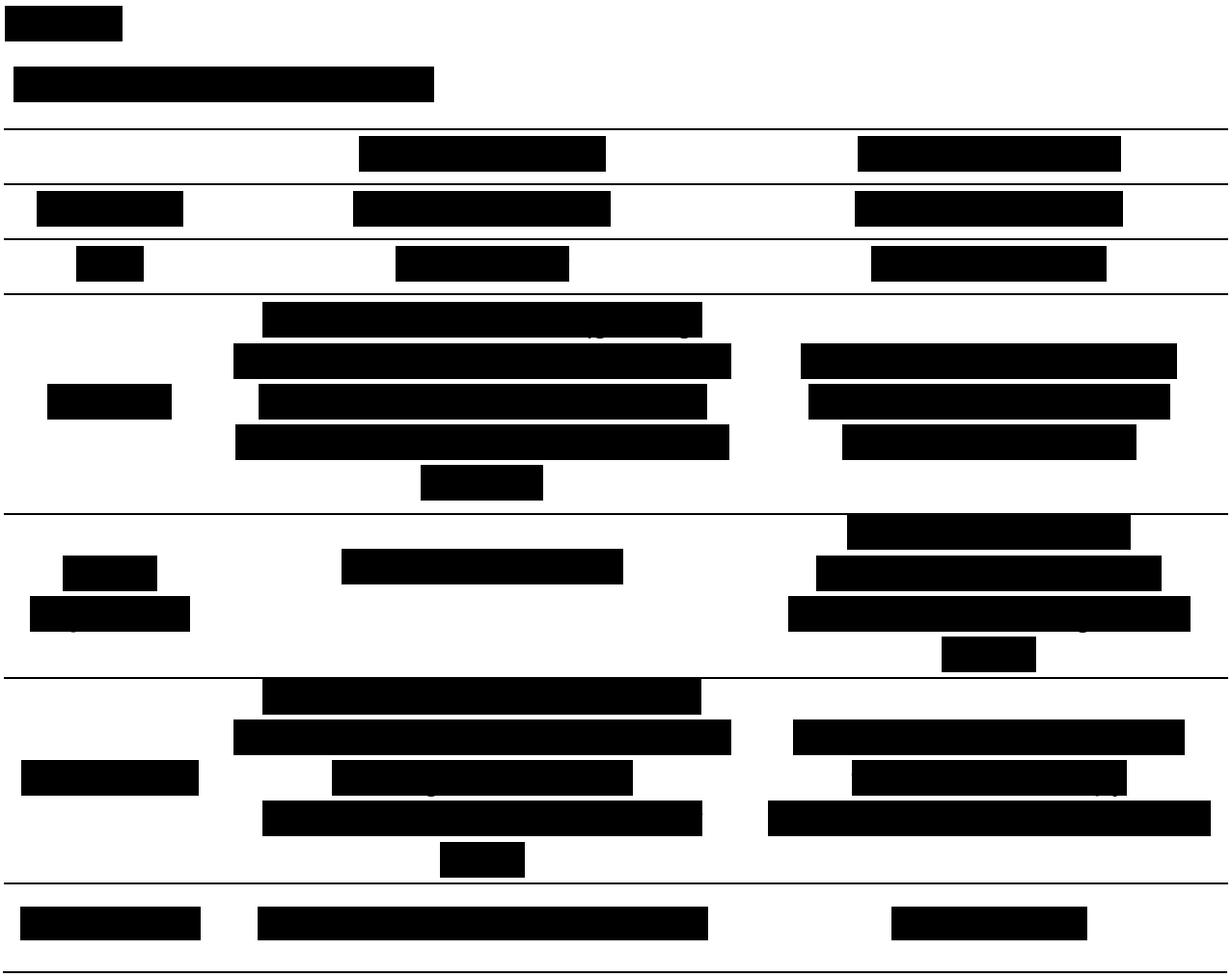


These Keywords were then combined with the Boolean operators “AND” or “OR”. The entry style of keywords was modified depending on the database, in order to narrow down the results. For example, on the Pubmed database the abbreviations TIAB and MESH were applied. The abbreviation “TIAB” refers to words that are included in a citation’s title, abstract, and keywords. This restricted the query to search in the title or abstract of the publications. MESH-terms serve as synonyms for

individual terms. On the database Web of Science, the field tags TS (Topic) and TI (Title) were used. No tags were applied to the search on PychINFO. Details on the individual search queries can be found in appendix A. The timespan of the publications was limited to 2000-2021 on all databases. In addition to the electronic search, references of relevant papers identified in the literature search were examined to identify other relevant publications.

2.2 Inclusion and exclusion criteria

The inclusion criteria, illustrated in table 2 below, were determined according to PICOS – Population, Intervention, Comparison, Outcome, and Study Design (Methley et al., 2014). The search was not by limited by geographical location, setting, or population age. Primarily scientific articles, which have been peer-reviewed, were included.



[a] The general population was chosen as the target population, in order to include interventions for the prevention of behavioural addictions and not exclusively their treatment. If this criterium was defined as “people suffering from a behavioural addiction” the search would solely include interventions targeting people who have already manifested an addiction.

2.3 Selecting studies

For the selection of adequate literature, the review management program Covidence was used, in which multiple reviewers can read through studies simultaneously and vote whether or not a study should be included or excluded. This allowed for more efficient collaboration and coordination amongst the reviewers. Due to the large number of resulting studies, one reviewer initially screened titles and abstracts. Subsequently, two reviewers independently screened the full-texts and verified if they met the inclusion criteria. Any disagreements regarding the inclusion or exclusion specific studies were resolved through a third reviewer.

2.4 Data extraction and synthesis

The following data was extracted and presented in tabular format for further analysis and comparison: General information (author, year, country, study type, type of addiction, diagnostic criteria), population (number of participants, recruitment, group allocation, mean age, gender), intervention characteristics (mode of delivery, duration, follow-up, content, guidance, theoretical background), outcome measures, results relating to effectiveness, and other additional findings (feasibility, acceptability, adherence, and engagement). Data extraction and quality assessment were conducted by one reviewer however both the extraction and quality assessment forms were verified by a second reviewer. Due to the heterogeneity of

the interventions and the variation of study designs included, a cross-study statistical analysis of effect sizes was not possible, and thus a narrative synthesis of the results from all studies was conducted. This includes narratively commenting on overall results and noting differences.

2.5 Assessment of study quality

To assess the quality of the studies included in the review, the Quality Assessment Tool for Quantitative Studies developed by the Effective Public Health Practice Project, was used. This tool allowed for a standardized means of rating the overall quality of the studies in eight areas: selections bias, study design, confounders, blinding, data collection methods, withdrawals and dropouts, intervention integrity, and analysis. The overall methodological quality was assessed on a scale of one to three, one being strong, two is moderate, and three is weak (Effective Public Health Practice Project, 1998)

3 Results

The initial electronic database search on Web of Science, Pubmed, and PsychInfo yielded a total of 4,150 potentially eligible studies. After removal of duplicates, 3,762 publications were screened by title and abstract. An additional five studies were identified through the references. Subsequently, a total of 44 full texts were screened. 21 studies were excluded for reasons, such as missing efficacy indices, wrong route of delivery, wrong type of publication, wrong focus (e.g., content analysis or application development), or wrong study design (e.g., qualitative study). One study was excluded because it was a duplicate and another because no corresponding full text was found, despite contacting the authors twice. Ultimately, 23 studies were included in this review. The study selection process is outlined in the PRISMA flowchart in figure 2 below.

