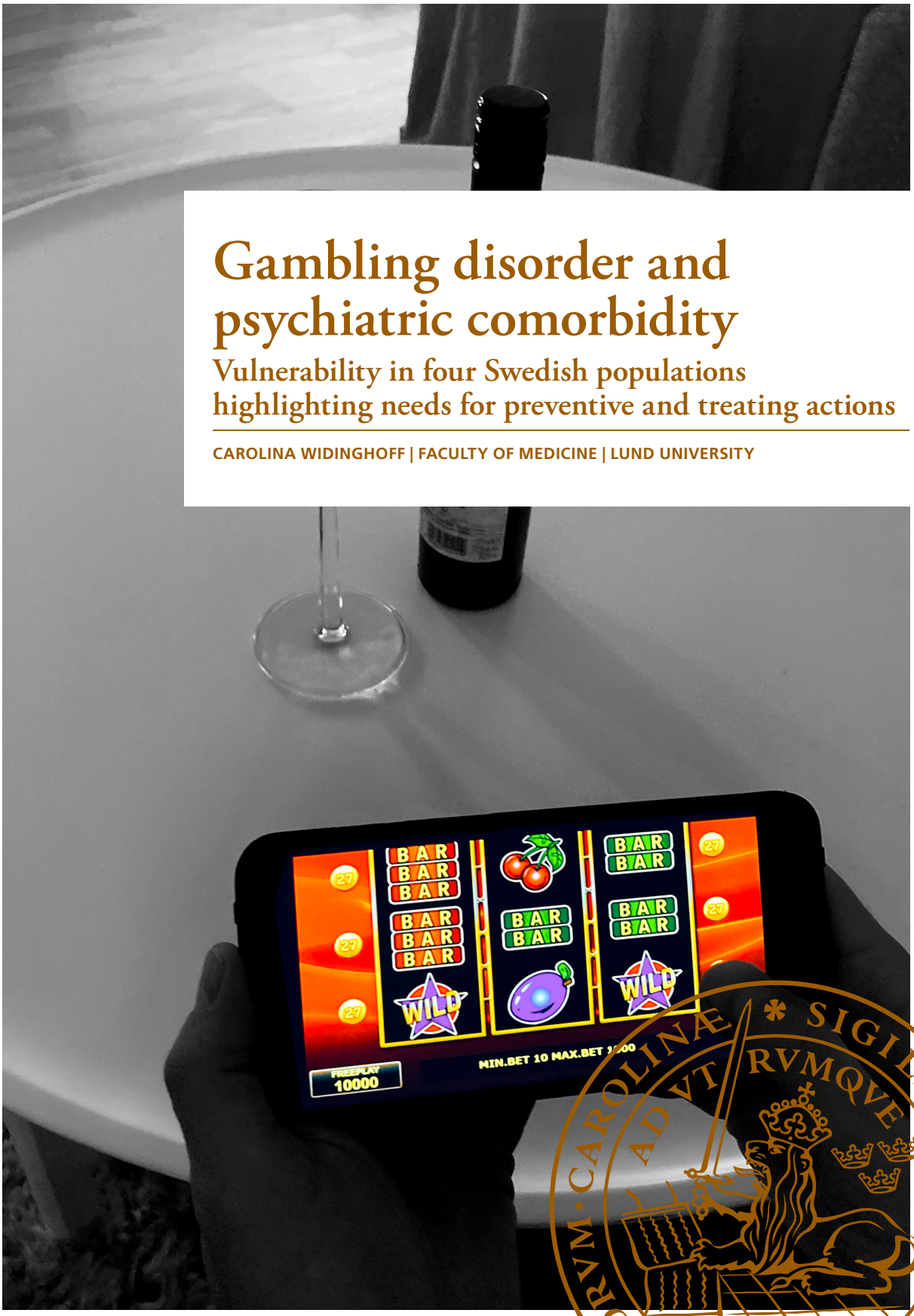
Gambling disorder and psychiatric comorbidity. Vulnerability in four Swedish populations highlighting needs for preventive and treating actions.

Widinghoff, Carolina

2021

Document Version:
Publisher's PDF, also known as Version of record



Gambling disorder and psychiatric comorbidity

Vulnerability in four Swedish populations highlighting needs for preventive and treating actions

CAROLINA WIDINGHOFF | FACULTY OF MEDICINE | LUND UNIVERSITY

Printed by Media-Tryck, Lund 2021 NORDIC SWAN ECOLABEL 3041 0903

LUND UNIVERSITY

FACULTY OF MEDICINE

Department of Clinical Sciences, Lund

Lund University, Faculty of Medicine
Doctoral Dissertation Series 2021:154
ISBN 978-91-8021-161-1
ISSN 1652-8220

Gambling disorder and psychiatric comorbidity

Gambling disorder and psychiatric comorbidity

Vulnerability in four Swedish populations highlighting needs for preventive and treating actions

Carolina Widinghoff

LUND
UNIVERSITY

DOCTORAL DISSERTATION
by due permission of the Faculty of Medicine, Lund University, Sweden.
To be defended at Psykiatrihuset, Baravägen 1, Lund,
December 17, 2021, at 13.00.

Faculty opponent: Per Carlbring
Main supervisor: Anders Håkansson
Co-supervisors: Jonas Berge and Helena Hansson

Organization LUND UNIVERSITY	Document name DOCTORAL DISSERTATION
	Date of disputation: 2021-12-17
Author(s) Carolina Widinghoff	Sponsoring organization

Title and subtitle: Gambling disorder and psychiatric comorbidity. Vulnerability in four Swedish populations highlighting needs for preventive and treating actions.

Abstract

Background: Gambling disorder (GD) is a psychiatric condition causing severe harm on individual and societal levels, and some parts of the population seem to be at greater risk. Despite a high psychiatric comorbidity and elevated risks of suicidal behavior, help seeking in GD populations is low. A better knowledge of vulnerable populations is of importance for optimizing preventive, therapeutic, and policy actions.

Materials and methods: Four populations were investigated focusing on GD or the wider term gambling problems, psychiatric comorbidity, and related factors: male violent offenders (n=264), patients diagnosed with GD in specialized health care (n=2,099), online gamblers (n=1,004), and clients seeking social services treatment (n=1,772). Databases and registers were used, and a new supplement to the Addiction Severity Index (ASI), ASI-gambling, was implemented in the social services.

Results: In young male offenders, prevalence rates of GD and psychiatric comorbidity were high, and GD was independently associated with failure to graduate elementary school on time, and cocaine abuse. Register studies of GD patients in specialized health care showed a high psychiatric comorbidity and poor mental health prior to, and following, GD diagnoses. In online gamblers in the general population, prevalence of gambling problems was high, and related to psychological distress, and online casino was associated with more frequent over-indebtedness. Social services clients with gambling problems reported high rates of anxiety and depression symptoms and rated very high needs for help. Online casino was the most frequently reported gambling type.

Conclusions: These five studies present populations with GD or gambling problems and high levels of psychiatric comorbidity, indicating certain psychiatric vulnerabilities which need to be taken in regard in psychiatric and social work. This knowledge is valuable for the continued preventive and therapeutic work is this area and highlights the need for effective gambling policies. Subgrouping problem gamblers, with respect to predisposing factors and psychiatric comorbidity could be an implication for further research, aiming to optimize personalized GD treatment.

Key words Gambling disorder; Substance use disorder; Psychiatric comorbidity; Psychiatric drugs; Offender population; Gambling harm; Gambling policy; Financial problems; Addiction Severity Index

Classification system and/or index terms (if any)

Supplementary bibliographical information		Language: English
ISSN and key title: 1652-8220		ISBN: 978-91-8021-161-1
Recipient's notes	Number of pages 86	Price
	Security classification	

Gambling disorder and psychiatric comorbidity

Vulnerability in four Swedish populations highlighting needs for preventive and treating actions

Carolina Widinghoff

LUND
UNIVERSITY

Lund University, Faculty of Medicine Doctoral Dissertation Series 2021:154

ISBN 978-91-8021-161-1
ISSN 1652-8220

Printed in Sweden by Media-Tryck, Lund University
Lund 2021

To my father Björn Widinghoff

Table of Contents

List of papers

The thesis is based on the following papers:

I. Widinghoff, C., Berge, J., Wallinius, M., Billstedt, E., Hofvander, B., & Hakansson, A. (2019, Jun). Gambling Disorder in Male Violent Offenders in the Prison System: Psychiatric and Substance-Related Comorbidity. *J Gambl Stud, 35*(2), 485-500. https://doi.org/10.1007/s10899-018-9785-8

II. Hakansson, A., Karlsson, A., & Widinghoff, C. (2018). Primary and Secondary Diagnoses of Gambling Disorder and Psychiatric Comorbidity in the Swedish Health Care System-A Nationwide Register Study. *Front Psychiatry, 9*, 426. https://doi.org/10.3389/fpsyt.2018.00426

III. Widinghoff, C., Berge, J. & Hakansson, A. (2021). Psychiatric Drug Prescription and Temporal Associations with a First Diagnosis of Gambling Disorder—Results from a National Register Study. *Int J Ment Health Addiction*. https://doi.org/10.1007/s11469-021-00636-6

IV. Hakansson, A., & Widinghoff, C. (2020). Over-Indebtedness and Problem Gambling in a General Population Sample of Online Gamblers. *Front Psychiatry, 11*, 7. https://doi.org/10.3389/fpsyt.2020.00007

V. Widinghoff, C., Berge, J., Hansson, H., & Hakansson, A. Gambling problems, substance use problems and psychiatric comorbidity in clients seeking social service treatment. Manuscript.

Abbreviations

ADOS	Autism Diagnostic Observation Schedule
AOR	adjusted odds ratio
APA	the American Psychiatric Association
ASI	Addiction Severity Index
ASDI	The Asperger Syndrome/high functioning autism Diagnostic Interview
BH	Benjamini Hochberg
CBT	cognitive behavioral therapy
CS	composite score
DAABS	the Development of Aggressive Antisocial Behavior Study
DISCO	Diagnostic Interview for Social and Communication Disorders
DSM-IV	The Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition
DSM-5	The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition
GAI	General Ability Index
GD	Gambling disorder
K6	The Kessler Psychological Distress Scale
LEAD	longitudinal, expert, and all data
MI	motivational interviewing
NPR	the Swedish National Patient Register
OR	odds ratio
PDR	the Swedish Prescribed Drug Register
PGSI	the Problem Gambling Severity Index

SBU	Statens beredning för medicinsk och social utvärdering (Swedish Agency for Health Technology Assessment and Assessment of Social Services)
SEK	the Swedish currency code
SCID-I	Structured Clinical Interview for DSM-IV-Axis I Disorders
SCID-II	Structured Clinical Interview for DSM-IV-Axis II Disorders
SUD	substance use disorder
WAIS-III	Wechsler Adult Intelligence Scale, Third Edition

Introduction

Gambling disorder

Gambling has been a source of entertainment and part of many human cultures across the world for hundreds of years. Already in the 13th century, there were strict gambling regulations in Sweden, implying that these activities were not only recreational, but also posing problems for individuals and society (Binde, 2014). Along with the emerge of the Internet, and media commercials, a new market for highly addictive gambling forms has arisen (Hakansson & Widinghoff, 2019; Mora-Salgueiro et al., 2021; Sulkunen et al., 2021). According to current research, relatively few gamblers represent large proportions of the money spent on gambling (The Swedish Public Health Authority, 2019), and there are strong associations between gambling expenditures and gambling harm (Castren et al., 2018). Gambling-related harm is disproportionally affecting marginalized groups, and researchers have called for a more pronounced public health approach from legislators (Muggleton et al., 2021; Wardle, Reith, et al., 2019). Consequences of gambling disorder (GD) can be severe, yet few problem gamblers seek help and barriers to treatment are high, part due to stigma (Gainsbury et al., 2014b). Previous studies have shown that individuals with gambling problems often suffer from other addictions and psychiatric disorders, implying that knowledge about psychiatric comorbidity in these patient groups is highly relevant for screening and treatment (Potenza et al., 2019). From an addiction medicine perspective, parallels may be drawn to the strict regulations applied for alcohol, highlighting the need for more effective limitations on the gambling market (Karlsson, 2020). GD is a serious public health issue, requiring further actions in order to protect vulnerable groups (Abbott, 2020).

In this thesis, four different samples are investigated: male criminal offenders, GD patients diagnosed in specialized health care, online gamblers, and clients seeking social service help for addiction problems. The focus is on GD and psychiatric comorbidity, and associations with psychological distress and psychosocial factors. Increased knowledge in this area may contribute to evidence-based policy actions and guide us towards development of personalized psychosocial, and in some cases also pharmacological treatment.

Psychiatric definitions, classifications, and prevalence

In the psychiatric classification system, GD is a psychiatric condition, classified as an addictive disorder, belonging to the new subsection of non-substance-related disorders in the latest version of The Diagnostic and Statistical Manual of Mental Disorders, DSM-5 (American Psychiatric Association (APA), 2013). In the previous version, DSM-IV, the diagnosis was named 'pathological gambling' and placed among impulse control disorders together with more rare conditions, such as pyromania, kleptomania, and intermittent explosive disorder (APA, 2000). Along with a growing body of research in epidemiology, neurobiology, genetics, and clinical experiences, the evidence for viewing GD as an addictive disorder increased (Potenza et al., 2019). Impulsivity plays an important role in the development, and maintenance, of addictive disorders, but is now considered a factor contributing to the pathobiological mechanisms of GD, rather than defining the right diagnostic group (Ioannidis et al., 2019). The creation of the new subsection was preceded by intensive expert deliberations, resembling the debates regarding the whole concept of addiction disorders, but the reclassification was concluded to represent an important development in the area of gambling research (Potenza, 2014b). Beyond the psychiatric diagnostic classification, problematic gambling is often referred to as "gambling problems", indicating a behavior associated with negative consequences, but not necessarily meeting criteria for diagnosis. Gambling problems is a widely used term in research contexts, often measured by systematic screening instruments, such as the Problem Gambling Severity Index (PGSI) (Wynne & Ferris, 2001).

The GD diagnosis is based on nine criteria, which are, to a large extent, the same as for substance-related disorders; tolerance, withdrawal, loss of control, preoccupation, escape from reality, and social consequences. Three criteria are more specific for gambling; chasing losses, lying to hide gambling activity, and relying on others to solve financial problems caused by gambling. A GD diagnosis requires fulfilment of at least four criteria the past year, leading to clinically significant impairment or distress (APA, 2013). The Swedish Public Health Agency conducts a large investigation of gambling and health in Sweden, called The Swedish Longitudinal Gambling Study (Swelogs), including repeated surveys in the general population (Abbott et al., 2014). According to the latest estimations, the point prevalence of GD is around 0.6 % of the Swedish adult population and another 0.7-2.9 % are at different levels of increased risk, measured by the PGSI (The Swedish Public Health Authority, 2019). However, individual gambling patterns vary highly over time and there is considerable movement between levels of severity. This implies that the lifetime prevalence of GD or gambling problems is markedly higher than the point prevalence (The Swedish National Board of Health and Welfare, 2018). Moreover, investigating gambling problems is complex, and researchers have stated that prevalence rates are generally underestimated, due to methodological challenges, such as errors in sample selection, non-response bias,

recall bias, and social acceptability (Sulkunen et al., 2021). Comparing gambling between countries is difficult, but generally, the Swedish estimations are in line with current studies from Europe, presenting rates of problem gambling varying between 0.12 and 3.4 % in adult populations (Calado et al., 2016).

Severity and consequences

Gambling problems are associated with severe mental and financial distress (Muggleton et al., 2021), often also affecting families, friends and communities (Langham et al., 2016). There is alarming research reporting markedly increased mortality in the highest-spending gamblers, but also that lower levels of gambling are associated with negative health and well-being outcomes (Muggleton et al., 2021). A recent longitudinal study from the present setting showed a 15-fold increased risk in suicide mortality for individuals with GD diagnosis, compared to the general population (Karlsson & Hakansson, 2018). A dose-response relationship between gambling problem severity and suicide attempts has also been presented (Moghaddam et al., 2015). GD and financial consequences may escalate quickly, particularly due to today's unlimited access to online gambling enabling risky behavior, such as several parallel gambling activities, increased bet sizes and losses, and gambling on unregulated sites (Gainsbury, 2015; Hakansson & Widinghoff, 2020a). The multiple levels of gambling harm have been conceptualized in a model describing seven dimensions; finances, relationships, emotions, general health, performance, and criminal activities, all potentially associated with life course and intergenerational harm (Langham et al., 2016). Problem gambling is a public health issue, and researchers have called for further legislative and commercial efforts to reduce related harm, which is reported to be underestimated (Wardle, Reith, et al., 2019).

Treatment and prognosis

Few people seek treatment for gambling problems, and there is a lack of longitudinal studies in gambling literature (Gainsbury et al., 2014a; Slutske, 2006). However, psychotherapeutic treatment studies have showed promising results, and cognitive behavioral therapy (CBT) is the main recommended treatment (The Swedish Agency for Health Technology Assessment and Assessment of Social Services, 2016). Motivational interviewing (MI) has also been suggested to be an efficacious style of therapy for GD (Carlbring et al., 2010; Yakovenko et al., 2015), and is recommended in combination with CBT for patients who are in certain need of motivational support, e.g., in cases with parallel substance use disorders (The Swedish National Board of Health and Welfare, 2018). CBT can be provided in various ways; individually, in group, internet-based, or on the phone (Carlbring et al., 2012; The Swedish National Board of Health and Welfare, 2018). The CBT aims

to raise the patient's awareness of thoughts, feelings, and reactions, to achieve a more realistic and functional behavior. MI is a counselling approach designed to strengthen personal motivation by a client-centered approach, aiming to resolve ambivalence towards change (The Swedish National Board of Health and Welfare, 2018; Yakovenko et al., 2015). Key qualities of MI include a respectful communication style, where the clinician empowers the clients by drawing out their own strengths and capacities and alter between following and directing, without direct confronting or instructing. In the work with offender populations, the most effective practitioners have been described as warm, empathic, rewarding and directive (Prescott, 2020).

Several psychiatric drugs have been tested in a gambling context, but so far there is no drug approved by the Swedish Medical Products Agency with an indication for GD (The Swedish Association of the Pharmaceutical Industry, 2020). The drug naltrexone, which is an opioid antagonist approved for treatment of alcohol use disorder, has been shown to have effect also on GD in some studies, especially in individuals presenting with both alcohol use and gambling problems (Goslar et al., 2019).

Considering the fact that GD is a complex mental health problem, with several biological, psychological, and social risk factors, the treatment options need to be wide, flexible, and accessible. Personalized treatment has been suggested in previous research and might be a way to optimize assessments and therapies, especially in patients with psychiatric comorbidity. The development of individually tailored case formulations and treatment plans might be of great value for treatment retention and effects (Bodor et al., 2021; Dowling et al., 2015b). So far, clinical trials in the subject are lacking, but in a large review of GD and psychiatric comorbidity in treatment-seeking gamblers, the authors concluded that the characteristics and severity of the psychiatric comorbidity could be guiding in a multimodal, stepped care approach, where the treatment intensity should increase with increased patient needs (Dowling et al., 2015b). Comprehensive psychiatric screening is of great importance from this perspective and may also give leads in cases where pharmacological treatment could be of value, additional to psychotherapy. E.g., Nicola and colleagues (2014) have presented an algorithm with a dimensional approach for treatment of concurrent GD and bipolar disorder, where drug types are suggested in a flow chart, taking symptoms and severity in regard. Theoretically, different drugs may be useful for patients with different combinations of GD and other addictions/and or psychiatric conditions, combined with psychosocial treatment (Di Nicola et al., 2014; Goslar et al., 2019).

Apart from direct GD treatment, different tools and methods for self-regulation have been presented. In Sweden, over 66,000 people are currently self-excluded from most forms of licensed gambling by use of the webpage "Spelpaus", which was introduced in 2019 (Swedish Gambling Authority, 2019b). "Spelpaus" appears to be of value, but it has limitations; self-exclusion only lasts for 1-12 months, and

gamblers with the most serious problems tend to continue their gambling on unregulated sites, offered by illegal gambling operators (Hakansson & Widinghoff, 2020a). Another important interventional study was recently conducted in Norway. Providing motivational interventions, by contacting high-expenditure gambling customers in Norway, resulted in sustained reductions in gambling for more than one year. Telephone contact was more effective than mailed letters, and both were effective compared with no intervention at all (Jonsson et al., 2020).

Prognosis is connected to levels of comorbidity, speaking for the need for comprehensive care in complex cases (Dowling et al., 2015a). In a German treatment study with a 12-month follow-up of GD patients, around 42 % maintained full abstinence from gambling, 29 % were gambling but not meeting criteria for GD, and 29 % were still meeting criteria for GD. Patients with the lowest success rates in treatment had the highest levels of psychopathology (Muller et al., 2017), further underlining increased knowledge about GD and psychiatric comorbidity, to optimize preventive and therapeutic actions (Dowling et al., 2015b).

Gambling disorder in a Swedish context

Market growth and high-risk gambling types

Addiction disorders develop through complex neurobiological and cognitive processes, influenced by multiple individual and environmental factors (Potenza et al., 2019). Regarding gambling, market forces and regulations are of great importance for exposure and availability, which are basic preconditions for development of addiction. Researchers have underlined the fact that vulnerable individuals are at risk of being exploited by the gambling industry (Orford, 2005). The global gambling market has been growing steadily for decades, parallel to the emergence of the Internet and new technology (Mora-Salgueiro et al., 2021; Sulkunen et al., 2021). Online gambling companies offer almost unlimited accessibilities to games with a high potential for addiction. The main characteristics for games considered particularly addictive are short time from bet to result and unlimited possibilities to raise bets, playing on parallel sites, and access to long gambling sessions (Meyer et al., 2011). According to neuroscientific reports, the design of video slot machines impacts the human reward system by reinforcement learning, often resulting in compulsive repetitive use and gambling-related harm. Examples of such features in video slot games are “losses disguised as wins”, or “near wins”, accompanied by celebratory sounds and animations, which may affect parts of the rewarding systems in the brain similar to addictive drugs (Myles et al., 2019). A clear clinical connection between fast online gambling and GD was seen in Swedish help-seeking gamblers when the first regional unit for gambling disorder

opened in Skåne, and 84 % of the patients reported primary problems with online casinos and/or live sports betting (Hakansson et al., 2017). The Swedish Public Health Agency reports increased online gambling in the general population and increased problem gambling among those who play poker and online casino (The Swedish Public Health Authority, 2019). The main part of the money spent on poker, gambling machines, and casino games is derived from people with gambling problems, parallel to the fact that gambling commercials on Swedish television are excessive and dominated by those gambling types (The Swedish Public Health Authority, 2019; Hakansson & Widinghoff, 2019).

Current changes in legislations

Sweden has a history of varying gambling culture and regulations, but since the 1980s there has been a trend of increasing commercialization (Binde, 2014). Up until 2019, there was a state monopoly on the Swedish gambling market, controlling most forms of land-based gambling. However, online gambling was practically unregulated and illegal online casino companies were taking increasing shares of gambling revenues. On January 1st, 2019, the market was re-regulated, opening up for various gambling companies to seek Swedish licenses, as an effort to take state control, collect taxes and achieve higher gambling responsibility (Ministry of Finance, 2018). All licensed companies became connected to the national exclusion system, Spelpaus, where gamblers may self-exclude from online gambling (Swedish Gambling Authority, 2019a). Current legislations are still not limiting the amounts of gambling commercials, or total possible sums spent on gambling, and further protective measures are still under investigation (Ministry of Finance, 2020).

Groups in need for effective policy and prevention

Exposure and vulnerability, as well as cultural values and beliefs, are of importance for gambling habits in different geographical areas (Papineau et al., 2020; Raylu & Oei, 2004). Increasing numbers of studies highlight the need to protect vulnerable groups, e.g., people with lower social capital and poor mental health, from exposure to highly addictive gambling, sometimes referred to as today's "gambling epidemic" (Awaworyi Churchill & Farrell, 2020). Unfortunately, signs of the opposite to protection have been presented, such as systematically higher density of electric gambling machines in areas with socio-economic deprivation (The Swedish Public Health Authority, 2008; Wardle et al., 2014). Despite statutory demands of holding licenses to operate on the Swedish gambling market, a supply of illegal online gambling sites remain to attract problem gamblers. In a recent study investigating online gamblers from the general population, 7 % reported ever having self-excluded on Spelpaus, and among them, 38 % reported gambling despite self-exclusion (Hakansson &

Widinghoff, 2020a). In summary, the gambling market is controlled and influenced by several stakeholders, and in the end financial interests must be weighed against ethics and individual suffering (Rossow, 2019). From an addiction medicine perspective, increased knowledge of vulnerable groups, and willingness to reform the current situation on the gambling market, are required to achieve substantial improvement.

Treatment responsibility and need for evidence-based methods

The Swedish health care system, divided in 'regions', and the social services in the municipalities, have a shared responsibility for treatment of addiction disorders. This division has been problematic, and there is an ongoing state investigation concerning the lack of sufficient care for patients with addiction disorders and psychiatric comorbidity. Previous reports have shown that individuals with complex psychosocial problems, and high needs for treatment, may not receive adequate care due to lacking accessibility, coordination, and continuity (The Swedish Government, 2020). For individuals who are socially and biologically vulnerable for addictive and psychiatric disorders, insufficient care may contribute to deteriorating mental health and/or transition on to other addictions (LaPlante, 2008). Hence, knowledge of psychiatric comorbidity has to increase, and structured cooperation is of great importance to optimize the care for these patient groups. Regarding GD, there has been a lack of structured treatment programs in regional health care. In the social services, GD treatment has not been offered systematically, other than in local projects or non-governmental self-help programs. In 2018, GD was highlighted in the legislations, emphasizing that individuals with GD have rights to support and treatment in health care and social services, corresponding to other addiction and psychiatric disorders (The Swedish National Board of Health and Welfare, 2018). Large-scale implementing work started, in both regional and municipal care, to follow the new legislations. There was a pronounced need for validated instruments and programs for assessment, follow-up, and treatment of GD patients (Forsström & Samuelsson, 2018). Swedish authorities provide comprehensive registers, enabling calculations of treatment uptake and occurrence of medical diagnoses in the health care system. By using the Swedish National Patient Register (NPR) and the Prescribed Drug Register (PDR), treatment uptake for GD and psychiatric comorbidity could be presented in study II and III in the present thesis.

Development of the Addiction Severity Index (ASI) gambling supplement

The national health care registers have no direct counterparts in the social services. There are, however, other systems based on wider sources of information than specific diagnoses and prescriptions. Social work is often complex and nonspecific

treatment elements, which may be difficult to standardize, are of high importance, but in a comprehensive interview called the Addiction Severity Index (ASI), main aspects of the client's behavior and environment are systematically addressed (McLellan et al., 1992). The ASI concept is validated in several countries and widely used in Swedish social services (The Swedish National Board of Health and Welfare, 2019). The standard ASI is a 14- page interview containing questions from seven areas: medical status, employment and support, alcohol use, drug use, legal status, family/social status, and psychiatric status. A specific measure, called *composite score (CS),* can be estimated by mathematic formulas in each area, indicating the current need for more help. The system is connected to a national database where interview results are inputted, which made it particularly propriate for involvement in our research project regarding gambling and psychiatric comorbidity (Rabe & Kobberstad, 2021). Within the frames of study V in the present thesis, a previously validated gambling supplement (Lesieur & Blume, 1992) became the model for development of the Swedish *ASI-gambling*, in Swedish: *ASI Spel,* see figure 1, page 37 (Håkansson & Widinghoff, 2017), which was implemented in the ASI routines. The ASI-gambling is a relatively short supplement to the standard interview, addressing possible gambling problems and assessing the current need for help.

Psychiatric vulnerability and associated factors

As in the case with other addictive disorders, genetics are of importance for gambling problems. Around 50 % of the variability in GD has been reported to be explained by genetic factors (Davis et al., 2019), and this predisposition is partly shared with the risk for alcohol use disorder (Slutske et al., 2000). The complete genetic mechanisms in this context are not known, but several of the involved genes are connected to dopaminergic and serotonergic systems of the brain, which have an impact on neurobiological systems for reward and inhibition of behavior. Some gene variants which are over-represented among individuals with addiction disorders seem to implicate a general vulnerability, sometimes referred to as "reward deficiency syndrome" (Gyollai et al., 2014). Impulsivity is central in neurobiological models of GD and implies quick and risky decision making. GD is associated with impairments in motor and attentional control and decision-making, and higher impulsivity is associated with more severe addiction (Ioannidis et al., 2019). Cognitive capacity is of relevance for the general vulnerability for psychiatric problems, and the risk for GD seems to increase with declining intelligence quotient (Melby et al., 2020; Rai et al., 2014).

Gambling problems emerge through heterogenic mechanisms, and a well-known theoretical model describing three different pathways has been presented and replicated in several studies (Allami et al., 2017; Blaszczynski & Nower, 2002;

Valleur et al., 2016). The first way includes around half of the individuals with GD, who do not present any psychopathology preceding the gambling problems, therefore called the 'behaviorally conditioned group'. The remaining half is split into two groups with approximately equal proportions, one characterized by anxiety and/or depression ('emotionally vulnerable group'), and the other by antisocial behavior ('antisocial impulsivist group'), before initiation of gambling problems. In clinical practice, it may be hard to conclude the actual chronology or division between different psychiatric problems (Allami et al., 2017; Kendell & Jablensky, 2003), but this framework may constitute a starting point for theoretical subgrouping and further research.

Gender aspects in gambling research

Most gambling research has been conducted on men, but women's gambling participating has been reported to increase (McCarthy et al., 2019a). In total numbers, more men participate in gambling activities and suffer from GD (Abbott et al., 2017; Hakansson et al., 2017), but researchers are discussing an on-going 'feminization of gambling', implying that increasing gambling among females is resulting in higher rates of female problem gamblers (McCarthy et al., 2020). According to the pathways model, women are over-represented in the emotionally vulnerable group, and there seem to be gender differences in preferences of gambling types. Women usually prefer chance-based games, such as electric gambling machines or bingo, whereas men are more likely to prefer games involving skill or strategy, e.g., poker or sports betting (Blaszczynski & Nower, 2002; Hakansson & Widinghoff, 2020b; Svensson & Romild, 2014). The antisocial group, described in the pathways model, consists almost exclusively of men, characterized by impulsive, risk-seeking behavior (Blaszczynski & Nower, 2002; Pachur et al., 2010). It is of importance to study possible gender differences since this knowledge might be of value for prevention and treatment. E.g., commercial messages, promoting highly addictive games, directed to groups who are known to be specifically vulnerable, are deeply inappropriate, risking to increase problem gambling and related harm (Hakansson & Widinghoff, 2019). Knowledge of gender and comorbidity on a group level may provide leads to further research and hypotheses for optimized actions.

Knowledge gaps in gambling research

Knowledge of GD as a psychiatric disorder and awareness of gambling problems as a public health issue has increased, but problem levels are remaining high and even increasing in some parts of the population (The Swedish Public Health Authority, 2019). To achieve more effective prevention and treatment, vulnerable groups need

to be identified and research must have both a general and specific focus, by sufficient and replicable methods. Previous prevalence studies of gambling in Sweden have been large, but unspecific, and with decreasing response rates (Abbott et al., 2014; The Swedish Public Health Authority, 2019). Considering the fact that point prevalence of GD seems to remain quite stable, while there is an ongoing movement in and out of the GD group, there is a risk of under-estimating the total amounts of suffering that these individuals are going through. There has been a lack of studies specifically addressing populations that could be assumed to present with higher prevalence rates of GD and related conditions. GD, or pathological gambling, has been a psychiatric diagnosis since 1980, but there have been no comprehensive systematic investigations of treatment uptake or psychiatric comorbidity in the healthcare system or social services.