[redacted]

3.1 Study characteristics

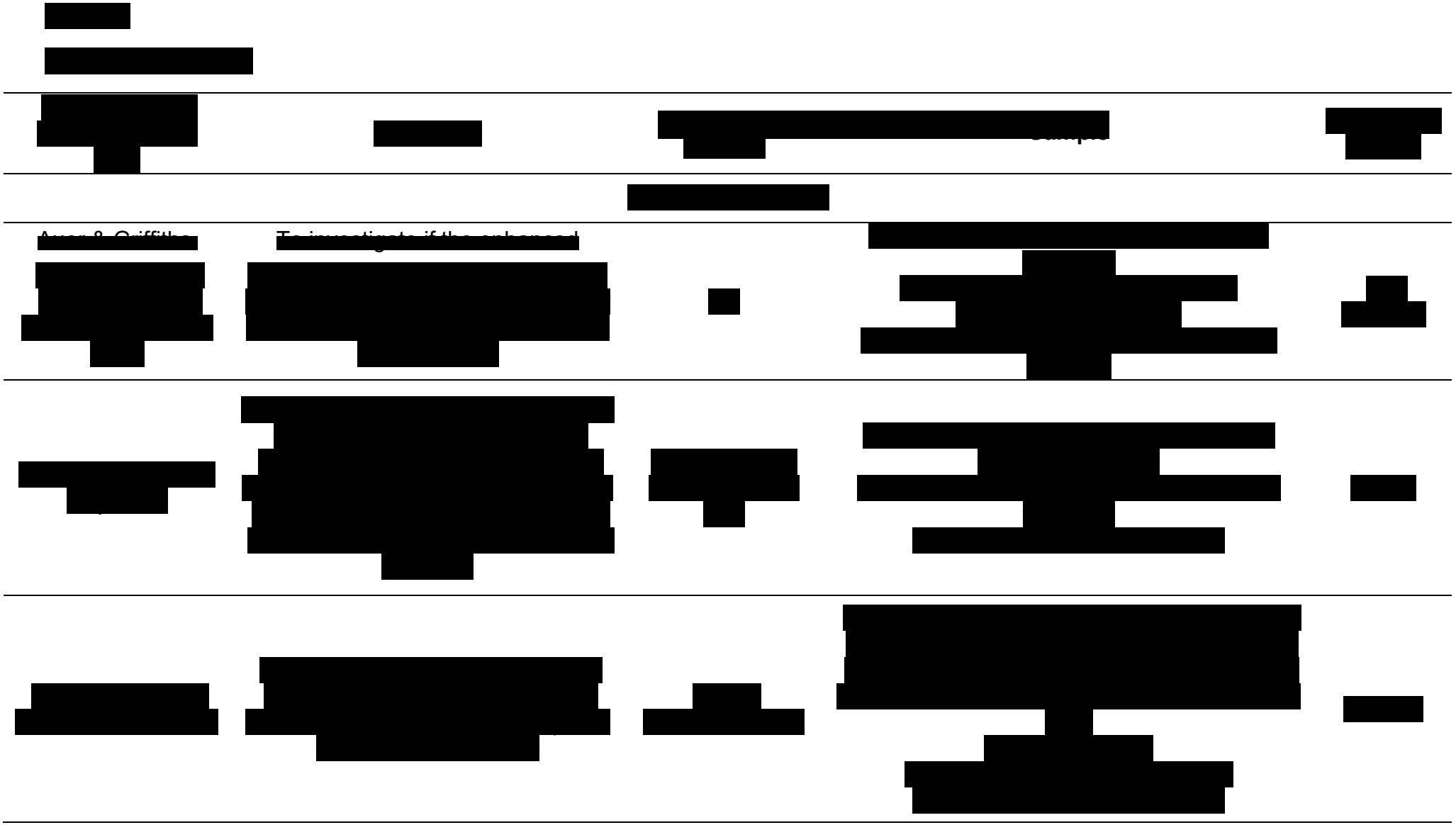
The publication year across all studies ranged from 2008 to 2020. The total sample size from all 23 studies was 5,230 and the mean age of participants ranged from 10 years to 50, whereas two studies did not report a mean age. Participants in 16 out of the 23 studies were predominantly (50% or more) male. Two studies did not report the male to female ratio.

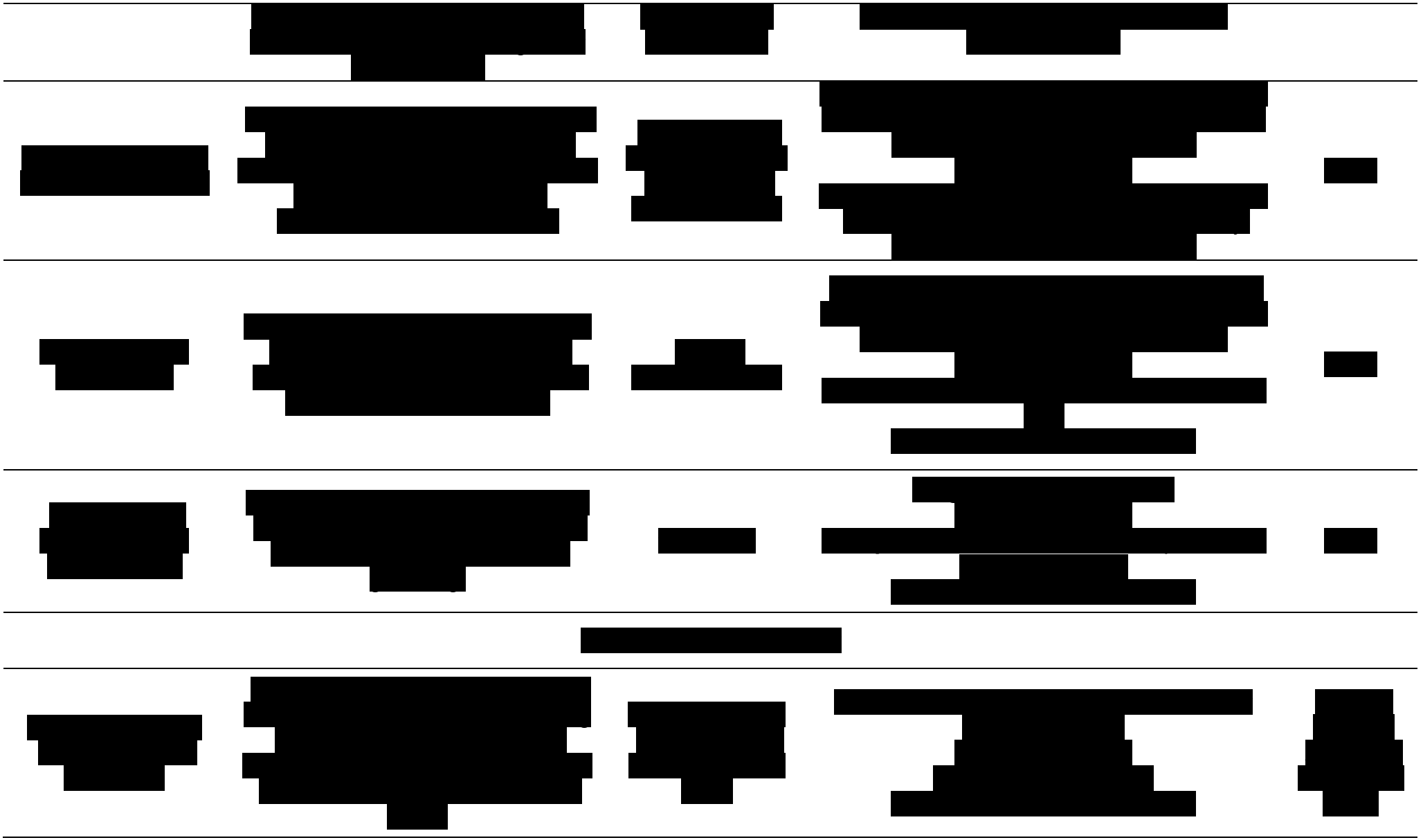
The majority of studies (n=4) were conducted in Canada, followed by Sweden (n=3) and Australia (n=3). The remaining studies were conducted in Italy, Finland, China, United States, Iran, Germany, France, Norway, Japan, and one in both Canada and the United States. All of the 23 studies were quantitative studies, 13 of them being randomized controlled trials (RCT). The remaining ten studies were either cross-