Addictive disorders generally appear with certain epidemiologic characteristics, but many different factors impact the epidemiology, pointing to the need for up-to-date analyses. E.g., the gender gap in harmful use of alcohol and other drugs is reported to increase, even though the stigma may be larger for women in many cultures (Slabbert et al., 2020). Societal changes related to migration are of importance as ethnic diversity is positively associated with gambling behaviors, likely connected to social capital and risks for social exclusion (Awaworyi Churchill & Farrell, 2020). Such dynamic factors are important for a cultural phenomenon as gambling, as well as changes in gambling supplies. To address current and future challenges in the gambling field, repeated studies of gambling patterns and epidemiologic factors from an addiction medicine perspective are of great importance.

In summary, the issue of GD needs to be addressed both from a preventive perspective, associated with policy and politics, and from a psychiatric perspective, aiming to take individual situations in regard, in order to optimize screening and treatment. Illustrating the lack of effective policy, national and global gambling revenues are currently hitting new records, and the market is highly affected by different stakeholders from the industry (Sulkunen et al., 2021; Yakowicz, 2021). Aiming for decreased gambling harm, addiction medicine researchers must present answers to the right questions, to make scientific-based advice available for policymakers. Yet, we are far from understanding neurobiological mechanisms of GD completely, but studies of different population samples, regarding comorbidity and problem gambling types, may guide us towards the right preventive and therapeutic actions.

Aims

General aims

People with GD or gambling problems experience severe mental stress and are often suffering from various mental health issues. Yet, there are barriers to help-seeking and few patients reach effective treatment. The primary aim of this thesis was to describe the prevalence of GD or gambling problems and/or psychiatric comorbidity in four different populations: male criminal offenders, GD patients diagnosed in specialized health care, online gamblers, and clients seeking social service help for addiction problems. Secondary aims were to investigate different factors possibly related to the occurrence and maintenance of GD or gambling problems in these for different populations. This knowledge could contribute to the development of more effective screening methods and treatment and form a scientific contribution to the ongoing work with gambling policy in Sweden.

Study-specific aims

Study I

The primary aims of this study were to investigate the prevalence of, and associations between, GD and other psychiatric diagnoses in a group of Swedish young, male violent offenders. Secondary aims were to compare the gambling and the non-gambling disorder groups concerning types of crimes and sociodemographic data.

Study II

In this study, Swedish national registry data were used, aiming to describe the psychiatric comorbidity and sociodemographic data in a nationwide sample of patients who had received GD diagnoses in specialized health care. Aims were also to assess whether the GD diagnoses were registered as primary or secondary diagnoses, and possible changes in treatment uptake over time.

Study III

This study was based on the same register population as Study II and investigated the psychiatric comorbidity by using the prescription of psychiatric drugs as a proxy. The aim was to assess the occurrence of psychiatric comorbidity and temporal associations between a first diagnosis of GD and other psychiatric conditions.

Study IV

Study IV aimed to examine problem gambling and financial debts and in a sample of general population online gamblers. Aims were also examinations of the relationship between problem gambling and financial debts and psychological distress, specific online gambling activities, gender, and sociodemographic data.

Study V

This study aimed to investigate gambling problems and related life areas, according to the ASI interviews, in a large national sample of clients seeking social service treatment for addiction problems. Development, implementation, and validation of a new Swedish ASI gambling section were also aims of this project.

Materials and Methods

This thesis includes five studies based on four different populations, all considered to be relevant for analyses of GD, psychiatric comorbidity, and various associated factors. The population of young convicted male offenders in Study I was hypothesized to present with a high prevalence of GD and related psychiatric conditions. Study II and III constitutes a sample included based on registered GD diagnoses and were investigated concerning concurrent psychiatric diagnoses (study II) and prescription of psychiatric drugs (study III). The participants in study IV were people from the general population recruited from a market research panel, based on the criterion that they were online gamblers. Participants of the last study (V) were social services clients seeking help for addiction problems, most of them primarily regarding substance use.

Table 1. Summary of general aspects of study designs in each paper.

	Study I	Study II	Study III	Study IV	Study V
Design	Cross-sectional, part retrospective	Cross-sectional, part longitudinal	Longitudinal	Cross-sectional survey	Cross-sectional
Study period	2010-2012	2005-2016		2019	2018-2019
Sample	Swedish male offenders aged 18-25	Swedish patients diagnosed with GD in specialized health care		General population online gamblers	Social services clients with addiction problems
Sample in main analyses (n)	263	2,099	2,018	1,004	1,772
Statistical methods	Bivariate analyses, Benjamini Hochberg-corrected: Student's t test, Fisher's exact test, logistic regression	ANOVA, chi-square, Mann Whitney U test	Generalized linear mixed model	Bivariate correlation matrix, logistic regression	Fisher's exact test, Student's t test

Study design, setting and participants

Study I

This study was conducted in collaboration with a team of psychologists (principal investigator Björn Hofvander) who had assessed a group of men in a research project called DAABS (*the Development of Aggressive Antisocial Behavior Study*) (Wallinius et al., 2016), which aimed to investigate aspects of mental health in young male offenders. Results from the psychiatric diagnostic assessments, according to the Diagnostic and Statistical Manual of Mental Disorders 4th Edition (DSM-IV) (APA, 2000) were systematically gathered in a database which we used for further analyses of the prevalence of GD and other psychiatric diagnoses, and related factors. The study design was cross-sectional, regarding present psychiatric diagnoses, but also retrospective with respect to earlier life events, e.g., age of elementary and middle school graduation and information from prison medical records.

The study participants were men aged 18–25 years, recruited while serving sentences for violent and/or sexual crimes in the Western region of the Swedish Prison and Probation Service during the period March 2010-July 2012. A total of 420 prisoners from nine different prisons, ranging from high to low-security facilities, were in the right crime and age category. Exclusion criteria were insufficient language skills (defined as the need for an interpreter for full participation) and a short duration of stay at the current prison ($\leq$ 4 weeks). Anonymous, basic information about the offenders who were excluded, or chose not to participate, was obtained, and compared to the rest of the offenders to assess the representativeness of the sample. In the group of individuals excluded due to insufficient language skills, sexual violent crimes were overrepresented; 52 % (n=2) in comparison to 11 % (n=28) among the participants. In summary, a total cohort of 263 men was included and considered representative for young Swedish male offenders convicted of these crimes.

Study II and III

Study II and III were register studies primarily based on data from the NPR, which covers medical diagnoses and treatment episodes in specialized in-patient and out-patient medical care. The first step of inclusion was having received a primary or secondary diagnosis of GD during the studied period between the years 2005 and 2016. Study II had a cross-sectional design, investigating concurrent psychiatric diagnoses, and a longitudinal part estimating changes in treatment uptake during the studied period. Study III was conducted on the same sample, analyzing psychiatric comorbidity during three different periods by using psychiatric drugs as proxies, in

a longitudinal design. In study III, the PDR, and the Statistic Database of National Drug Prescription, were also used.

There were 2,172 individuals who had been diagnosed with GD in specialized health care during the studied period, and 73 of them were aged below 18 years. Since gambling is illegal in Sweden for people below age 18, and that the diagnostic terminology in Swedish easily might be mixed up between GD and gaming disorder, of which the latter is more likely to occur in adolescents, these individuals were excluded from further analyses in both studies. For study II, there were no other exclusion criteria applied, resulting in a total number or 2,099 participants of whom 77 % were male. For study III, analyzing prescription of psychiatric drugs during the studied period, data from the PDR was also required. There were missing data concerning prescriptions in all three periods for 81 patients, leaving a total of 2,018 (77 % male) participants in the study.

Study IV

In this study, an adult general population sample of online gamblers was investigated, through an online survey distributed by Ipsos, a national market research company. The online survey consisted of questions regarding gambling habits, gambling problems, mental health, and indebtedness. Recruitment and collection of data were executed during 2019 and the study design was a cross-sectional survey.

Participants were part of a pre-existing web panel and recruited by confirming having gambled online on casinos or betting 10 times or more during the past 12 months. Web-panel members who gave online written consent to the study were then moved further to the survey. The aim was to address roughly 1,000 individuals, and data collection was closed when a total number of 1,009 participants had answered the survey. Five individuals were excluded due to missing data on gambling problem items, leaving a total sample of 1,004 included subjects of whom 78 % were male. The sample was stratified for age and had a relatively high level of educational attainment. Forty- seven percent of the participants had tertiary education, compared to 35 % in the general population, aged 16-74 (Statistics Sweden, 2018).

Study V

This study was the last to be completed, but the ASI-gambling project was initiating the work with this thesis. The focus was gambling problems in clients seeking social services treatment for addiction problems. To meet the need for a validated tool to facilitate systematic assessment of gambling problems, we developed a Swedish version of a gambling supplement to the ASI interview. This supplement, ASI-

gambling (in Swedish “ASI Spel”), was an updated version of the American ASI-G (Lesieur & Blume, 1992), which had been validated in further studies (Petry, 2003, 2007). ASI-G was constructed in line with the standard ASI interview, initiated with a form consisting of questions regarding gambling types, corresponding to the form in the alcohol and drug section. The original ASI-G was used as model for an updated version which was translated and adapted to current circumstances on the gambling market. The Swedish version was implemented in daily social work practices in many parts of Sweden in 2016. Data from gambling interviews was included along with other ASI data in the national database, which was used for analyses of gambling habits, and gambling problems and parts of the standard ASI areas. The mathematic formula for gambling CS was also adapted to the Swedish setting. The design of this study was cross-sectional.

Study participants were interviewed by social services workers during the years 2018-2019, as a part of their standard procedure for clients with addiction problems. Screening for gambling problems was performed using the Lie/Bet, a brief questionnaire consisting of two questions; ”have you ever had to lie to people important to you about how much you gambled”, and “have you ever felt the need to bet more and more money”. A positive response to one or both items indicates that further assessment is needed (Johnson et al., 1997). The gambling part was optional and study analyses were conducted with a de-identified register approach; hence no informed consent was required from the participants. A total of 1,772 clients from 45 municipalities were interviewed and had sufficient answers recorded and were included in the study.

Measurements and statistical analyses

A variety of measurements were used aiming to identify gambling problems and related psychiatric comorbidity, and other associated factors, in the studied populations. Some are based on systematic, diagnostic assessments using information from multiple sources (study I), some are actual registered verdicts (study I), psychiatric diagnoses (study II and III) or prescribed drugs (study III), and some are screening tools (study IV) or structured interview information (study V). Besides measurements concerning addiction and psychiatric problems or disorders, wider questions regarding other aspects of life and mental health were asked in study IV, which had a special focus on economy and debts, and study V in which the ASI interviews aim to summarize consequences of addictive behavior from a holistic perspective (e.g., concerning family, relationships, employment etc.).

Table 2. Summary of main outcome measures, other variables of interest, registers and databases, screening instruments, and diagnostic instruments.

	Study I	Study II	Study III	Study IV	Study V
Gambling-related measures	Pathological gambling according to DSM-IV	Pathological gambling F63.0 (ICD-10)	Problem gambling defined by PGSI		Gambling problems according to ASI-gambling
Main outcome measures	Prevalence of GD Association between GD and other psychiatric diagnoses	Prevalence of GD and concurrent psychiatric diagnoses	Proportions of prescription of psychiatric drugs and changes over time	Prevalence of problem gambling Over-indebtedness	Problem gambling types Correlation between gambling CS and interviewer ratings Addiction comorbidity
Other variables of main interest	Sociodemographic data GD criteria Types of crimes	Changes in treatment uptake for GD Gender differences	Changes in prescription of psychiatric drugs related to establishment of GD diagnoses Gender differences	Sociodemographic data Gambling habits Psychological distress Alcohol problems Drug problems	ASI-gambling questions ASI areas
Registers and databases	Criminal files	NPR PDR Statistic Database of National Drug Prescription			ASI database
Screening instruments	Self-rating questionnaires			ASI-gambling K6 PGSI Brief financial questions	ASI-gambling ASI
Diagnostic instruments	SCID-I SCID-II DSM-IV checklist WAIS-III GAI DISCO ADOS ASDI				

ADOS	Autism Diagnostic Observation Schedule (Lord et al., 2000)
ASDI	the Adolescent Domain Screening Inventory (Gillberg, 2001)
ASI	Addiction Severity Index (McLellan et al., 1992)
ASI-gambling	Addiction Severity Index-gambling (Håkansson & Widinghoff, 2017)
CS	composite score
GAI	General Ability Index (Tulsky et al., 2001)
DISCO	Diagnostic Interview for Social and Communication Disorders (Wing et al., 2002)
DSM-IV	The Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (APA, 2000)
GD	gambling disorder
K6	Kessler-6 (Furukawa et al., 2003)
NPR	the Swedish National Patient Register
PDR	the Swedish Prescribed Drug Register
PGSI	the Problem Gambling Severity Index (Wynne & Ferris, 2001)
SCID-I	Structured Clinical Interview for DSM-IV-Axis I Disorders (First, 1997)
SCID-II	Structured Clinical Interview for DSM-IV-Axis II Disorders (First et al., 1997)
WAIS-III	Wechsler Adult Intelligence Scale, Third Edition (Wechsler, 2002)

Study I

In the DAABS, a pre-set protocol was followed, and all participants were screened for psychiatric disorders by self-rating questionnaires, semi-structured diagnostic interviews, and neuropsychological assessments. Participants then went through a full day of clinical DSM-IV assessments according to SCID-I, SCID-II, and additional symptom checklists or instruments addressing specific diagnoses (DISCO, ADOS, and ADSI). Intellectual functioning was measured with the General Ability Index (GAI) from Wechsler Adult Intelligence Scales—third edition, (WAIS-III). Diagnostic conclusions were made under the LEAD-principle longitudinal, expert, and all data meaning that the clinicians make final decisions together, using all available data (Spitzer, 1983). Study I was conducted by using data from the DAABS database.

The prevalence of GD was estimated, and the study population was divided into a GD group and a non-GD group. Within the GD group, prevalence of each GD diagnostic criterion was estimated. The two groups were compared regarding sociodemographic variables, psychiatric disorders, substance abuse and types of crimes. For these bivariate analyses, Fisher's Exact test and Student's t test were used. To handle the risk of type I errors, all p-values were corrected according to the Benjamini Hochberg (BH) method (Hochberg & Benjamini, 1990). Five independent variables, with the lowest BH-adjusted p-values, from bivariate analyses were chosen for regression analysis (Vittinghoff & McCulloch, 2007). Calculations were performed using IBM SPSS Statistics for Mac, version 23.0 (IBM, Armonk, NY).

Study II and III

In study II and III the main inclusion criterion was a registered GD diagnosis in the NPR during the study period (2005-2016). Statistical analyses of changes in treatment uptake, concurrent psychiatric diagnoses, and sociodemographic data (age and gender) were calculated with information from the same register (study II). In study III, information from the PDR and the Statistic Database of National Drug Prescription was added, for estimations and comparisons of prescription of psychiatric drugs.

In study II, age distribution, percentage of women, and percentage with GD as their primary diagnosis were compared, year by year, for the whole study period. This was performed by using an ANOVA for age and the chi-square test for gender and primary diagnosis. Possible changes, compared to the previous year, regarding age, gender, and primary diagnosis, were calculated for every year. For age, the Mann-Whitney U test was used, and for gender and primary diagnosis, we used the chi-square test. The chi-square test was also used for calculations of prevalence of diagnoses for women and men.

In study III, time was defined in three periods: the first period two to four years prior to the diagnosis, the second period was the two years preceding the diagnosis, and the third period was two years following the diagnosis. GD diagnosis was made on the first day of the third period. For an observation period to be considered valid, the whole period had to be covered by the data from the PDR. Having defined the periods and which periods were valid for each individual, we then created binary variables for each of the eight drugs for each of the three periods. If an individual had been prescribed at least one drug from each class of drugs a given period, then the individual was considered as being in treatment with that drug in that period. To assess changes in proportions of patients with prescriptions of each drug group between the three time periods controlling for time, GD diagnosis, calendar year, age, and gender, a generalized mixed regression model was used, taking the repeated measurements of each individual into consideration. The variable GD diagnosis thus constituted the main variable of interest for the purposes of the present study.

Statistical analyses were performed in SPSS version 26 (IBM Corp.) and R version 3.5.3 (R Core Team, 2019).