sectional quasi-experimental studies, non-comparative studies, pilot studies, or program evaluations.

Out of the 23 studies included in this review, 19 address problematic gambling, one problematic pornography use, one internet gaming addiction, one social networks addiction, and one problematic internet use. No studies were found for shopping addiction, i.e., compulsive buying. The most common recruitment method was online advertisements (e.g., Facebook or Twitter) followed by print media (Newspapers, bus advertisements, or flyers), and/or radio. The studies by Canale et al. (2016) and Chau et al. (2019) recruited in primary schools in Italy and China, respectively. Rosen et al. (2020) recruited ex-offenders through probation and pretrial services, as well as through flyers displayed across midwestern cities in the United States, and through online advertisements. Luquiens et al. (2016) recruited participants directly in their gambling environment, meaning participants were invited to participate in the program through the poker gambling service “Winamax”.

With regards to diagnostic criteria, the majority of the studies (n=9) addressing problematic gambling used the DSM-IV criteria for pathological gambling. The remaining studies on gambling used the Problem Gambling Severity Index (PGSI), the South Oaks Gambling Screen (SOGS), or the Gambling Symptom Severity Scale (G-SAS) as diagnostic criteria. The one study on internet gaming addiction used the Korean Addiction Proneness Scale as diagnostic criteria, whereas Su et al. (2011) used Young’s Diagnostic Questionnaire (YDQ), and Rad & Ahmadi (2018) applied the Online Social Networking Addiction Scale. The one study on pornography addiction did not report any diagnostic criteria. Further details on study aim, group allocation, and target population of the included studies can be found in the table 3 below.





3.2 Intervention characteristics

The subsequent chapter summarizes the following intervention characteristics: delivery mode, approach and guidance, duration, theoretical background, and content. Further details and in-depth descriptions of the individual interventions can be found in appendix B.

The most common mode of delivery was the internet, i.e., websites, followed by pop messages, text messages, or SMS. One intervention involved a smartphone application, and another used an email-only delivery approach. 11 of the 23 interventions were guided. Guidance was provided through either preprogramed or personalized emails, text message reminders, or telephone, and one study involved additional onsite training in schools. Guidance was most commonly provided as a means of providing feedback, support, and encouragement, as well as to answer the participants' questions. One study did not provide any information on exchange or guidance within the intervention. All interventions were stand-alone treatments and the duration of the interventions varied from 10 minutes (single session), to four months.

Of the 19 studies on problematic gambling, six were internet-based cognitive behavioural therapies, five online self-help tools, three were text message interventions, two web-based counselling (email or telephone), two were brief single-session web-based interventions, and one a personalized feedback intervention. Recurring themes or topics amongst those interventions for problematic gambling were the following: information and prevalence on "problematic gambling", goal setting, monitoring behaviour, identifying and responding to high-risk situations, motivation to change, identifying urges or triggers and how to combat them, how to manage debt, relapse prevention, and relationships. Most (n=17) of the interventions for problematic gambling were based on cognitive behavioural therapy and motivational interviewing. Two of these 17 interventions also incorporated behavioural change techniques and personalized feedback. Cognitive behavioural therapy (CBT) aims to teach patients that it is not the situation that determines how people feel, but rather how they interpret the situation (Fenn & Byrne, 2013). CBT most commonly employs cognitive techniques such as "guided discovery", and

behaviour change techniques (e.g., goal setting and problem solving). The theoretical background varied amongst the remaining studies, whereby one intervention was based on principles of self-regulation and self-control, another on the solution-focused approach as well as motivational interviewing, and another was based on principles of self-appraisal and self-efficacy.

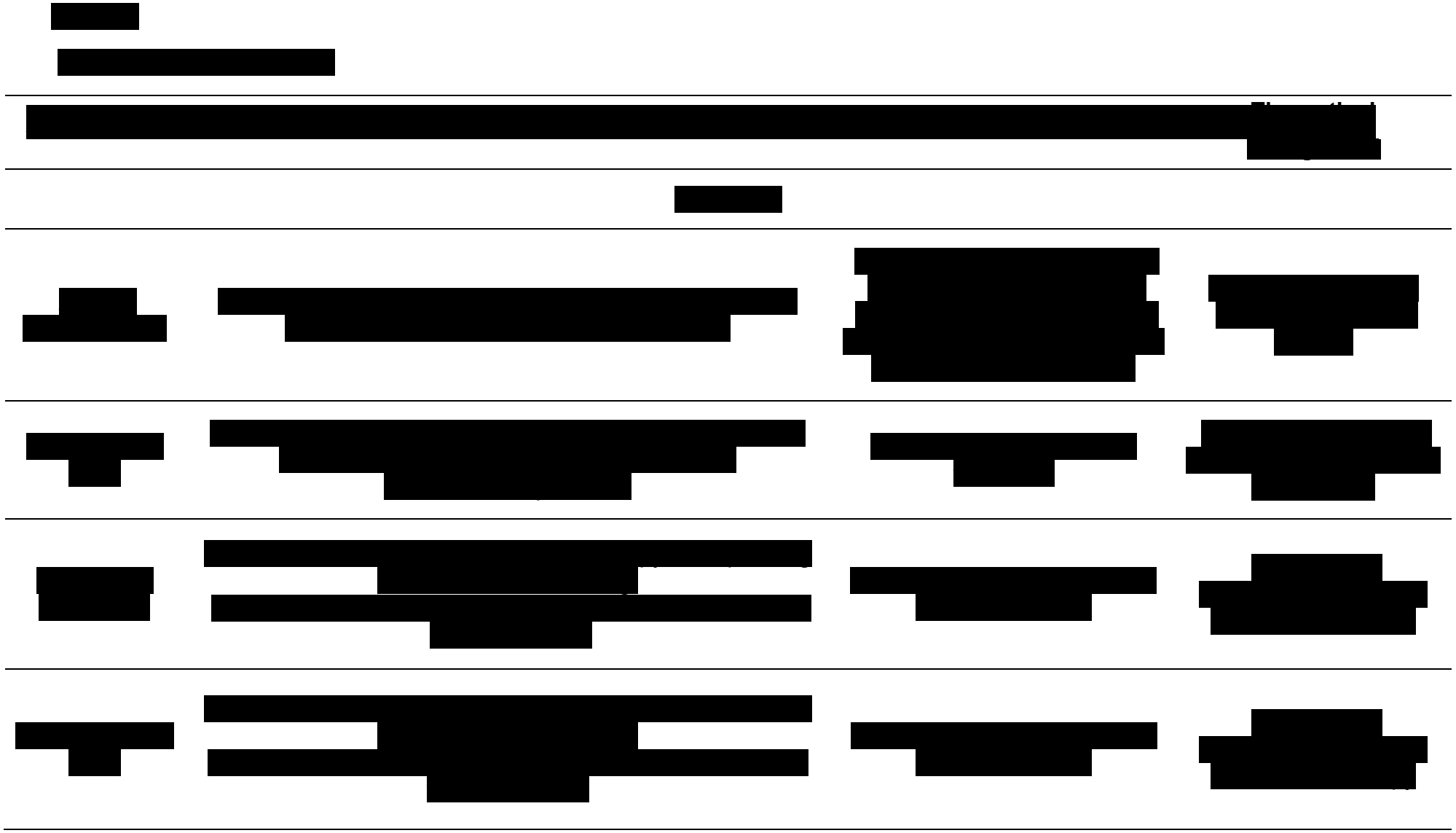
The program “Wise IT-Use” for Internet gaming disorder consisted of online training modules made up of three parts. The first part introduces the participant to the prevalence of problems related to Internet gaming disorder and risky online behaviour. In the second part, information is provided on the unfavourable consequences of Internet gaming disorders, and in the last part, participants are taught effective ways to combat problems related to Internet gaming disorder (Chau et al., 2019). The program is based on the “flow theory” by Nakamura and Csikszentmihályi, which suggests that the learning experience is maximized when learners experience heightened joyfulness and when they are fully absorbed in the learning activity. Consequently, this increases their intrinsic motivation and active engagement in learning (Lopez & Snyder, 2009). Thus, participants were invited to take part in an onsite training consisting of interactive learning games and activities, to apply the acquired knowledge and to enhance participants’ joyfulness and motivation.

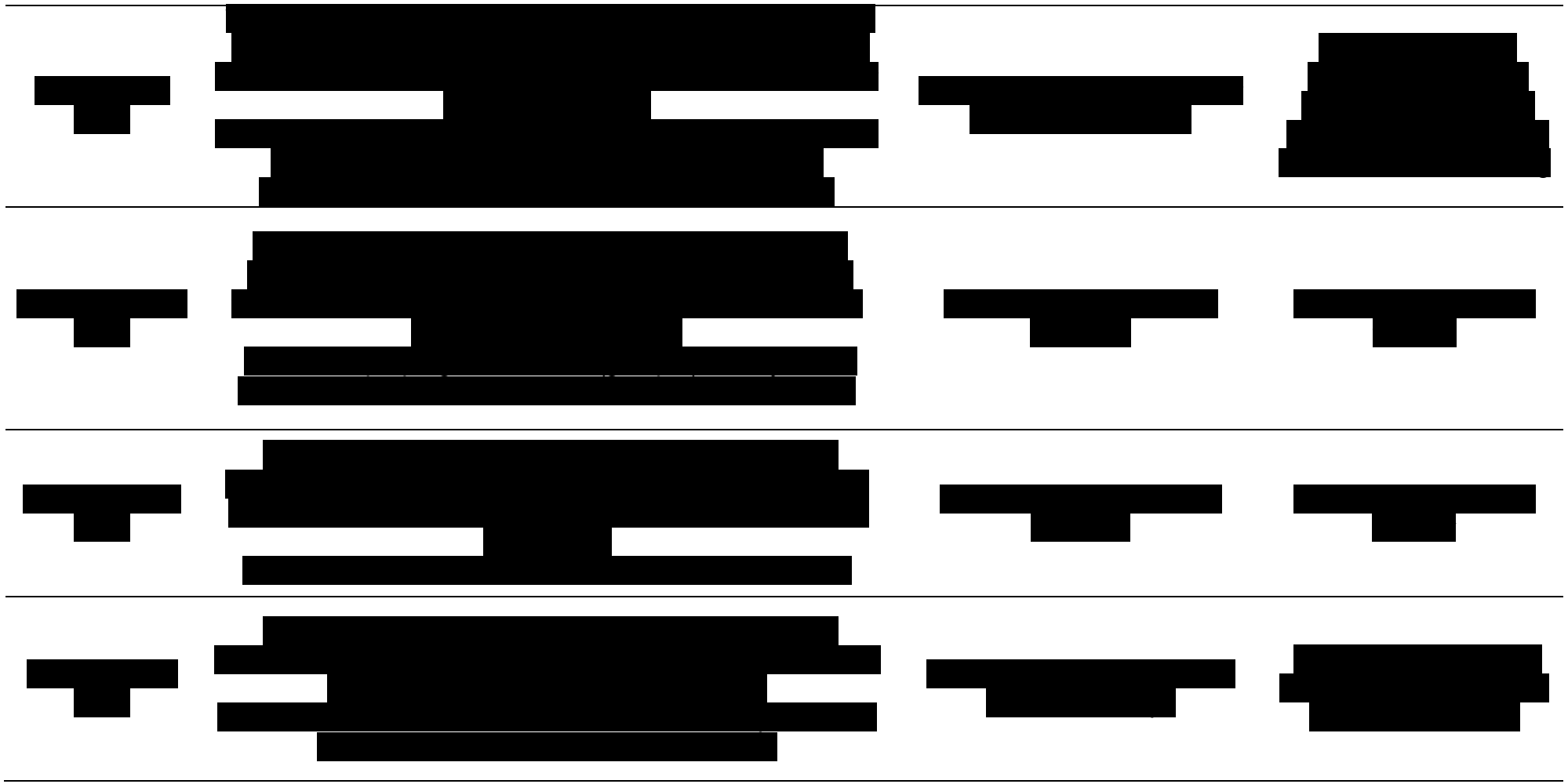
The mobile application targeting social networking addiction enabled participants to manage their use of online social networking apps by sending the participants notifications informing them that they have exceeded their time spent online and that the activity of “browsing online” should be replaced by another activity. The application also provided information on online social networking addiction and its effects, questionnaires to measure specific variables, lists of alternative activities, and a list of all the social networking applications downloaded on the device. The contents of the intervention were based on reality therapy (Rad & Ahmadi, 2018).