Study IV

Participants, who were recruited from a pre-existing web panel, answered an online survey with five different sections: gambling involvement, psychological distress, problem gambling, financial debts and over-indebtedness, and sociodemographic data. The frequency of gambling in each gambling type the past 30 days was investigated by questions from the ASI-gambling, covering ten online and land-based modalities: casino games online, land-based casino, online horse race betting, land-based horse race betting, sports, and odds (live betting), sports and odds (non-live betting), online poker, land-based poker, land-based electronic gambling machines, and online bingo (Håkansson & Widinghoff, 2017). Questions were also asked about total gambling losses in the past 30 days (Hakansson et al., 2019). Psychological distress was measured using the Kessler Scale-6, K6, consisting of six Likert scaled questions regarding nervousness, feelings of hopelessness, restlessness/fidgety, depression, feelings of being worthless, and the feeling that everything in life is an effort (Furukawa et al., 2003). Problem gambling symptoms were investigated by the PGSI, a nine-item scale ranging from 0 to 27, which was used to categorize the respondents according to total scores: a sum of eight or more describing problem gambling, 3–7 indicating moderate-risk gambling, 1–2 indicating low-risk gambling, and a sum of 0 representing no risk (Wynne & Ferris, 2001). In the financial section, brief questions about monthly income, history of loans, having borrowed money to gamble or cover gambling losses (past 12 months or ever), and debts being passed on to a collection service or to the Swedish Enforcement Authority (past 12 months or ever) were asked. Over-indebtedness was assessed according to the subjective definition (Turunen & Hiilamo, 2014), by the

following questions: “have you experienced that you (or you and others living in your household) have repeatedly recurring problems paying your bills?” (divided into two questions addressing the past year and lifetime prior to that), and “do you expect that you (or you and others living in your household) will have large problems paying your bills during the next two months?” (addressing expected over-indebtedness during the next 2 months (The Swedish Public Health Authority, 2018). The sociodemographic section consisted of questions addressing age, gender, and level of education. It was also asked whether an individual ever had felt a need to seek treatment for alcohol problems, or problems related to illicit drugs or pharmaceuticals with addiction potential. Descriptive data regarding gambling activities, problem gambling, and sociodemographics were calculated. Further analyses were performed with three outcome measures respectively: problem gambling, a history of over-indebtedness (ever) and expected over-indebtedness in the next two months. Unadjusted comparisons were conducted for descriptive purposes. For categorical variables, the chi-square method was used, and for the continuous variables we used the Mann-Whitney U test, the latter since the summed K6 value was assumed not to be equally distributed. In the examinations of factors associated with each of the three outcome measures, hierarchical logistic regression in two steps was used, omitting PGSI in the second model. PGSI was omitted since a bivariate correlation matrix, run prior to logistic regression analyses, had shown a high correlation between PGSI values and recent types of online gambling (Pearson R=0.43). Included variables were gender, age, tertiary education (any education beyond high school), problem gambling described as PGSI score (in model 1 only), psychological distress, need for help for alcohol problems, need for help for drug problems, total gambling losses during the past 30 days, and recent specific online gambling activities. Statistical analyses were performed in SPSS version 26 (IBM Corp.).

Study V

Social services clients participating in this study were all interviewed with the standard ASI and screened for gambling problems using the Lie/Bet. Participants with at least one positive Lie/Bet answer were also interviewed with the 26 questions in the ASI-gambling. Questions from the standard interview, which were considered relevant for the context, were chosen as variables for the study. The alcohol and drug use sections are initiated with a form consisting of questions regarding the use of eleven different drug groups. Each of the seven main areas terminates with a client question rating the need for help, with a score ranging between 0 and 5, and a corresponding interviewer rating between 0 and 10. A composite score, ranging between 0 and 1, can be calculated according to certain mathematic formulas for each area, aiming to compose a summation facilitating follow-up of the problem degree.

ASI Spel Grund

ASI Spel är ett kortfattat formulär för kartläggning och bedömning av spelproblem. Grundfrågorna är utformade efter en amerikansk förlaga (ASI-G), som är validerad för att mäta allvarlighetsgraden av spelproblem i grupperna frekventa spelare, spelberoende i öppenvård, spelberoende i behandlingsstudie samt spelberoende vid samtidigt substansberoende.

Frågorna i ASI Spel omfattar spelandets historik och dess konsekvenser, samt graden av hjälpbehov. Formuläret är uppbyggt i enlighet med övriga ASI-områden och skattningarna görs med motsvarande skattningsskalor. De kritiska frågorna, som utgör grunden för intervjuarskattningen, är markerade med understrykningar i intervjuformuläret. Uppföljning sker med ASI Spel Uppföljning.

Den svenska versionen ASI Spel (2017) har utvecklats av
Anders Håkansson[1], leg läkare, professor i beroendemedicin med särskild inriktning på spelberoende
Carolina Widinghoff[1], läkare, doktorand i beroendemedicin med inriktning på spelberoende.

[1] Lunds Universitet, Beroendecentrum Malmö

Spel om pengar

Klientens skattningsskalor

0 Inget problem eller behov av hjälp.
1 Litet problem eller behov av hjälp.
2 Måttligt problem eller behov av hjälp.
3 Påtagligt problem eller behov av hjälp.
4 Mycket stort problem eller behov av hjälp.

Intervjuarens skattningsskala

0 – 1 Inget problem. Hjälp krävs inte.
2 – 3 Litet problem. Hjälp krävs troligen inte.
4 – 5 Måttligt problem. Viss hjälp krävs.
6 – 7 Påtagligt problem. Hjälp krävs.
8 – 9 Mycket stort problem. Hjälp krävs absolut.

Denna fråga handlar om spel om pengar.
Ange svar på frågorna för respektive speltyp.
a. Hur många av de senaste 30 dagarna har du spelat detta spel?
b. Hur gammal var du första gången du upplevde problem med detta spel?
c. Hur många år har du upplevt problem med detta spel?

	Speltyp	a. Spelade dagar av senaste 30	b. Debutålder spelproblem	c. Antal år med problem
		Antal dgr	Ålder	Antal år
S1	Kasinospel – på internet			
S2	Spel på fysiskt kasino			
S3	Hästar – på internet			
S4	Hästar – ej på internet			
S5	Sport och odds – livebetting			
S6	Sport och odds – ej livebetting			
S7	Nätpoker			
S8	Poker – ej på internet			
S9	Spelautomater – ej på internet			
S10	Bingo – på internet			

Figure 1. ASI-gambling in Swedish, page 1 of 2 (The Swedish National Board of Health and Welfare, 2017).

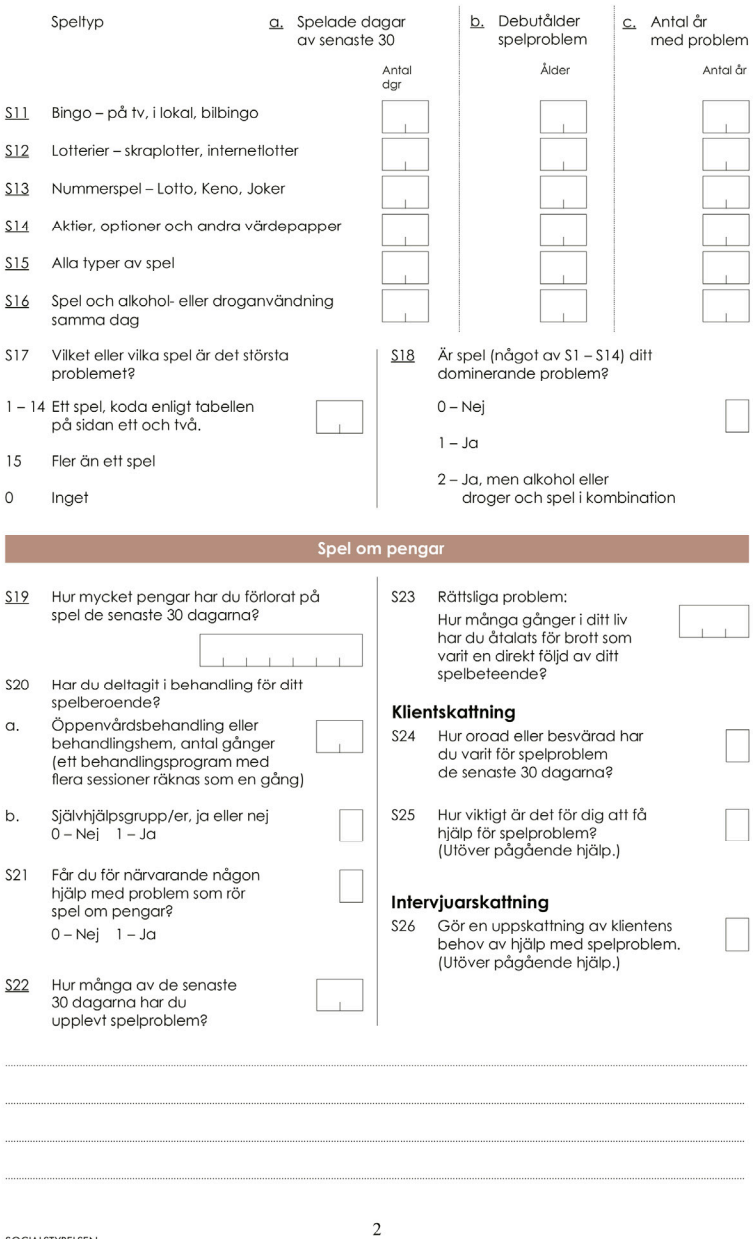


Figure 1. ASI-gambling in Swedish, page 2 of 2 (The Swedish National Board of Health and Welfare, 2017).

The total data material of 1,772 included individuals was divided into a group with predominant substance problems (n=1,607) and a group with pronounced gambling problems (n=165). The gambling group was defined by having at least one yes on the Lie/Bet questionnaire, having given an affirmative answer on question S17 and/or being assessed with a need of help >1 on question S26, and having data available for estimation of gambling composite score. Statistical analyses were conducted in two parts.

The first part consists of descriptive ASI-gambling data. For questions resulting in qualitative variables (S18, S20ab and S21) percentage distributions were calculated and for questions resulting in quantitative variables (S19 and S22-S26) mean values and medians were calculated. Gambling composite scores were calculated with a mathematic formula based on five items from the gambling interview which are weighted and aggregated in consistency with the ASI system (Makela, 2004): (**A/150 + lnB/57.6 + C/150 + D/20 + E/20**E**)**. The included questions are: S15: How many days in the last 30 days have you gambled, including all sorts of gambling for money? (A), S19: How much money would you say you lost on gambling during the past 30 days? (B), S22: How many days in the past 30 have you experienced gambling problems? (C), S24: How troubled or bothered have you been in the past 30 days by gambling problems? (D) and S25: How important to you now is treatment for gambling problems? The validity of the ASI-gambling was calculated by using a Pearson correlation between gambling composite scores and interviewer ratings.

In the second part, comparisons were made between the substance group and the gambling group. Relative frequencies of each included variable for the gambling group and the substance group were calculated. Comparisons between groups were made with Fisher's exact test and T test for dichotomous and continuous variables respectively.

All interview data was provided by the company Råbe & Kobberstad (Rabe & Kobberstad, 2021) statistical calculations were performed in SPSS version 26 (IBM Corp.).

Ethical considerations

All studies were approved by the Regional Ethics Committee, Lund, Sweden (file number 2009/405 for study I, file number 2016/1104 for study II and III, file number 2018/495 for study IV, and file number 2017/14 for study V).

Beyond the statutory ethical landmarks that must be followed, some reflections can be made in the current context of addiction research. Addiction disorders are known to be associated with large stigma, negatively affecting the help-seeking behavior (Gainsbury et al., 2014a), underlining the importance of constructive and supportive

attitudes in professionals who see patients or clients with addiction problems in different contexts. Theoretically, screening and research situations could be seen as starting points for individual reflections and possible motivation for change, hence making a professional attitude inspired by MI appropriate. Maintenance of an empathic and non-judging practice has been found effective in helping individuals with a wide range of problematic behaviors (Prescott, 2020). Ideally, well-formulated addiction research, taking stands for vulnerable groups in problem formulations and possible solutions, could contribute to reducing the stigma and distances between groups with different social capital (Awaworyi Churchill & Farrell, 2020).

Study I

Participation in the study was voluntary, and informed written consent was provided by all the offenders before participation. The participants were offered to take part of their preliminary results of the assessment and receive personal feedback from the interviewers, as well as an opportunity to be referred to the prison psychiatrist for further assessment and possible treatment. The monetary reward was considered low enough not to influence the free consent.

Study II and III

According to the Swedish research ethics legislations, no informed consent is required from study participants for non-identified data from national register units.

Study IV

All the participants were voluntarily taking part as members of a web-panel provided by the market survey company Ipsos and were provided written information about the study.

Study V

The client material consisted of on non-identified information owned by each municipality and informed consent was obtained from competent representatives of each municipality. In the ethical application, this procedure was also motivated by the fact that participation in the ASI interviews was completely voluntary, and that the standard interview content is of more delicate character than the gambling supplement. Participation in the study did not involve any risks, but rather a chance to receive adequate treatment for possible gambling problems.

Results

Study I

The lifetime prevalence of GD in was 16 % (n=42) in the cohort. This corresponded to a 95 % confidence interval (CI) for the true proportion of GD in this population at 12.0 – 21.3 %, under the assumption that this cohort was representative for young Swedish male violent offenders.

For most sociodemographic variables: age, marital status, country of birth (Sweden or other), and employment, there were no significant differences between the GD - and the non-GD group. However, concerning elementary school graduation, significantly fewer in the gambling disorder group had graduated in the expected time (BH-corrected p-value=0.027).

Psychiatric diagnoses, percentages and p-values from bivariate analysis are shown in table 3. Substance abuse was common, and at least one substance abuse diagnosis was seen in 84.5 % of the participants. Three substance use diagnoses were significantly more common in the GD group: cannabis abuse (p_{BH} =0.043), cocaine abuse (p_{BH}<0.001) and anabolic steroids abuse (p_{BH} =0.027).

According to the initial analysis, mental retardation was significantly more common in the GD group (p=0.031), but the p-value was no longer significant after BH-correction, due to the small sample size (p_{BH} =0.105). In the bivariate analysis, antisocial personality disorder was significantly more common in the gambling disorder group (p_{BH} =0.027).

Table 3. Psychiatric and substance abuse comorbidity by occurrence of gambling disorder, lifetime.

	Total sample, % (n)	Gambling disorder group, % (n)	Non gambling disorder group, % (n)	p-value*	BH-adjusted p-value**
Mental retardation	1.9 (5)	7.10 (3)	0.90 (2)	0.031	0.105
ADHD	43.3 (113)	52.4 (22)	41.6 (91)	0.234	0.316
Autism spectrum disorders	9.5 (25)	0.0 (0)	11.3 (25)	0.019	0.086
Conduct disorder	79.1 (208)	88.1 (37)	77.4 (171)	0.148	0.266
Substance abuse (any)	84.4 (222)	92.9 (39)	82.8 (183)	0.110	0.248
Alcohol	48.3 (127)	52.4 (22)	47.5 (105)	0.615	0.692
Sedatives	48.7 (127)	64.3 (27)	45.7 (100)	0.029	0.105
Cannabis	77.5 (203)	92.9 (39)	74.5 (164)	**0.008**	**0.043**
Central stimulants	48.7 (127)	59.5 (25)	46.6 (102)	0.133	0.257
Cocaine	40.6 (106)	73.8 (31)	34.2 (75)	**<0.001**	**<0.001**
Hallucinogens	33.7 (88)	47.6 (20)	31.1 (68)	0.049	0.147
Anabolic steroids	14.9 (39)	31.0 (13)	11.9 (26)	**0.003**	**0.027**
Inhalants	20.0 (52)	14.3 (6)	21.1 (46)	0.401	0.471
GHB	19.0 (50)	28.6 (12)	17.2 (38)	0.090	0.221
Heroin	34.0 (89)	40.5 (17)	32.7 (72)	0.375	0.460
Opioid analgesics	41.4 (109)	52.4 (22)	39.4 (87)	0.127	0.257
Methadone, buprenorphine	13.7 (36)	7.10 (3)	14.9 (33)	0.226	0.316
Psychotic disorders	7.6 (20)	7.10 (3)	7.7 (17)	1.00	1.00
Affective disorders	54.0 (142)	64.3 (27)	52.0 (115)	0.177	0.267
Anxiety disorders	51.5 (135)	61.9 (26)	49.5 (109)	0.178	0.267
Eating disorders	1.10 (3)	4.80 (2)	0.50 (1)	0.067	0.181
Antisocial personality disorder	63.9 (168)	83.3 (35)	60.2 (133)	**0.005**	**0.034**

* Fisher's exact test used for all categorical variables
** Benjamini-Hochberg adjusted p-values using all 27 p-values from table 3 and sociodemographics
p-values <0.05 presented in bold text

Five variables showed significant differences between the GD and non-GD groups in the bivariate analyses and were chosen for logistic regression analysis (table 4). Cannabis abuse, anabolic steroids abuse, and antisocial personality disorder were not independently associated with GD in logistic regression. There were independent associations between GD and not having graduated elementary school in expected time (AOR 2.89, CI 1.37 –

6.10, p=0.005) and cocaine abuse (AOR 3.93, 1.67 – 9.27, p=0.002). The model had a Nagelkerke R Square of 0.217, $\chi^2 = 35.5$, with $p < 0.001$.