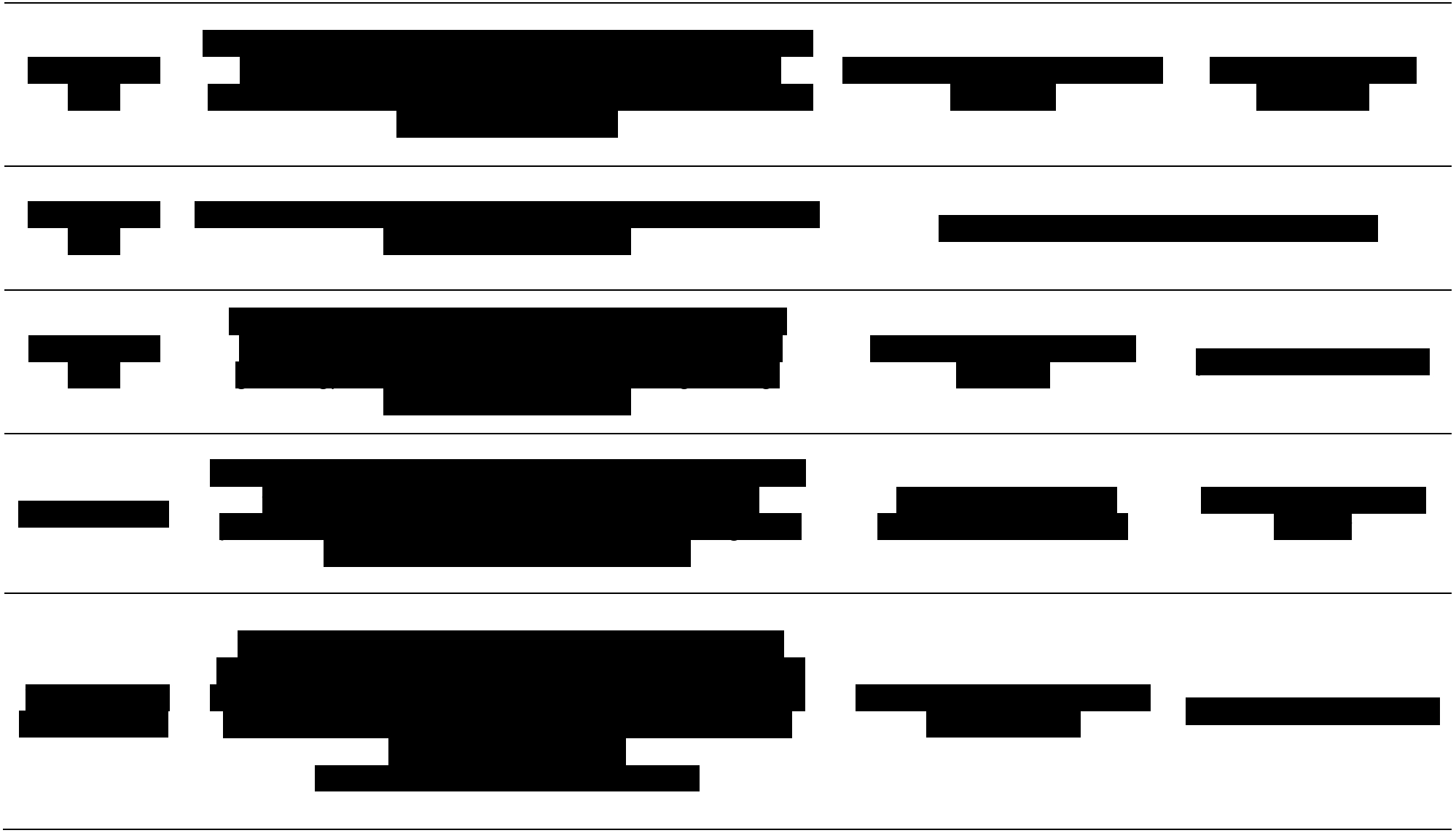
The “Healthy Online Self-helping Centre” (HOSC) was an online system compromised of four modules, namely (1) an introduction to the program and instructions on how to use the system, (2) feedback and data on participants’

behaviour, (3) exercises to encourage change, (4) teaching methods of change, such as, adjusting irrational cognitions, creating a plan, resisting temptation, and accessing support resources. The modules in the HOSC were based on motivational interviewing and cognitive behavioural therapy (Su et al., 2011).

Lastly, the Candeo program targeting problematic pornography use provided participants with ten psychoeducational modules delivered through text, graphics, video, audio, and interactive exercises. The modules included the following: (1) information on habits and addictions, (2) myths about sexual addiction and understanding how an addiction develops, (3) “thinking” your way out of an addiction, (4) cognitive restructuring principles, (5) recovery success and maintaining it, (6) response to setbacks, (7) altering repetitive thoughts, (8) learning how to fill the intimacy void, (9) understanding triggers and habits, and (10) healthy pleasure outlets. The Candeo program was also based on cognitive behavioural therapy (Hardy et al., 2010).







3.3 Effectiveness

As explained in chapter 1.4, the aim of this review is to assess the effectiveness, acceptability, feasibility, and engagement of online interventions for behavioural addictions. To do this, a narrative approach was used to synthesize key findings relating to these outcomes. This approach was chosen due to the heterogeneity of the included studies, in terms of study design, intervention type, and outcome measures. The following chapter provides a summary of the effectiveness, acceptability, engagement, and feasibility of the interventions, as well as an overview of the quality of the individual studies. Details on outcome measures and results of the individual studies can be found in appendix C.

3.3.1 Problematic gambling

Internet-based cognitive behavioural therapy (I-CBT) was the most common approach used for the treatment of problematic gambling and overall proved to be effective in reducing gambling-related problems. For example, Carlbring and Smit (2008), were able to show that I-CBT significantly reduced gambling problems, anxiety, depression, and increased quality of life and found that these effects were sustained up to the 36-month follow-up. The same intervention was evaluated in 2012 with a severely depressed sample and similar results were found. However, the more severely depressed participants showed significantly larger reductions in depression scores and an increase in quality of life (Carlbring et al. 2012). Another study evaluating the effectiveness of I-CBT found that compared to the waitlist condition, participants who completed the I-CBT showed significant reductions in gambling severity, frequency, urges, gambling related cognitions, depression, and anxiety (Casey et al. 2017). When compared to the I-MFS (monitoring, feedback and support) condition, I-CBT lead to greater reductions in gambling urges, cognitions, stress, and improvements in life satisfaction, however no other differences were found between the two groups. While both interventions significantly reduced gambling related problems, participants in the I-CBT group were significantly more satisfied with the treatment. Similarly, Castrén et al. (2013) found that I-CBT significantly reduced gambling problems, urges, social consequences, erroneous thoughts, and depressive feelings. They also observed improvements in impaired

control of gambling. All of these changes were sustained up to the 6-month follow-up. Evidence for the effectiveness of I-CBT was also illustrated by Nilsson et al. (2018), through the comparison of I-CBT (for gamblers only) to internet-delivered behavioural couples therapy (gamblers and concerned significant others). Gamblers in both groups reported significant decreases in money lost, gambling severity, gambling frequency, anxiety, and depression. The only difference found between the two groups was that the I-CBT group experienced greater reductions in anxiety symptoms, to levels corresponding to “no anxiety” at the 6-month follow-up. Luquiens et al. (2016) assessed the effectiveness personalized feedback on gambling behaviour delivered by email, a self-help book based on CBT, and a CBT program emailed weekly by a trained psychologist but found all interventions to be ineffective. They compared these three modalities and found that PGSI scores decreased in the entire sample, including the control group, with no significant between-group differences. The authors explain that this lack of effectiveness may be due to the fact that the trial included non-treatment seeking gamblers with no prior involvement in treatment, who tend to display low motivation and readiness for change.

Five other studies investigated the effects of self-help tools on gambling-related problems, however evidence in support of their effectiveness appears to be less prominent in comparison to I-CBT. Cunningham et al. (2019a), compared an online self-help tool for problematic gambling with a no-intervention control group, and found significant reductions in all outcomes (gambling problems, number of days gambled, gambling symptoms) in the entire sample, with no significant differences between the two groups. Two randomised controlled trials (Cunningham et al., 2019b, Cunningham et al., 2020) comparing the effects of the same online self-help tool with or without supplementary modules on alcohol consumption or mental health, also found an overall decrease in gambling severity and number of days gambled. However, there were no significant differences between the two groups, indicating that the supplementary modules on problematic alcohol use or mental health did not have an added effect on the corresponding outcomes (alcohol consumption and mental health). Another study (Hodgins et al., 2019) investigated the effects of a self-help tool compared to a brief personalized feedback intervention

and found that both interventions were equally as effective in reducing gambling severity, mean days spent gambling, and mean dollars spent. In contrast, Yakovenko and Hodgins (2020) concluded that both a voluntary a self-exclusion self-management program with automated emails and face-to-face therapy were equally as effective in reducing gambling severity, money spent, and days spent gambling. This was illustrated by the absence of significant differences found between the groups, with the exception of quality of life, which increased in the face-to-face group, but not in the online group.

Canale et al. (2016) compared a personalized feedback intervention with a web-based gambling intervention (personalized feedback with online activities) for high school students and found similar results as Hodgins et al. (2019). The study provides partial support for the effectiveness of a web-based gambling intervention for high school students, as the only outcome impacted by the intervention was gambling severity. No other significant differences were found between the intervention and control group (personalized feedback only) for the outcomes gambling frequency, gambling expenditure, and attitudes toward the profitability of gambling. Authors explain that the lack of effectiveness could be attributed to the fact that the participants included were not problem gamblers, indicating that the intervention may be more effective for samples with more severe gambling problems. This is supported by the fact that frequent gamblers showed a greater reduction in gambling problems, frequency, and attitudes towards gambling, compared to non-frequent gamblers.

The effectiveness of email or telephone guidance combined with an online intervention was evaluated in two studies, and overall results show only partial effectiveness. Myrseth et al. (2013) evaluated a telephone and web-based treatment for pathological gambling and observed significant decreases in all outcome measures (gambling severity, cognitive distortions, psychological distress) from pre- to post-treatment. Additionally, 58% of the sample was considered recovered at post-treatment (according to SOGS-R cut-off scores), and follow-up data showed that treatment effects were sustained up to 6 months. Jonas et al. (2020), compared a web-based structured intervention (with counselling by a trained psychotherapist),

with email counselling and a waitlist condition, and found that participants in both intervention groups showed significant changes in gambling severity, frequency, highest stake, client satisfaction, and working alliance when compared to the waitlist group. The only significant difference found between the two intervention groups was for well-being, for which higher scores were achieved in favour of the web-based intervention.

Two other studies (Rodda et al. 2017, Rosen et al. 2020) evaluated brief, single-session interventions, but found no evidence for their effectiveness. Rodda et al. (2017) analysed the outcomes readiness to change, confidence, and distress, however only confidence increased as a consequence of the session. No other changes were found. A lack of effectiveness was also observed in the study by Rosen et al. (2020), comparing a brief 10-minute online intervention with a group who received referral to treatment only. While, gambling severity, awareness, and attitudes decreased in the entire sample, no differences were found between the intervention and control group.

Mixed results relating to effectiveness were also found in the three studies evaluating text-message interventions (i.e., SMS and Chatbot). For example, Auer and Griffiths (2015) found that the enhanced pop-up message (compared to a simple, non-enhanced pop-up message) doubled (0.67% to 1.39%) the number of participants ceasing their gambling session after the 1,000th game. Despite showing promising effects, this was only effective for a very small percentage of gamblers. Secondly, Rodda et al. (2018) compared a SMS intervention to “treatment as usual” (email, website, community forums, very brief self-help) and found no interaction between group and time for any of the outcomes (gambling symptoms, frequency, money spent, and readiness to change). However, significant decreases in all outcome measures (except for readiness) were found across the entire sample, indicating that SMS and various other forms of e-health interventions can both significantly decrease gambling-related problems. Lastly, the randomized controlled trial by So et al. (2020) found that the unguided chatbot-delivered CBT for problem gamblers (GAMBOT) had no effect on gambling severity compared to an assessment only control group. However, the intervention significantly reduced gambling symptoms,

whereas the assessment only group experienced no reductions in gambling symptoms.

3.3.2 Internet gaming disorder

Chau et al. (2019), evaluated the impact of the web-based universal prevention program “Wise-IT-Use” for primary school students, and found that the program significantly increased the proportion of “average” gamers and decreased the proportion of gamers categorized “at-risk”, whereas the proportion of “high risk” gamers stayed the same. The program was also able to mitigate symptoms of internet gaming disorder and negative affect, as illustrated by the significant decrease in the respective outcomes from pre- to post- intervention. This program was the only intervention that explicitly aimed to prevent an escalation of the behaviour.

3.3.3 Social networking addiction

Rad & Ahmadi (2018) observed significant reductions in social networking addiction, time spent online, anxiety, depression, and an increase in sleep quality and life satisfaction, as a result of a mobile application designed to measure and decrease social networking addiction. Effectiveness of the treatment was highlighted by the fact that no statistically significant changes from before to after the treatment were found in the control group.

3.3.4 Problematic internet use

Su et al. (2011) assessed the impact of the “Healthy Online Self-Helping Center” and demonstrated that the program effectively reduced the number of hours spent online and internet addiction severity, as well as increased satisfaction in online usage. Su et al. (2011), assessed the effectiveness of the program in both laboratory environments and natural environments, and observed significant results in both conditions. They also compared these two conditions with a non-interactive system and found that it also reduced the number of hours spent online and internet addiction severity, whereas the control group experienced no significant changes in the respective outcomes.

3.3.5 Problematic pornography use

In the cross-sectional study on the online recovery program “Candeo” for problematic pornography use and masturbation, Hardy et al. (2010), observed changes in all aspects of recovery when comparing current and retrospective data. Significant increases were found for the perceived percent recovered, as well as improvements in the psychological dimensions of recovery (constructive reaction to temptation, positive affect, self-control, meaning in life, connection to peers, forgiveness, awareness, and finding healthy pleasure outlets). The participants also reported having less obsessive sexual thoughts, negative affect, and tendency to deny responsibility.

3.4 Acceptability, feasibility, and engagement

Definitions of the acceptability, feasibility, and engagement varied greatly across all studies and most studies either (1) did not provide the data, (2) only reported data on a select few of these outcomes, or (3) defined the respective outcomes differently. Details on the acceptability, feasibility, and engagement of the individual studies can be found in appendix C.

What is most apparent across all studies is the lack of engagement. Seven studies reported an engagement rate of 50% or less, meaning that in these studies less than half of the participants completed all modules/exercises provided in the interventions. Cunningham et al. (2019a) found that only 13.9% of the sample completed at least one of the 15 different self-help tools and only 8.6% logged in more than once. This was the lowest engagement rate across all studies. Four other studies reported engagement rates of 50% or more, for example Cunningham et al. (2020) found that 80% of the sample accessed at least one of the online gambling modules, however only 28% completed at least two of the four modules. Hodgins et al. (2019) and Rodda et al. (2018) reported engagement rates of 57% and 52% respectively. High rates of engagement were reported by So et al. (2020), with 77% using the GAMBOT chat throughout the intervention period. They also reported that, on average, participants responded to GAMBOT 22.6 out of 27 days. Jonas et al. (2020), found that participants in the intervention group (web-based intervention with counselling by a psychotherapist) used the intervention twice as long as the control

group (email counselling only), and also reported significantly stronger working alliance than users in the control group. Su et al. (2011) also found significant differences between the treatment conditions, namely that participants using the interactive system spent 28.5 minutes completing the program, whereas participants provided with the non-interactive system spent only 15.6 minutes on the program. The remaining nine studies did not provide any data on engagement or adherence. Besides engagement and attrition, none of the studies provided explicit data on the feasibility (i.e., data on demand, practicality, integration etc.)