Table 4. Logistic regression on occurrence of gambling disorder.

	OR (95% CI)	AOR (95% CI)	p-value*
Not graduated elementary and middle school graduation in expected time	2.98 (1.50-5.91)	2.89 (1.37-6.10)	**0.005**
Cannabis abuse	4.44 (1.32-14.93)	1.46 (0.35-6.09)	0.601
Cocaine abuse	5.41 (2.58-11.37)	3.93 (1.67-9.27)	**0.002**
Anabolic steroids abuse	3.33 (1.54 – 7.20)	1.54 (0.65-3.63)	0.329
Antisocial personality disorder	3.31 (1.41 - 7.78)	1.83 (0.71-4.75)	0.215

*p-values <0.05 presented in bold text

Table 5. Types of crimes by occurrence of gambling disorder.

	Total sample, % (n)	Gambling disorder group, % (n)	Non gambling disorder group, % (n)	p-value*	BH-adjusted p-value**
Violent offenses	100 (263)	100 (42)	100 (221)	N/A	
Sexual offenses	11.8 (31)	11.9 (5)	11.8 (26)	1.00	1.00
Drug-related offenses	73.9 (193)	88.1 (37)	71.2 (156)	.022	0.055
Property offenses	87.8 (231)	90.5 (38)	87.3 (193)	.797	0.996
Traffic violations	64.9 (170)	81.0 (34)	68.1 (136)	.021	0.055
Fraud	26.0 (68)	31.0 (13)	25.0 (55)	.444	0.740

* Fisher's exact test used for all categorical variables
** Benjamini-Hochberg adjusted p-values using the five p-values displayed in this table

In table 5, types of crimes by the occurrence of gambling disorder are shown. There were initial significant associations between gambling disorder and drug-related (p=0.022) and traffic violations (p=0.021) but the associations were no longer significant after a BH-correction (both $p_{BH} = 0.055$).

Study II

Of the 2,099 patients who were included, 629 had received pathological gambling (F63.0) diagnoses in in-patient treatment. Treatment uptake for GD increased significantly in out-patient care during the studied period. In total, treatment uptake in out-patient care increased from 87 patients in 2005, to 324 patients in 2016 ($p<0.01$), and from 54 patients in 2005 to 60 patients in 2016 in-patient health care (p=0.81). Fifteen percent were diagnosed with GD both in in-patient and out-patient treatment. Proportions of female gender varied between 15 % and 29 % during the

studied years. A total of 73 % had any co-occurring psychiatric disorder, most commonly anxiety disorders (F4, 34 %) or affective disorders (F3, 33 %), see table 6.

Table 6. Prevalence of ICD-10 psychiatric comorbidity diagnoses in patients receiving a GD diagnosis in specialized out-patient or in-patient treatment.

	All (N=2,099), % (n)	Out-patient (N=1,784), % (n)	In-patient (N=629), % (n)
Any co-occuring psychiatric disorder	73 (1,531)	70 (1,242)	90 (566)
Mean age		36.0 (std dev 11.5)	38.8 (std dev 12.5)
Female gender	23 (474)	22 (389)	25 (157)
DIAGNOSTIC CATEGORIES			
F0 (mental disorder due to known physiological conditions)	1 (13)	0 (9)	1 (5)
F1 (substance-related disorders)	25 (521)	23 (403)	30 (188)
Alcohol	17 (356)	15 (270)	22 (138)
Opioid	1 (29)	1 (24)	1 (7)
Sedatives	2 (42)	2 (30)	3 (17)
Cannabis	2 (41)	2 (37)	1 (7)
Cocaine	0 (11)	0 (9)	0 (2)
Amphetamine use	1 (21)	1 (16)	1 (7)
Hallucinogenics	0 (2)	0 (1)	0 (1)
Tobacco	0 (9)	0 (5)	1 (4)
Solvents	0 (0)	0 (0)	0 (0)
Polysubstance	5 (102)	4 (79)	5 (33)
F2 (psychotic disorders)	4 (78)	4 (66)	5 (33)
F3 (affective disorders)	33 (684)	30 (542)	39 (246)
F4 (anxiety, dissociative, stress-related, somatoform and other non-psychotic disorders)	34 (724)	32 (563)	41 (258)
F5 (behavioral syndromes associated with physiological disturbances and physical factors)	3 (60)	3 (53)	1 (7)
F6, excluding F63.0 (disorders of adult personality and behavior)	10 (217)	10 (184)	11 (67)
F7 (intellectual disabilities)	1 (18)	1 (13)	2 (10)
F8 (pervasive and specific developmental disorders)	3 (53)	3 (45)	3 (16)
F9 (behavioral and emotional disorders with onset usually occurring in childhood/adolescence)	10 (210)	10 (186)	8 (50)
Accidental overdose (X40-49)	0 (2)	0 (1)	0 (1)
Suicide attempt (X60-84)	3 (65)	0 (8)	10 (60)
Self-inflicted injury/poisoning, unclear intent (Y10-34)	0 (4)	0 (1)	1 (4)

Overall psychiatric comorbidity was more common in women than in men (79 % vs. 71 %, p<0.01). The occurrence of several diagnoses differed between men and women. There was no significant difference regarding the category substance-related disorders, but cannabis abuse (39 % vs. 2 %, p=0.01) was more common among men. Affective disorders (F3, 42 % vs. 30 %, p<0.001) and anxiety disorders (F4, 39 % vs. 33 %, p=0.01) were significantly more common in women. Also disorders of adult personality and behavior, excluding F63.0 (F6, 16 % vs. 9 %, p<0.001) were more common among women.

Study III

A total of 2,018 patients were included. The mean age was 36.5 years, ranging between 18 and 83 years, with 22.6 % (n=474) females. In 29.2 % (n=591) of the cases, GD diagnoses were established within in-treatment episodes, and the corresponding number for out-patient treatment was 85.7 % (n=1,729). Fifteen percent of the cases (n=302) had been diagnosed with GD in both in-patient and out-patient treatment. GD was received as a primary diagnosis in a total of 46.6 % (n=938) of the participants.

In table 7, proportions of patients with prescriptions of each drug category, according to ATC codes, for each of the three periods are presented. There was an increase for every drug category between periods. The yearly prescriptions were higher for each drug group during the studied period (corresponding percentages of dispensed drugs in the general population in parenthesis): antiepileptics 8.0 – 12.4 % (1.9 – 3.0 %), antipsychotics 11.4 – 21.0 % (2.0 – 2.2 %), benzodiazepines 10.1 – 15.4 % (4.5 – 5.0 %), hydroxyzine 9.4 – 17.0 % (1.9 – 3.0 %), hypnotics 20.5 – 36.8 % (10.4 % – 10.5 %), antidepressants 31.9 – 53.8 % (10.3 – 12.1 %), psychostimulants 5.4 % - 7.1 % (0.13 – 0.79 %) and drugs used in addictive disorders 2.5 – 10.5 % (0.5 – 0.7 %), compared to the general population (The Swedish National Board of Health and Welfare, 2020b).

Table 7. Prevalence of ICD-10 psychiatric comorbidity diagnoses in patients receiving a GD diagnosis in specialized out-patient or in-patient treatment.

Drug group	ATC code	Period 1[a] % (n)	Period 2[b] % (n)	Period 3[c] % (n)	Total[d] % (n)
Antiepileptics	N03	8.0 (143)	10.6 (201)	12.4 (207)	15.6 (314)
Antipsychotics	N05A	11.4 (204)	15.7 (298)	21.0 (351)	23.2 (468(
Benzodiazepine derivatives	N05BA	10.1 (180)	13.9 (265)	15.4 (257)	20.9 (422)
Anxiolytics	N05BB, N05BC	9.4 (168)	14.1 (268)	17.0 (284)	26.5 (534)
Hypnotics	N05C	20.5 (366)	27.2 (518)	36.8 (614)	42.0 (848)
Antidepressants	N06A	31.9 (570)	42.9 (816)	53.8 (898)	59.7 (1204)
Psychostimulants	N06B	5.4 (97)	5.7 (109)	7.1 (118)	8.5 (172)
Drugs used in addictive disorders	N07	2.5 (44)	4.7 (89)	10.5 (175l	11.8 (238)

a Period 1: 4 – 2 years before day of GD diagnosis, n total=1,786 (missing data in 313 cases).
b Period 2: 2 – 0 years before day of GD diagnosis, n total=1,904 (missing data in 195 cases)
c Period 3: Day of GD diagnosis and following 2 years, n total=1,670 (missing data in 429 cases).
d Total n=2,018, valid percentages.

In table 8 and figure 2, the odds ratios of each drug group in the three time periods controlling for period, the possible impact of GD diagnosis, years passed, age, and gender are presented. The variable "periods" showed significant increases proportion of prescriptions between periods 1 and 2, and between periods 2 and 3, for each category except psychostimulants. "GD diagnosis" shows the change in the odds ratio for period 3 compared to the expected linear progress after periods 1 and 2, possibly representing the impact of establishment of the GD diagnoses. For benzodiazepines, a significant decrease in prescription after GD diagnosis was seen, and for psychostimulants, there was a significant increase for the corresponding period. "Year" represents the change in frequency of prescriptions for each year and showed a significant decrease for hypnotics and antidepressants. The variable "age" represents the average change in frequencies of prescription for each year of age, and showed a small, yet significant increase for benzodiazepines, hypnotics, and antidepressants. It was significantly more common with prescriptions for antiepileptics, anxiolytics, hypnotics, and antidepressants in participants of female gender.

Table 8. Changes in proportions of patients with prescriptions of each drug group between the three time periods controlling for time, GD diagnosis, calendar year, age, and gender. N=2,018.

	Anti-epileptics		**Anti-psychotics**		**Benzodiazepine derivatives**		**Anxiolytics**	
	OR (95 % CI)	p	OR (95 % CI)	p	OR (95 % CI)	p	OR (95 % CI)	p
Period	3.86 (2.39-6.24)	**<0.001**	4.39 (2.87-6.71)	**<0.001**	2.96 (2.01-4.36)	**<0.001**	1.84 (1.44-2.34)	**<0.001**
GD diagnosis	0.54 (0.25-1.18)	0.122	0.69 (0.35-1.35)	0.278	0.34 (0.18-0.64)	**0.001**	0.72 (0.49-1.07)	0.104
Year	1.05 (0.93-1.18)	0.446	0.98 (0.89-1.09)	0.766	0.92 (0.84-1.01)	0.083	0.98 (0.94-1.02)	0.273
Age	1.09 (0.8-1.49)	0.576	1.03 (0.79-1.35)	0.817	1.47 (1.14-1.90)	**0.003**	1.07 (0.95-1.19)	0.272
Female gender	2.81 (1.25-6.32)	**0.012**	1.63 (0.76-3.48)	0.207	1.73 (0.86-3.46)	0.124	2.46 (1.79-3.38)	**<0.001**
	Hypnotics		**Antide-pressants**		**Psycho-stimulants**		**Drugs used in addictive disorders**	
	OR (95 % CI)	p	OR (95 % CI)	p	OR (95 % CI)	p	OR (95 % CI)	p
Period	2.13 (1.68-2.69)	**<0.001**	2.55 (2.09-3.11)	**<0.001**	1.94 (0.94-3.97)	0.071	4.64 (2.56-8.42)	**<0.001**
GD diagnosis	1.02 (0.70-1.49)	0.918	0.88 (0.63-1.22)	0.434	3.85 (1.12-13.27)	**0.033**	2.46 (0.95-6.33)	0.062
Year	0.87 (0.82-0.92)	**<0.001**	0.91 (0.87-0.96)	**<0.001**	1.18 (0.95-1.47)	0.130	0.97 (0.86-1.09)	0.595
Age	1.84 (1.57-2.17)	**<0.001**	1.45 (1.27-1.64)	**<0.001**	0.73 (0.41-1.27)	0.265	1.2 (0.89-1.62)	0.231
Female gender	4.71 (2.98-7.45)	**<0.001**	5.2 (3.58-7.54)	**<0.001**	1.72 (0.43-6.77)	0.441	0.96 (0.39-2.38)	0.932

p-values <0.05 presented in bold text

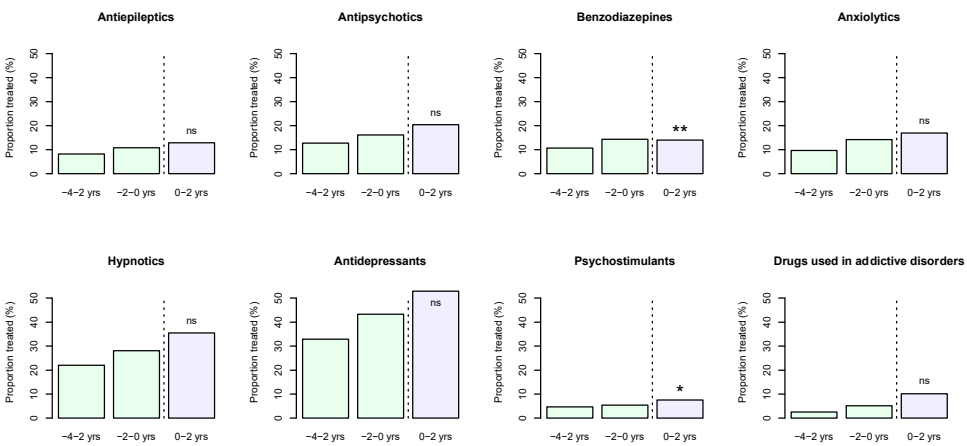


Figure 2. Changes in proportions of patients with prescriptions of each drug group between the three time periods. The test for statistical significance reported in the figures refers to the change in linear trends in period 3, controlling for time, calendar year, age, and gender.

Study IV

Of the 1,004 study participants, 22 % (n=218) were women. As described in the method section they were stratified for age, to represent the distribution in the general population. The majority, 72 % (n=727), were working as main occupation, 17 % (n=170) were retired, 5 % (n=47) were students, 3 % (n=29) were job seeking and 3 % (n=31) reported "other". The most common level of education was high school (45 %, n=447) and a full university degree (32 %, n=317). Twenty-one percent (n=214) had ever been prescribed pharmaceuticals for psychological distress and 6 % (n=60) had ever felt the need to seek help for problem gambling. Six percent (n=65) had ever felt a need to seek help for alcohol problems and 3 % (n=34) had ever felt a need to seek help for drug problems.

Past 30-day gambling activities were investigated by the first section of the ASI-gambling and are presented in table 9. For some of the further analyses, the sample was sub-divided in four groups based on reported gambling activities: those reporting both online casino and live betting (18%, n= 77), those reporting online casino but no live betting (16%, n=164), those reporting live betting but no online casino (36%, n=365), and those reporting neither online casino nor live sports betting during the past 30 days (30%, n=298).

Table 9. Past 30-day gambling activities reported (N=1,004).

Gambling activity	n	%
Online casino	341	34
Live sports betting	542	54
Online horse betting	400	40
Online poker	179	18
Online bingo	161	16
Sports betting – non-live	605	60
Land-based casino	90	9
Land-based horse betting	219	22
Land-based poker	93	9
Land-based electronic gaming machines	104	10
Gambling within video games	79	8

Problem gambling was investigated by the PGSI, according to which 13 % met the criteria of problem gambling and 19 % met the criteria of moderate-risk gambling. Low-risk gambling was seen in 23 % of the sample and 44 % had no gambling problems. In women, problem gambling was more common than in men (24 % vs. 10 %, $p<0.001$). The summed measure of problem gambling and moderate-risk gambling was also more common in women than in med (48 % vs. 28 %, $p<0.001$). In subjects reporting both past 30-day online casino and live betting, the percentage of respondents meeting the criteria for problem gambling was 44 %, and the corresponding number was 18 % in those reporting online casino but no live betting. The summed measure of moderate-risk gambling and problem gambling was met by 65 % of subjects reporting both online casino and live betting. By those reporting only online casino gambling during the past 30 days, the summed measure of moderate-risk gambling and problem gambling was 52 %, whereas the same measure was met by 21 % of subjects reporting only live betting, and by 16 % reporting neither of these gambling activities during the past 30 days.

Logistic regression analyses were performed investigating variables associated with problem gambling, with history of over-indebtedness, and with expected future indebtedness. In table 10, comparisons of respondents with problem gambling and no problem gambling are presented. Problem gambling was significantly associated with younger age, psychological distress, a higher level of education, level of recent gambling losses, and with recent online casino gambling and recent combined online casino gambling and live sports betting, in logistic regression.

Table 10. Comparison of respondents with problem gambling and no problem gambling. Chi-squared analysis and Mann-Whitney comparison, and logistic regression analysis with problem gambling as the dependent variable (N=1,004).

	Problem gambling, % (n)	No problem gambling, % (n)	p-value (Chi-squared or Mann-Whitney comparisons)	Odds ratio with 95 percent confidence interval (logistic regression)*
Male gender	61 (80)	81 (706)	<0.001	0.64 (0.36-1.15)
Age group			<0.001	0.57 (0.46-0.70)**
18-24	13 (17)	3 (24)		
25-29	18 (24)	6 (55)		
30-39	13 (41)	21 (179)		
40-49	22 (29)	23 (198)		
50-59	13 (17)	23 (202)		
60-69	2 (3)	16 (138)		
70+	1 (1)	9 (76)		
Psychological distress	16.5 (IQR 13-20)	9 (7-12)	<0.001	1.15 (1.09-1.21)**
Alcohol problems	18 (24)	5 (41)	<0.001	1.53 (0.64-3.64)
Drug problems	14 (19)	2 (15)	<0.001	2.40 (0.86-6.70)
Tertiary education	57 (75)	45 (396)	0.01	1.68 (1.01-2.80)**
Past-30-day money lost from gambling (Euros)***			<0.001	1.58 (1.41-1.78)**
<4.3	5 (7)	21 (179)		
4.3-8.7	4 (5)	11 (94)		
8.7-17.4	5 (7)	16 (142)		
17.4-34.8	8 (10)	18 (156)		
34.8-52.2	15 (20)	13 (111)		
52.2-87.0	10 (13)	9 (77)		
87.0-173.9	18 (24)	9 (78)		
173.9-434.8	12 (16)	3 (26)		
434.8-869.6	8 (10)	1 (7)		
>869.6	15 (20)	0 (2)		
Past-30-day online gambling activity			<0.001	
None				
Online casino, no live betting	8 (11)	33 (287)		
Live betting, no online casino	23 (30)	15 (134)		2.40 (1.03-5.58)**
Both	11 (14)	40 (351)		0.74 (0.31-1.80)
	58 (77)	11 (100)		5.12 (2.35-11.17)**

*Nagelkerke 0.56.

**Significant association (p<0.05).

***Responses in local currency, and values expressed here in Euros (1 Euro corresponding to around 11.5 SEK).

Having a history of past-year or previous over-indebtedness was endorsed by a total of 12 %. Lifetime history of over-indebtedness was more common with increasing levels of gambling problems; 3 %, 9 %, 13 %, and 46 % of respondents with no risk gambling, low-risk gambling, moderate-risk gambling, and problem gambling, respectively ($p<0.001$, chi-squared, linear-by-linear). In logistic regression with a lifetime history of over-indebtedness as the dependent variable, there were significant associations with psychological distress, a higher degree of problem gambling, and alcohol problems. In a second model, when problem gambling (PGSI) was excluded, lifetime history of over-indebtedness was significantly associated with psychological distress, alcohol problems, and past 30-day combined online casino and live betting.

Expected future over-indebtedness was significantly associated with psychological distress and degree of problem gambling, and negatively associated with tertiary education in logistic regression. After exclusion of PGSI, in the second model, future over-indebtedness was significantly associated with psychological distress, alcohol problems, negatively associated with tertiary education, and positively associated with online casino gambling.

A lifetime history of gambling-related borrowing was endorsed by nine percent (n=87). Among respondents with problem gambling, fifty percent had ever borrowed money related to gambling, compared to 6 % among moderate-risk gamblers, 2 % of low-risk gamblers, and 1 % of respondents with no risk. Eight percent of the respondents reported debts sent to the enforcement authority during the past year were reported by 8 % (16 % among those reporting both online casino and sports betting, 13 % in recent online casino gamblers, 4 % of sports live bettors, and 4 % of those reporting neither of these two recent gambling activities).

Study V

Of the 1,772 participants, 28.6 % (n=505) were female, and male gender was significantly more common in the gambling group (80.8 % vs 70.2 %, p=0.007). The mean age was 39.7 years, and significantly lower in the gambling group (37.0 years vs 40.0 years, p=0.002). In most cases, the clients themselves were initiators of contact (78.4 %. n=1,359), but in the substance group authorities were initiators in 10.3 % (n=162) of the cases, compared to only 4.4 % (n=7) in the gambling group. Clients in the substance group had been in a controlled environment past 30 days more frequently than clients in the gambling group (p=0.017), most frequently in psychiatric treatment (7.0 % vs. 2.4 %), alcohol/drug treatment (6.8 % vs. 1.2 %) or withdrawal management (5.5 % vs. 2.4 %). There were no significant differences between groups concerning principal caregiver, place of residence and type of residence.

Major gambling types reported in the gambling group are presented in Table 11 and distribution of client (G25) and interviewer (G26) ratings are presented in figure 3.

Table 11. Major problem gambling types. ASI-gambling question G17. Gambling group, n=162.

	Gambling type	Stated as the major problem by respondent n (%)
G1	Casino online	83 (50)
G2	Casino, not online	5 (3.0)
G3	Horses online	1 (0.6)
G4	Horses, not online	0 (0.0)
G5	Sports and odds livebetting	18 (11)
G6	Sports and odds, not live	4 (2.4)
G7	Online poker	6 (3.6)
G8	Poker, not online	1 (0.6)
G9	Slot machines, not online	12 (7.3)
G10	Bingo online	0 (0)
G11	Bingo, not online	1 (0.6)
G12	Lotteries and scratch tickets	1 (0.6)
G13	Number games	1 (0.6)
G14	Stocks, options, and securities	0 (0)
G15	Any gambling at all	26 (16)
	None	3 (1.8)

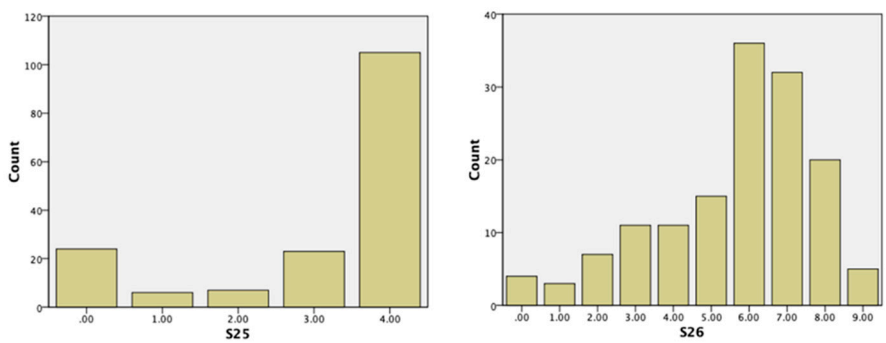


Figure 3. Distribution of client (G25) and interviewer (G26) ratings. ASI-gambling questions G25-G26. Gambling group, n=165.

Gambling composite scores ranged between 0.06 and 0.99. The median value was 0.69 and the mean value was 0.62. In Figure 4, the distribution of gambling composite scores is presented. A score around 0.80 was the most frequently occurring. Pearson correlation between gambling composite scores and interviewer ratings was $R=0.757$, $p<0.001$ ($n=144$).

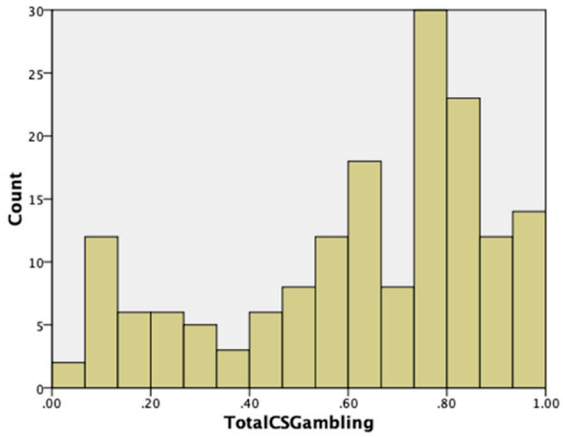


Figure 4. Distribution of gambling composite scores. Gambling group, n=165.

In table 12, results from the seven standard ASI areas are presented: medical status, employment/support status, drug/alcohol use, legal status, family and social relationships and psychiatric status. Comparisons were made between the gambling group and the substance group. Except in legal status, there were significant differences between groups in a varying number of items in all areas.

Table 12. Comparisons between substance group and gambling group. The seven Addiction Severity Index areas, n=1,772.

	Total	Substance group	Gambling group	p
Medical status n (%)				
Chronic medical problems	1021	940 (58.5)	81 (49.1)	**0.020**
Taking prescribed drugs regularly	641	597 (37.1)	44 (26.7)	**0.008**
Employment/support status n (%)				
Having driver's license	648 (36.6)	566 (35.2)	82 (49.7)	**<0.001**
Usual employment pattern, past 3 years:				
Full time	601 (34.7)	511 (32.5)	90 (55.9)	**<0.001**
Part time (regular hours)	83 (4.8)	75 (4.8)	8 (5.0)	
Part time (irregular hours)	95 (5.5)	90 (5.7)	5 (3.1)	
Student	77 (4.4)	72 (4.6)	5 (3.1)	
Service/Military	1 (0.1)	1 (0.1)	0 (0.0)	
Disability pension	252 (14.5)	234 (14.9)	18 (11.2)	
Retirement	65 (3.8)	63 (4.0)	2 (1.2)	
Unemployed	533 (30.8)	502 (31.9)	31 (19.3)	
In controlled environment	26 (1.5)	24 (1.5)	2 (1.2)	
Welfare	533 (30.1)	499 (31.1)	34 (20.6)	**0.005**
Mate, family, or friends	584 (33.0)	513 (31.9)	71 (43.0)	**0.004**
How troubled or bothered by employment problems past 30 days, scale 1-5, mean	1.91	1.90	1.97	0.459
Drug and alcohol use				

Alcohol, to intoxication, past 30 days, mean	4.6	4.7	3.3	**<0.001**
Heroin, use past 30 days, mean	0.50	0.54	0.12	**0.002**
Methadone, use past 30 days, mean	0.51	0.56	0.03	**0.001**
Sedatives, hypnotics, tranquilizers, use past 30 days, mean	5.87	6.05	4.18	**<0.001**
Cocaine, crack, use past 30 days, mean	0.76	0.67	1.61	**<0.001**
Amphetamine or other stimulants, use past 30 days, mean	2.36	2.31	2.78	0.078
Cannabis, use past 30 days, mean	3.94	4.09	2.52	**<0.001**
Daily use of tobacco, n (%)	1470 (83.0)	1342 (83.5)	128 (77.6)	0.054
Substance(s) being the major problem, n (%)				
None	70 (4.1)	21 (1.4)	49 (34.5)	**<0.001**
Alcohol	693 (41.0)	664 (42.9)	29 (20.4)	
Heroin	43 (2.5)	43 (2.8)	0 (0.0)	
Methadone	0 (0.0)	0 (0.0)	0 (0.0)	
Buprenorphine	22 (1.3)	22 (1.4)	0 (0.0)	
Other opioids/analgesics	64 (3.8)	62 (4.0)	2 (1.4)	
Sedatives, hypnotics, tranquilizers	58 (3.4)	56 (3.6)	2 (1.4)	
Cocaine, crack	40 (2.4)	33 (2.1)	7 (4.9)	
Amphetamine or other stimulants	96 (5.7)	91 (5.9)	5 (3.5)	
Cannabis	161 (9.5)	153 (9.9)	8 (5.6)	
Hallucinogens	1 (0.1)	1 (0.1)	0 (0.0)	
Ecstasy	2 (0.1)	2 (0.1)	0 (0.0)	
Inhalants	3 (0.2)	3 (0.2)	0 (0.0)	
Alcohol and one or more drugs	135 (8.0)	118 (7.6)	17 (12.0)	
Legal status				
Presently awaiting charges, trial, or sentencing, n (%)	293 (16.5)	268 (16.7)	25 (15.2)	0.615
Psychiatric status				
Experienced serious depression, n (%)				
In your life	1231 (69.5)	1119 (69.6)	112 (67.9)	0.777
In your life, only under influence of alcohol, drugs, or withdrawal	128 (7.2)	117 (7.3)	11 (6.7)	
Past 30 days	734 (41.4)	651 (40.5)	83 (50.3)	0.033
Past 30 days, only under influence of alcohol, drugs, or withdrawal	140 (7.9)	132 (8.2)	8 (4.8)	
Experienced serious anxiety or serious tension, n (%)				
In your life	1256 (70.9)	1132 (70.4)	124 (75.2)	0.404
In your life, only under influence of alcohol, drugs, or withdrawal	171 (9.7)	156 (9.7)	15 (9.1)	
Past 30 days, n (%)	908 (51.2)	805 (50.1)	103 (62.4)	**0.007**
Past 30 days, only under influence of alcohol, drugs or withdrawal	180 (10.2)	170 (10.6)	10 (6.1)	
Attempted suicide, n (%)				
In your life	535 (30.2)	494 (30.7)	41 (24.8)	0.268
In your life, only under influence of alcohol, drugs, or withdrawal	48 (2.7)	44 (2.7)	4 (2.4)	

Discussion

Current research has shown that gambling-related harm in society is substantial and has called for increased knowledge about vulnerable groups, in order to develop effective harm-reducing measures (Abbott et al., 2018; Sulkunen et al., 2021; Sundqvist & Rosendahl, 2019a). In this thesis, four different samples are presented regarding GD, or gambling problems, and psychiatric comorbidity. The primary hypotheses, that the prevalence rates would be high, were confirmed. In the sample of young male criminal offenders in study I, GD appeared as a general indicator of problem severity, associated with worse schooling results and several substance use disorders. Study II and III presented a national sample of patients who had received GD diagnoses in specialized health care. Study II showed that treatment uptake for GD was increasing but still remarkably low compared to estimated prevalence rates in the general population. In study III, the high and increasing comorbidity indicated severe suffering temporarily associated with the establishment of GD diagnoses. In study IV, a sample of general population online gamblers was investigated, and hypothesized associations between gambling problems and over-indebtedness were confirmed. As expected, online casino appeared as the main problem in study IV and V, where gambling types were investigated. In study IV, gambling problems were associated with female gender, which was somewhat surprising, but in line with new research highlighting the narrowing of gender gaps in prevalence rates of addiction disorders (McCarthy et al., 2018; Slabbert et al., 2020). The studies have several limitations, but also relevant implications for policy work, clinical contexts, and future research.

Methodological considerations

Challenges in psychiatric research

Psychiatric diagnostics and research are complex, and there are often sliding scales between normal and abnormal behavior, and unsharp borders between different psychiatric diagnoses (Kendell & Jablensky, 2003). In the case of GD and psychiatric comorbidity; symptoms of anxiety or depression can precede the gambling problems, sometimes contribute to the development of them, be a result of them, or both (Blaszczynski & Nower, 2002; Sundqvist & Rosendahl, 2019b).