Overall, follow-up rates were moderate across most of the studies, with 10 studies reporting follow-up rates of 50% or more across all follow-up points. Four other studies reported follow-up rates of 45% or less, one of them (Luquiens et al. 2016), reporting an attrition rate of 83%. Seven studies did not provide follow-up data. Casey et al. (2017) found that in the face-to-face version of the online version there were substantially lower drop-out rates (18.63% face-to-face therapy, 47.7%, online intervention).

Seven studies provided data on acceptability and satisfaction, all of which reported mostly positive feedback. For instance, in one study (Castrén et al., 2013), participants described the intervention as follows, “this program saved my life, thank you”, “it was hard to get committed to the program and complete the modules at the beginning. Therapist’s encouragements help me to continue, thank you”, “Once, I got used to therapist’s calls, I started waiting for those conversations”, “Modules were easy to understand”, “Involving significant others, was challenging, but helpful.” As mentioned in chapter 3.1.1, Casey et al. (2017), found that participants were significantly more satisfied with the I-CBT intervention than the I-MFS. Participants in the I-MFS condition were only moderately satisfied with the program. Furthermore, two studies (Nilsson et al. 2018, So et al. 2020) reported that the majority of participants would recommend the program to people in similar situations. Jonas et al. (2020), who compared a structured web-based intervention with email counselling (control), reported CSQ-scores (Client Satisfaction Questionnaire) of 25.6 and 23.3, equating to moderate and high satisfaction. Nilsson et al. 2018 also provided insight into the therapists’ feedback, reporting that therapists were satisfied with the length of the treatment, its content and the exchange with participants, however they also

stated that trying to reach participants who did not answer phone calls was tiresome and demoralising. The one study (Hardy et al. 2010) addressing problematic pornography use, assessed participants' perception of the helpfulness of the online program compared to other treatments and found that no other forms of treatment were perceived as being more helpful than the online intervention (Candeo). In contrast, Yakovenko and Hodgins (2020) reported that participants generally liked the program and rated the quality high, however half of the users rated the monthly email reminder negatively and suggested that more interactivity, media variety, simulation, shorter modules, and personalization should be integrated into the program.

3.5 Study quality

To assess the quality of the included studies the EPHPP tool was used. Overall, 4 of the 23 studies were judged as strong, 7 as moderate and 12 as weak. Reasons for rating a study as weak varied, however most studies (n=10) received this rating due to either missing or low follow-up rates. Within the domain "selection bias" 5 studies were rated as weak, primarily because the samples did not represent the target population. For example, two studies recruited students from universities, which represent a relatively homogenous group. Eight studies were rated weak in the domain "confounders" for the lack of reporting or poor control of confounders. The types of confounders included incentives for participation, religious affiliation, various demographic characteristics, access to other treatments during the intervention etc. Blinding of researchers and/or participants was often not described or not applicable due to the design of the study. A strong data collection method was used in six studies, through the employment of standardized, validated psychometric measures. 14 other studies primarily relied on self-reported data and were therefore rated as moderate. With respect to study design, 13 studies were rated as strong, as these were randomized controlled trials, which according to the EHPP tool must be ranked as good/strong, while any other designs were rated as moderate or (if unknown or not described) weak. Further details on the study quality can be found in appendix D.

4 Discussion

The aim of this systematic review was to assess the effectiveness, acceptability, and feasibility of online interventions for behavioural addictions. A further aim was to identify specific characteristics of these interventions, such as the theoretical background and implementation. Of the 23 studies included in this review, the majority of the interventions were based on principles of cognitive behavioural therapy and motivational interviewing. Two others included behavioural change techniques and personalized feedback, one was based on principles of self-regulation and self-control, the solution-focused approach as well as motivational interviewing, and another on principles of self-appraisal and self-efficacy. Two studies addressing internet-related addictions included the “flow theory” or reality therapy. All interventions included in this review were stand-alone treatments.

As mentioned in chapter 1.6, interventions were considered effective if they significantly reduced problems relating to the respective behaviours. Overall, I-CBT, online self-management tools, email and telephone counselling, and text messages can all be considered effective methods for the treatment of gambling problems. Nonetheless, I-CBT proved to be the most effective treatment method as four of the five studies investigating the effects of I-CBT found significant reductions in gambling related problems as a consequence of the interventions. In contrast, three of the five studies on self-help tools found the interventions to be ineffective. Interestingly, one of these studies reported that the paper-pencil equivalent of the online program was more impactful than the online version, which, as explained by the authors, could be due to the fact that the online version did not include therapist support. On the other hand, the study by Hodgins et al. (2019) illustrated that both an online self-help tool and a personalized feedback intervention are equally as effective. Similarly, Yakovenko and Hodgins (2020) observed that a voluntary self-exclusion online self-management program and a face-to-face intervention both lead to significant reductions in gambling-related problems. Rodda et al. (2018) also observed that SMS and other e-health services are equally as effective. This is a promising result as SMS interventions tend to be more cost-effective options. Email and telephone contact in combination with a web-based intervention show similar potential. Results

illustrate that both web-based interventions with telephone guidance and email counselling are promising, effective, methods of decreasing gambling related problems. Brief single-session interventions, on the other hand, are less effective intervention approaches. With regards to internet-related addictions, results indicate that both a universal web-based prevention program for primary school students and an android application to measure and decrease social networking addiction, can significantly reduce problems related to gaming addiction and social networking addiction, respectively. The “Healthy Online Self-helping Centre” was found to significantly reduce problems relating to problematic internet use, as was the non-interactive system, which it was compared to. As for problematic pornography use and masturbation, results show that an online psychoeducational program can effectively reduce problems related to problematic pornography use.

A concise answer to the research question “How effective are online interventions in treating or preventing behavioural addictions?” would be that online interventions are somewhat effective in treating behavioural addictions. Due to the vast differences between study design, intervention type, target behaviour, it remains unclear what interventions characteristics are associated with greater effectiveness. Overall, no definite conclusions can be made about whether or not the interventions were effective in preventing the respective addictive behaviours, as only one study explicitly focused on universal prevention. Many interventions incorporated modules on relapse prevention, however the association between the inclusion of these modules and the effectiveness of prevention cannot be determined.

As for the last research question “what is the feasibility, acceptability, and engagement of these interventions?” no definite conclusions can be made about the acceptability, feasibility, engagement, and adherence of the included studies, primarily because there was a lack of data provided on the respective outcomes. Nonetheless it is evident that the lack of engagement was a flaw in many of the interventions. Satisfaction with the interventions, on the other hand, was generally high. It is unclear what features of the interventions are associated with these outcomes, however possible reasons include: the novelty of online interventions, the lack of awareness about behavioural addictions, concerns about privacy and

security, a lack of “user-centred” design, or the physical or social distance (Hardiker & Grant, 2010).