The overall design of the included studies in the current thesis was cross-sectional, hence ruling out the possibility to estimate risks and possible causal relationships. All five studies were descriptive, presenting possible associations between GD and different variables considered relevant for the contexts. The epidemiological character of the included studies did, however, enable the presentation of novel data in psychiatrically vulnerable populations, which may contribute to improved strategies gambling policies and preventive actions. Descriptive research in the psychiatric field may be of value for the understanding of complex psychiatric needs and forming new hypotheses for adequate treatment and further research.

Study I

This study aimed primarily to investigate the prevalence of GD and related psychiatric disorders in young male violent offenders. Despite the previously described factors possibly predisposing individuals for antisocial personality disorder, GD and substance abuse, there has been a lack of research in the area.

A clear limitation, possibly affecting the generalizability of this study was the sample size; a total of 263 participants, of whom 16 % (n=42) were diagnosed with GD. All populations studied within the addiction field must be regarded in unique cultural contexts, which may further limit the generalizability (Medeiros et al. 2015; Raylu and Oei 2004). The small sample size could also have led to type II errors. Among the individuals who were asked to participate, the 109 who declined did not differ from participants with respect to mean age or type of index crimes but could have differed in other variables. Exclusion of individuals who did not speak Swedish well enough to carry through the study investigations without an interpreter (n=12), could have been of importance for the prevalence, since previous research indicates an over-representation of GD in ethnic minorities (Abbott et al., 2014; Alegria et al., 2009). The group which was excluded due to insufficient language skills were over-represented in sexual violent crimes, 52 % (n=12) in comparison to 11 % (n=28) among the participants and could have differed in comparison with the included group regarding additional variables which were not investigated.

Despite attempts to investigate the social and psychiatric histories and conditions of the study participants by comprehensive screening, criminal file information and diagnostic instruments, there are several possible sources of errors. Respondent bias could occur due to difficulties or unwillingness to express or recall relevant information. Questions regarding possibly delicate stigmatizing subjects, such as gambling problems or substance abuse, could imply particular risks for such biases. According to previous research, recall bias is often substantial addiction research (Hammersley, 1994). A flaw appearing in the data was the lack of assessment of each DSM-IV criterion for substance use disorders, and because of that we chose to use the term substance abuse instead, which can be seen as wider but less specific.

A relatively high number of variables were included in comparisons between the gambling group and the non-gambling group, which could result in type I errors. In order to handle the false discovery rate the BH correction method was used, by which all p-values are re-calculated using a mathematic formula taking the numbers of included variables into consideration. However, the risk of type I errors is not eliminated by the method. Performing logistic regression on a small population carries a risk for overfitting a potential issue, and we thus limited the number of independent variables to five to limit this risk, according to general recommendations (Vittinghoff & McCulloch, 2007).

The main strength of this study was the comprehensive assessment, based on validated instruments and systematic DSM-IV diagnoses. According to the literature review of the study, no previous studies with corresponding complete DSM-IV-based diagnostics focusing on GD in a prison population had been published. In summary, despite limited generalizability to other GD contexts, the studied population was considered to be representative of young, Swedish male offenders with GD.

Study II and III

Study II and III were based on registers, investigating treatment uptake for GD, and psychiatric comorbidity, in patients who had received GD diagnoses in specialized health care between the years 2005 and 2016. There is little previous research on large clinical samples of GD patients, and Swedish national registers compose valuable sources of data enabling this type of investigation. To the authors best knowledge, these two studies were the first to investigate GD and psychiatric comorbidity with the current methods. However, there were methodological limitations in the total patient data, and in the studies separately, which needed to be considered.

The primary criterion for inclusion in both studies II and III, was having received a GD diagnosis in specialized health care, according to the NPR. This register is reported to have high validity and coverage for in-patient care (Ludvigsson et al., 2011), but during the first three years of the current study 21-56 % of the diagnoses were missing in visits in out-patient psychiatric care. Virtually full coverage has been reported for in-patient care, and missing data for diagnoses in out-patient specialist care increased during the study period to a 4-percent level as a whole in 2016 (The Swedish National Board of Health and Welfare, 2020a). This register design, based on inclusion through the NPR, leaves out gambling problems treated in primary care, social services, or outside the health care system. Summarized, this possibly implies some underestimations of the treatment uptake for GD, especially during the first years of the study.

Only few individuals with possible GD seek help for their gambling problems (Gainsbury et al., 2014a), and it can be assumed that patients who receive GD diagnoses in specialized health care are a group with relatively severe problems. Hence, the included patients in this data material cannot be considered representative of people with gambling problems in the general population. On the other hand, previous studies of gambling problems in general population samples have shown a surprisingly high level of psychiatric comorbidity. Participants of studies II and III can be presumed to represent individuals with a relatively clear GD and high psychiatric comorbidity, compared to all individuals with any gambling problem in the general population. A few included patients had been diagnosed with GD in specialized somatic care, which is difficult to interpret regarding the actual treatment in the given episode.

A limitation with study II, which contributed to the idea of conducting study III, was the fact that the NPR covers only diagnoses made in specialized health care, and not in primary health care. This means that, in study II, psychiatric comorbidity treated only in primary care could not be detected. While study II was measuring concurrent psychiatric diagnoses in a cross-sectional design, the method of study III carried a more longitudinal perspective, investigating three different periods in connection with the establishment of GD diagnoses.

Study III had several limitations. The PDR as a register is not limited in coverage, corresponding to the NPR discussed above, but psychiatric drugs themselves are limited as proxies for psychiatric comorbidity. The complexity of establishing and validating psychiatric diagnoses can be seen as a limitation in both the studies. Initiating the right pharmacologic treatment might be even more complicated. For example, several psychiatric drug classes address varying conditions involving affective instability, anxiety, or depressive symptoms, making it hard to triangulate the comorbidity more specifically. A hypothesis could be that more accurate psychiatric diagnoses are established within specialized psychiatric care, as in study II, and usually it takes a more severe psychiatric condition to see a psychiatrist. The method of study III likely captured a broader, but less specific, amount of psychiatric comorbidity. Study III aimed to present GD and psychiatric comorbidity with a more longitudinal perspective than study II, presenting prescription of psychiatric drugs during three different time periods connected to GD diagnoses. The possibility of describing the actual chronology between different diagnoses, however, was limited using this study design, since the time for registration of GD diagnoses were probably not the time point when gambling problems had started.

Direct comparisons between study II and study III were hard to do, considering the different measures of psychiatric comorbidity. As discussed above, psychiatric drugs are somewhat inexplicit proxies for psychiatric comorbidity, primarily due to varying indications and off-label use. Generally higher levels of psychiatric comorbidity were detected in study III, as expected, since data from PDR covers prescription from both specialized and primary care.

The methodological strengths of studies II and III were the large sample sizes and relatively high coverage and validity of used registers. Compared to study II, study III had a design allowing for measurement of psychiatric comorbidity in both specialized and primary care, and a more longitudinal perspective.

Study IV

Study number IV was the only one in is this thesis investigating GD in a general population sample. Participants of study IV were online gamblers, recruited by a web panel, while participants of the other four studies were all being subject to different actions by the criminal authorities (study I), health care system (study II and III), or social services (study V). This study aimed to examine gambling problems, over-indebtedness, and psychological distress, in online gamblers, by using an online survey.

Recruiting people to answer surveys, usually implies methodological limitations, since it is hard to ensure the actual representability. A power analysis could not be calculated in this case, since previous studies did not allow for the prediction of potential outcomes in different groups in this sample of online gamblers. A goal of about 1,000 participants, stratified for age, was set and reached relatively easily by the market survey company. Participants of the current panel, who were included in the study, had a higher level of education than the general population; 35 % of individuals aged 16 to 74 in the general population are reported to have tertiary education, 35 % compared to the 47 % in the present study (Statistics Sweden, 2018). The initial question of inclusion was focused on past year online gambling, hence leaving out people who might have had a relevant history in the subject but no current gambling activity. Despite a relatively high number of study participants, the number of participants with gambling problems (13 %, n=130) makes a quite small sample in relation to estimations of the total prevalence of gambling problems in the Swedish population. It can also be assumed that parts of the general population with a high degree of gambling problems, e.g., young men, ethnic minorities, and people with socio-economic problems, are under-represented in Ipsos's panels. Analyses lacked controlling for several such variables which could have been of importance. It is likely that there was a selection bias among panel members who chose not to participate in this survey, due to the subject. Further, it is known that people often tend to underestimate their consumption of addictive products or substances, part due to social control and stigmatization (Leifman & Trolldal, 2014; Sulkunen et al., 2021). Apart from an unwillingness to answer correctly because of the mentioned reasons, recall bias may have affected the survey results. This was obvious in questions about the history of over-indebtedness ever, which was endorsed by 10 %, whereas, inconsequently, 11% endorsed the following question addressing past year over-indebtedness and collapsing the two items resulted in 12 % endorsing at least one of the items.

The validity of the investigated measures varied. The main subject, gambling problems, was measured by the PGSI, which is widely used and validated, but K6, the measure of psychological distress, has not been specifically validated in its Swedish translation. Gambling patterns were only described for the past 30 days, which likely was relevant for the estimations of associations with gambling problems and with future over-indebtedness. Due to the cross-sectional design, it was not possible to unravel the chronology of any of the investigated items, and plausible conclusions could not be drawn between the associated subjects.

In summary, this study was an attempt to investigate gambling problems, over-indebtedness, and psychological distress in a sample of online gamblers. The main drawbacks in this survey method were probably selection bias and recall bias, possibly resulting in under-estimations of some of the measures, and a lack of longitudinal perspectives. However, strengths were the novelty of investigating and conforming the associations between certain patterns of gambling, gambling problems, and over-indebtedness, which may be of great value to policymakers.

Study V

In study V, the sample consisted of clients who had been seeking help for addiction problems in the social services. We developed a Swedish ASI-gambling version to facilitate examination of gambling problems and collection of data for research in the context. Initially, in 2016, the idea was to investigate the prevalence of gambling problems in help-seeking substance abusers, based on a hypothesis that enough screening and treatment for GD was not fulfilled. However, shortly after the development of the Swedish ASI-gambling form was finished, Swedish gambling legislations were adjusted and both health care units and social services were assigned more pronounced roles regarding responsibilities of screening and treating GD (The Swedish National Board of Health and Welfare, 2018). The gambling market was also given increasing political attention, and in 2019 a large-scale re-regulation was carried through. These occurrences probably affected the intended selection of the study, and the aims had to be part re-written.

The original focus of the investigation was the prevalence of gambling problems in substance abusers, and possible associations with related areas in the standard ASI interview. Along with the implementation of the updated gambling legislation, parallel to the implementation of ASI-gambling, data were gathered in the ASI database without clarifications of which kind of addiction clients had been seeking help for in the first place. Many clients were screened by the Lie/Bet, according to our initial instructions, but not all of them, and it was not completely clear whether we were looking at gambling problems in a substance abuse population, or vice versa, or, most likely, a mix of the two. This resulted in a study where we aimed to investigate gambling problems in a population of social services clients seeking help for *addiction problems*, without further specification. Comparisons were made

between a substance group and a gambling group, and results from the ASI-gambling were presented separately. Selection to the gambling group was based on a combination of the Lie/Bet questionnaire, having endorsed any gambling type as a major problem (S17), and/or being assessed with a need for help (S26).

The sample (n=1,772) was considered representative of quite broad population seeking help for addiction problems in the social services. Levels of missing data were generally low; 0-3.3 % in presented ASI-gambling items, except for the interviewer ratings, where the corresponding number was 12.7 %. In items from the standard ASI interview, levels of missing data were 0-4.6 %. Likely, clients with the most serious addictions and concurrent mental problems were not asked to be interviewed. Previous research has also highlighted the need of taking into consideration that, due to the severity of the life situations of the respondents, answers to some interview questions may be hard to interpret. A client with very severe abuse problems could deny problems in some areas, e.g., employment or relationships, considering them secondary compared to the worst problems of abuse (Jansson, 2001).

Composite scores were calculated by using a mathematic formula constructed according to the same principles as the originally validated version and validated by correlations with interviewer ratings. In the formula, gambling losses the past 30 days were logarithmized and differences in currencies between American dollars as SEK were taken into consideration. The Swedish version of the composite score formula in the ASI employment area has been criticized for the absence of such adjustment (Jansson, 2001). According to the results there was a significant correlation in the current attempt to validate the form, but this needs to be examined in further studies.

The main strengths of this study were the novelty of presenting a relatively large Swedish sample, all interviewed with the ASI which is a comprehensive all widely validated instrument, and the scientific presentation of the ASI-gambling. Methodologically, we could not carry through with the initial structure and the current study is probably hard to replicate yet it presents important results and may contribute to further implications in screening and hypotheses for research.

Main findings

Occurrence of gambling disorder and treatment uptake

Two of the studies in the present thesis investigated the prevalence of GD, or gambling problems, in specific populations. In study I, the prevalence of GD was assessed by psychologists, based on diagnostic DSM criteria (APA, 2000). The

lifetime prevalence of 16 % was remarkably higher than in the general population, as expected. According to Swelogs, gambling problems in 18-19-year-old men is around 8 %, which can be compared to 0.6 % in the whole population, even though lifetime rates would probably be higher (The Swedish Public Health Authority, 2019). In previous studies of offender populations, rates of GD have been reported with an average of 33 %, with a high degree of variability due to methodological differences in the studies (Turner et al., 2013; Williams et al., 2005). Considering the well-known connections between criminal behavior, impulsivity and substance use disorders, which are all associated with GD (Varghese et al., 2014), the prevalence reported here was not surprising and may be explained by previously described genetic and environmental factors (Blaszczynski & Nower, 2002; Potenza, 2014a). Prevalence of past-year gambling problems in online gamblers was investigated in study IV, by PGSI in an online survey, and showed a clear over-representation compared to the general population. This confirms results from previous studies, where PGSI-levels of gambling problems in online gamblers have been high (Hing et al., 2015), possibly due to individual risk factors and characteristics of these gambling types (Gainsbury, 2015; Meyer et al., 2011). In study II, treatment uptake of GD in specialized health care was analyzed and presented an increasing number of patients receiving GD diagnoses between the years 2005 and 2016, but a large gap remained between probable population prevalence of GD and number of patients in treatment. Estimations of point prevalence rates of GD correspond to around 30,000-40,000 individuals, indicating considerably higher lifetime rates (The Swedish Public Health Authority, 2019), and only a total of 2,099 patients were registered for GD in specialized health care these years.

Psychiatric comorbidity in the investigated populations

The main theme of this thesis was occurrence of GD and psychiatric comorbidity. All studied populations were investigated from this perspective and comorbidity was generally high, as expected. One theoretical concept which can be considered relevant and applicable for analyses of the results is the pathways model by Blaszczynski and Nower (2002). In previously investigated populations, around 20-30 % of GD patients have been described as “antisocial, impulsivist”, characterized by antisocial personality disorder, which was highly prevalent in study I, and high novelty seeking (Balodis et al., 2014; Valleur et al., 2016). Rates of antisocial personality disorder were expectedly high among the investigated young male violent offenders and higher in the GD group (83.3 vs. 60.2 %, p_{BH} =0.034), which might be seen as an expression of pronounced novelty seeking (Goudriaan et al., 2009). The most remarkable features of the GD group were worse results in elementary school, indicating that they had problems early in life, and the extremely high prevalence of cocaine abuse, which may also be connected to certain impulsive

personality traits, previously described in individuals with problematic gambling and cocaine use (Ethier et al., 2020).