Overall, the results must be interpreted with caution as there are a number of weaknesses in the methodology of the individual studies. For example, in those studies that did not involve a control group, it is unclear if the effectiveness of the interventions is due to the intervention, or due to factors such as natural recovery processes, exchange between participants and researchers, participation in assessments, or statistical regression towards the mean. What is also important to consider is that the degree of “recovery” i.e., “severity” is dependent on the diagnostic criteria and screening method used. The criteria and instruments used varied greatly across studies, and it is thus possible that due to differences in cut-off scores, the degree of the “addiction” may have been classified differently across studies. Additionally, most studies used self-reported data, which may have been skewed by social desirability. However, it is not certain that this was the case, as the anonymity of the internet may make individuals feel more comfortable about disclosing information.

The preliminary findings of this review partially concur with existing evidence. For instance, a systematic review on non-pharmacological treatments of gambling disorder was also able to confirm the effectiveness of CBT, finding significant improvements in the majority of the outcomes as a result of CBT. However, the authors also found that group treatment had additional benefits due to the group cohesion and social support, as well as additional observational learning, meaning participants were able to learn from each other (Ribeiro et al., 2021). On the other hand, a systematic review on treatments for internet gaming disorder and internet addiction found limited evidence in support of the effectiveness of CBT. The authors also concluded that there is limited evidence for the effectiveness of the treatments due to the lack of well-designed studies (Zajac et al., 2017). A surprising result of the same review is that medication treatments, in particular antidepressants and bupropion, show potential effectiveness for the treatment of internet gaming disorder. Similarly, Gola and Potenza (2016) found short-term reductions of problematic pornography use through the treatment using the medication “paroxetine”.

4.1 Implications for health promotion and prevention

Substances such as alcohol, tobacco, or cannabis, can be regulated through age limits, price regulations, bans on commercials, restrictions on sales etc. This is not the case for behavioural addictions, which makes their prevention and treatment significantly more difficult. Finding appropriate methods to treat or prevent behavioural addictions is therefore rather challenging. However, the findings from this review illustrate that online interventions are promising approaches for the treatment of behavioural addictions. In addition to the various benefits associated with online interventions, such as their low threshold, easy access, and low cost, they provide the opportunity for individuals, who fear stigmatization, to anonymously seek help (Rogers et al., 2017). This is particularly relevant for behavioural addictions, as there is currently a lack of awareness about them and the stigma surrounding them may therefore be more prevalent (Griffiths, 1996; Konkolÿ Thege et al., 2015).

Despite the mixed findings from this review, a number of recommendations for future interventions can be deduced from them. First, from a theoretical perspective CBT appears to be the most promising therapy method and therefore future interventions should employ elements of CBT. Secondly, what is particularly evident from the findings is the lack of engagement with the interventions. There are many factors that may influence this, however a potentially effective way to increase user engagement is by enhancing the user-centred design. This means that affected individuals are incorporated into the design and testing process as equal partners. It may also involve concerned significant others or third parties who will potentially pay for the treatment (e.g., insurance companies). A more drastic approach may also include patient-led design, where affected individuals themselves determine the focus and characteristics of the intervention (e.g., content, delivery mode, guidance, exchange etc.). Engaging affected individuals ensures that interventions meet the needs of the target audience and may therefore also engage those often underserved due to ethnicity, or educational attainment (Hardiker & Grant, 2010). Engagement may also be influenced by the lack of awareness of about behavioural addictions, which may subsequently also lead to a lack of willingness to seek treatment (Konkolÿ Thege et al., 2015).

All but one of the studies included in this review targeted individuals with severe behaviours. Future efforts should focus on increasing awareness about behavioural addictions and employ primary prevention strategies. Additional interventions should be developed to inform about behavioural addictions and potential warning signs to enable early detection. It may therefore be useful to refer to the biopsychosocial model to identify possible approaches for primary prevention, such as focussing on the social factors that affect an addiction, including peer influence or the availability of services. Examples of potential prevention methods include, incorporating modules on the topic into the school curriculum, smartphone applications to monitor behaviour, or providing information or disclaimers on gambling websites or online shopping sites (comparable to the warnings found on cigarette packages).

4.2 Implications for future research

What is crucial to keep in mind is the distinction between moderate “healthy” use/behaviour and an addiction, however this is greatly challenged by the vast disagreement regarding the diagnosis of behavioural addictions. Some researchers have argued that by categorizing certain behaviours as addictions, we risk over-pathologizing daily lifestyle choices. However, the opposite may be true too, meaning that through the lack of standardized criteria for behavioural addictions, potentially harmful and clinically relevant behaviours may be overlooked. As illustrated in chapter 1.6.1 Brand et al. (2020) have proposed the three meta-level criteria “clinical relevance”, “theoretical embedding”, and “empirical evidence” as a guide to define behavioural addictions. The results from this review highlight the need of a unified definition and diagnostic criteria. Future research should therefore use the three meta-level criteria as a guide to investigate the psychological and neurobiological processes involved in the different types of behavioural addictions,. (Brand et al., 2020). Using the three-meta level criteria proposed may also facilitate the inclusion of certain behaviours in the ICD-11 category “other specified disorders due to addictive behaviours”. Future research should also include qualitative studies using a person-centred approach to identify its aetiology, development, and the factors affecting functional impairment (Kardefelt-Winther et al., 2017).

4.3 Limitations

The current review has a number of limitations, with the most obvious being the heterogeneity of the included studies. The study design, group allocation, outcome measures, interventions characteristics, screening tools, and effectiveness indices varied greatly across all studies, which limits the comparability of the studies and subsequently also the ability to draw conclusions. Secondly, the majority of the participants in studies were male and most studies did not provide data on demographics. It is therefore unclear how effective the interventions are amongst individuals with different cultures, religions, educational attainment, socioeconomic status etc. Thirdly, the weak methodological quality of the individual studies limits the overall confidence in the findings. Furthermore, due to limited time resources only three databases (Web of Science, Pubmed, PsychInfo) could be searched. It is therefore likely that additional literature, which may have been relevant to the research question, was not identified. It is also likely that the chosen keywords may have limited the number of relevant results. For example, the addition of terms such as “addiction”, “disorder”, or “compulsive” may have yielded more targeted results. Lastly, even though the full-text screening was conducted by two reviewers, the title and abstract screening, data extraction, and quality assessment was conducted by one reviewer only, which may have led to a bias in the study selection and synthesis.

4.4 Conclusion

The development and evaluation of online interventions for behavioural addictions is a novel yet growing research field, with ample of room for growth. Within this systematic review, the effectiveness of various forms of interventions for behavioural addictions was evaluated, including internet-based treatments, self-help tools, email and telephone counselling, and SMS interventions. Overall, this review was able to demonstrate that online interventions can be effective in treating behavioural addictions. However, the findings also highlight the need for further research, and more interventions targeting primary prevention. Future interventions should (1) employ concepts of cognitive behavioural therapy, (2) include affected individuals to yield a more user-centred design relevant to the target group, (3) focus on primary prevention and increasing awareness about behavioural addictions. With regards to the methodology, future studies should include a control group, include long-term follow-ups to determine the durability of effects, measure engagement and

adherence, and report satisfaction. Furthermore, future studies should evaluate barriers to treatment and assess mediators of effectiveness to determine what intervention characteristics are associated with greater effectiveness.

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6 List of figures

7 List of tables

8 Declaration of originality and word count

«Ich, Stefanie Abend, erkläre hiermit, dass ich die vorliegende Arbeit selbständig, ohne Mithilfe Dritter und unter Benutzung der angegebenen Quellen verfasst habe.»

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9 Appendix

Appendix A: Search queries