In the national register studies, papers II and III, all registered psychiatric diagnoses, and prescriptions of psychiatric drugs prior to and following GD diagnoses, were presented. As hypothesized, the psychiatric comorbidity was high in the studied population. In study II, 73 % of the participants had at least one concurrent psychiatric diagnosis, with the highest presence of anxiety disorders (34 %), affective disorders (33 %), and substance-related disorders (25 %). Patients receiving psychiatric diagnoses in specialized health care, especially in-patient cases, could be hypothesized to suffer from more severe psychiatric problems than other samples, but according to meta-analysis, the differences are not salient (Lorains et al., 2011). Hence, the levels of comorbidity presented here might be somewhat higher compared to problem gamblers in the general population, but still relevant for analyses of the need for prevention and treatment for gambling problems in general. To cover comorbidity also from primary care, and present a more longitudinal perspective, prescription of psychiatric drugs prior to and following GD diagnoses was analyzed in study III and showed a high, and increasing, psychiatric comorbidity during the studied period. Due to methodological differences in diagnostics and the wide indications for several psychiatric drugs, direct comparisons between studies II and III could not be made, but summarized, they present poor, and deteriorating, mental health in this group of GD patients. Despite being able to present an exact chronological perspective in study III, the results indicated that a considerable proportion of the participants had symptoms of depressive and/or anxiety disorders preceding the gambling problems, possibly placing them in the group of emotionally vulnerable gamblers, according to the pathways model (Blaszczynski & Nower, 2002). The increase in the prescription of psychiatric drugs between periods could be an expression of both increasing occurrence of parallel psychiatric disorders, and of suffering caused by GD itself, such as anxiety and sleeping problems (APA, 2013; Parhami et al., 2013).

Study IV, which was an online survey directed to online gamblers, investigated gambling problems by the PGSI and ASI-gambling, psychological distress by K6, and brief questions were asked about alcohol and drug problems. Problem gambling was associated with psychological distress, which was likely an expression for both psychiatric comorbidity, and symptoms of gambling problems themselves (Oksanen et al., 2018). There seemed to be a link between levels of gambling problems, over-indebtedness, psychological distress, and alcohol problems, which was not chronologically clarified but probably indicating a general vulnerability in these and catalyzing effects between the investigated factors (Hellberg et al., 2019).

In study V, gambling problems and substance use problems in social services clients were investigated by ASI interviews. For obvious reasons in the selection, substance use problems were generally more frequent in the substance group, but, interestingly, cocaine or crack was the only separate drug which was reported as the

main problem more often in the gambling group (4.9 % vs. 2.1 %, p<0.001 in comparisons with all substances). This was in line with the particular association between GD and cocaine also seen in study I, likely explained by neurological alterations in the reward system, bringing increased risks of initiating these activities, and subsequent rewarding experiences promoting the continued use of addictive games and cocaine (Ethier et al., 2020; Worhunsky et al., 2014). The combination of alcohol and one more drug was also more frequently reported in the gambling group (12.0 % vs. 7.6 %, p<0.001 in comparisons with all substances), which might be an expression of generally high addiction severity. In the gambling group, there seemed to be signs of acute stress reactions, which has previously been described (Oksanen et al., 2018). Regarding attempted suicides, there were no differences between groups, but 30.2 % of all participants reported a lifetime history of attempted suicide, which is in line with previous research and indicates a history of poor mental health and the presence of several risk factors (Yuodelis-Flores & Ries, 2019).

Gambling problems and associations with gambling types and over-indebtedness

Previous data from the present setting showed a clear over-representation of fast online games among problem gamblers (The Swedish Public Health Authority, 2019; Hakansson et al., 2017). In the present thesis, gambling types were investigated by the ASI-gambling in studies IV and V. The results indicated a high occurrence of problematic online gambling, and associations with mental distress and over-indebtedness. In study IV, the inclusion criterion was having gambled online the past 12 months, hence excluding other groups of gamblers, however, analyses within the included group did illustrate the potential destructiveness of the investigated gambling types. Thirteen percent of the whole sample met the criteria for problem gambling according to the PGSI, but among those who reported active online casino and live betting (past 30 days) the corresponding number was 44 %. Adding moderate-risk gambling, 65 % met the criteria, in line with reports from The Swedish Public Health Agency (2019), indicating that the vast majority of money betted on these gambling forms derives from individuals with gambling problems. Several reports of electric gambling machines, including studies of specific neurocognitive features (Myles et al., 2019), have shown a particular addiction potential in this gambling type, and online accessibility adds even higher risks (Effertz et al., 2018; Gainsbury, 2015; Siemens JC). Results from study V were confirming this further, as the most frequently reported gambling type being the major problem was casino online (50 %), followed by sports and odds live betting (11 %).

Utility and possible value of ASI-gambling

The Swedish version of ASI-gambling was developed and implemented within the frames of study V in the present thesis. The ASI-gambling project aimed to increase collaborations between psychiatric health care and social services and according to the number of engaged municipalities and interviews, the initiative seemed to be relatively well-received by social workers. Previous research has described barriers to implementation of evidence-based methods in social work, due to, e.g., difficulties of reducing complex problems into short assessments or numeric ratings, or expectations of increased workload, but positive attitudes have also been expressed (Heiwe et al., 2013). Easy access and links to the standard ASI interview, which was already part of the workflow, may have had a positive impact on the current project (Heiwe et al., 2011), but utility needs to be evaluated in further studies. Continued use of the ASI-gambling may be of value for clinical assessments and contribute to the ASI database, enabling further scientific evaluations. Predictive validity is a key measure for clinical work and research, which has been evaluated with excellent results in the use of ASI-gambling in treatment-seeking gamblers (Petry, 2003), and needs to be investigated also in the present setting. The high ratings for the need of help in the gambling section, possibly reflecting the acute crisis also seen in the reporting of symptoms of anxiety and depression in the gambling group, require further attention in both clinical and policy work. In the first validation study of ASI for gambling, similar results were seen, with a mean rating of 3.3-3.4 in desire of help, compared to a mean of 3.1 in the current study (ratings possibly ranging from 0-4, with 4 indicating an extreme need of help) (Petry, 2003). Composite scores were calculated and correlations with interviewer ratings were excellent, indicating that they may be of value for assessments of severity and treatment follow-up. Gambling problems are known to present with a dynamic long-term course (LaPlante et al., 2008), and ASI-gambling is supposed to be a helpful tool for the assessment of the current need for help. In previous analyses of convergent validity, correlations to instruments assessing recent, rather than lifetime, gambling problems were higher (Petry, 2003). In summary, taking the discussed challenges and limitations in regard, adequate use of ASI-gambling may continue and become a part of a standard routine in social services, also helping to increase general awareness of gambling problems.

New perspectives on gender in a gambling context

Traditionally, gambling contexts have been dominated by men, resulting in a male bias in research and policy (McCarthy et al., 2019b; McCormack et al., 2014). However, a change has started to emerge internationally (McCarthy et al., 2019a), also reflected in some of the studies presented in this thesis. In study IV, the risk of problem gambling was higher in women than in men, maybe due to the fact that some women may be certainly vulnerable and predisposed to destructive online

casino gambling (Blaszczynski & Nower, 2002; Tavares et al., 2001). Women presented with a higher prevalence of anxiety and depression diagnoses in study II, and higher prescription of psychiatric drugs addressing the same disorders in study III, which could be in line with the emotional vulnerability described in the pathways model (Blaszczynski & Nower, 2002; Sundqvist & Rosendahl, 2019a). In total numbers, there are generally more men in GD populations, especially in samples with high levels of externalizing behavior as in study I, including only men, but "feminization" of gambling in the U.S. was discussed already in 2003 (Volberg, 2003). Previous studies have shown that women are more prone to choose chance-based, monotonous games, suggesting that this might be linked to internalizing symptoms, loneliness, and boredom, associated with female problem gambling (Stark et al., 2012; Trevorrow & Moore, 1998).

As women may present with emotional vulnerabilities on a group level and seem to be at higher risk for problems with some gambling types, increased awareness and knowledge are of importance for preventive actions and treatment (Blaszczynski & Nower, 2002; McCarthy et al., 2020). Unfortunately, instead, what has grown parallel to the emerge of the Internet, is the amounts of commercials targeting women, normalizing highly addictive gambling products (Hakansson & Widinghoff, 2019; McCarthy et al., 2020). Both younger and older women are at risk for problem gambling (Grant et al., 2012; McCarthy et al., 2020) and might be even less prone than men to seek help, due to stigma (McCormack et al., 2014). This, together with the high comorbidity and risk for suicide (Husky et al., 2015), calls for the high need of focus also on women in the continued work with gambling policy and prevention, as well as in treatment contexts.

General conclusions

The present thesis includes five studies, which aimed to describe gambling problems and related psychiatric comorbidity in four different populations. GD is a psychiatric addictive condition, associated with large stigma, causing severe harm on societal and individual levels, and few people seek help for their gambling problems (Gainsbury et al., 2014a). According to previous research, a small part of gamblers stands for a significant part of gambling expenditure (Rossow, 2019), and current studies from the Swedish setting have indicated an increase of the most severe gambling problems (The Swedish Public Health Authority, 2019). Certain gambling patterns, as well as psychiatric comorbidity, pose risk factors for appearance and persistence of GD. Yet, there has been a lack of knowledge about vulnerable populations, and of scientific bases for policy and directions for prevention, treatment, and policy in Sweden. The studies of this thesis investigated gambling problems, and related psychiatric factors, in populations considered relevant for the context. Some conclusions could be made based on the study results.

- In young male offenders, GD was highly prevalent compared to the general population, as expected. Psychiatric comorbidity was high in the whole sample, especially regarding substance abuse, but GD was independently associated with cocaine abuse, and failure to graduate elementary school within the expected time. The results called for the need for highlighting gambling problems in the probation service and youth care.
- Register studies of patients diagnosed with GD in specialized health care showed an increasing treatment uptake for GD, and high psychiatric comorbidity. The studied group had been prescribed significant amounts of psychiatric drugs both prior to, and after, the establishment of GD diagnoses, indicating major suffering and, likely, insufficient care.
- The study of online gamblers confirmed the hypothesis of the high presence of psychological distress and gambling problems among recent online gamblers. Online casino gamblers reported more frequent histories of having borrowed money for gambling, and more frequent over-indebtedness, compared to subjects not reporting this gambling activity, raising the questions about certain risks and vulnerability in the group.
- Clients seeking help for addiction problems in the social services in Sweden have rarely been studied from a psychiatric perspective, and in the last study of this thesis, the Swedish version of ASI-gambling was presented and validated for the first time. Comorbidity between gambling problems and substance use problems was remarkably high, and implementation of this instrument enables further research on the subject. Among all gambling types, online casino was by far the most reported as the major problem, and a majority of the clients interviewed with the ASI-gambling rated their need of help as the highest possible.

In summary, these five studies present populations with certain psychiatric vulnerabilities, which need to be taken in regard to psychiatric and social work, and in societal efforts, to improve preventive and treating measures for gambling problems. Research in the subject may play an important role to highlight these groups, reducing the stigma of addiction disorders, and sometimes being a voice for those who are seldom heard in policy discussions. The studies presented in this thesis, could not present conclusions based on causal associations or immediate future directions in the subjects, but clearly point to the need for further efforts to improve GD prevention and treatment scientific evaluations. Continuing to increase the knowledge from s psychiatric perspective, taking related ethical issues in regard, would be a valuable and necessary part of future policy efforts in this highly complex area.

Implications for clinical work and gambling policies

In the present thesis, gambling problems and related psychiatric problems were described in four different populations. The high comorbidity highlighted the importance of screening for gambling problems in psychiatric care, social services, and probation service. It could also be presumed that screening would be of value in high-risk environments, such as youth care, municipal debt counselling, and relevant cases in primary care. Gambling problems among female online gamblers were remarkably high, along with high levels of psychiatric comorbidity, and should not be overlooked. Co-occurrence of gambling problems and substance abuse problems was highly prevalent, but not always detected by initial questioning in the social services, indicating that the execution of full ASI interviews was of certain value to enable comprehensive assessments of the need for help in these individuals.

The studies presented in this thesis did not evaluate treatment methods and could not form implications for treatment recommendations but may be considered raising the need for wide perspectives in the context. Gambling problems and other psychiatric disorders or psychological distress were often co-occurring in the studied populations, likely reciprocally catalyzing each other. Discovering comorbidity could possibly improve the making of individual treatment plans, which has been suggested in previous research (Di Nicola et al., 2014). Knowledge of complexities in psychiatric comorbidity, from different perspectives, could be helpful in the development of GD treatment, including individually adjusted goals, assessment of needs of long-term treatment, and strategies for relapse prevention. Increased awareness of GD and treatment are highly important, as suicide risk in GD patients is clearly elevated. Several risk factors for suicide, e.g., impulsivity and personality disorders (Bjorkenstam et al., 2016; Swann et al., 2020) were over-represented in the presented populations and providing support in emergency situations could potentially be lifesaving (Larkin & Beautrais, 2010).

Prevention of gambling problems in clinical practices and policies is highly complex. The subject needs to be discussed in a wide context, including improved mental health in the general population, societal efforts for social and economic equality, and gambling policies limiting the possibility for gambling companies to take advantage of individuals who have lost control over their gambling (Sulkunen et al., 2021). One starting point could be to find the vulnerable groups and call for psychiatric and societal analyses of the situation. The studies in the present thesis were involved in state gambling policy discussion and highlighted the immediacy of the issue.

Implications and ideas for future research

The main parts of the present thesis were cross-sectional register data, limiting longitudinal perspectives and proving of causal associations. However, hypotheses for future research could be formed, and both efforts to replicate, and improve study methods, could be of value from a gambling research perspective.

GD in criminal offenders remain of interest, and studies of larger populations would be of importance to investigate prevalence numbers, and associations with other addictions and psychiatric comorbidity. Study I raised questions about the parallel emergence of gambling problems and criminal behavior in even younger populations and youth care. Of course, it would be highly relevant with research aiming to implement, and evaluate, screening and treating measures in these contexts.

Regarding the register studies, II and III, repeated studies of treatment uptake could be of value for further and updated knowledge, about the national Swedish GD population. One way to deepen the understanding about the course of GD and psychiatric comorbidity, could be personal interviews aiming to investigate the chronology of the events. There is a pronounced need for longitudinal research in GD populations, and it would be of interest to study further treatment needs and prognoses and in this population.

Among Swedish problem gamblers, a majority gamble in online casinos and internet live betting sites. Additional studies of gambling problems, and related psychiatric and economic issues, in online gamblers are of great importance for gambling policies and preventive actions. Replication of study IV could be relevant, also aiming to reach participants from wider parts of the population, including groups of varying socio-economic backgrounds and from different geographical settings. Research based on gambling expenditure data from gambling companies, together with qualitative measures of how gamblers experience these types of gambling, could contribute to further directions in the area.

The amount of research on help-seeking social services clients with gambling problems is highly limited, despite the fact that this populations often have complex psychosocial problems and large needs for help (Bramley et al., 2019; Forsström & Samuelsson, 2018; Guilcher et al., 2016; Wardle, Bramley, et al., 2019). Development of ASI-gambling, and presentation together with the other ASI data in study V, could be seen as the beginning of a project in need of long-term follow-up. The database, now covering both ASI-gambling and other ASI areas could contribute to further studies of gambling problems, co-occurring psychosocial problems, and assessment of executed measures.

All the five studies were interesting from a gender perspective, even though this was not the primary focus. Women were clearly over-represented regarding emotionally

vulnerability, seen in study II and III, and at a higher risk for gambling problems among the online gamblers in study IV. These study results speak for the need for an increased focus on women in gambling research and indicate probable shortfalls in the care of these patients in general, further highlighting the issue. As expected, in total numbers, there were more men than women in all the presented studies and men participate in gambling more often than women. It would be highly relevant with more research investigating gender differences in gambling patterns, aiming to present relevant evidence for policies and treatment.

Summarizing my own perspective, in the end of the work with the present thesis, I see a need for research and policies not stepping back for complex issues and ethical difficulties. Gambling research is partly lacking up-to-date data, presenting gambling expenditures in relation to tipping points for societal costs in relation to individual suffering (Rossow, 2019; Sulkunen et al., 2021). Further comprehensive studies of gambling problems rates in different parts of the population, along with evaluations of actions for prevention, screening, and treatment need to be conducted. Case-control studies could be of importance for increased knowledge of long-term consequences of GD, and personalized algorithms need to be further hypothesized and evaluated. In treatment situations, I believe that it is of significance to see the individual conditions from a wide perspective, regarding psychiatric comorbidity and difficulties with e.g., impulse control, to optimize a constructive and non-judging treatment situation (Dowling et al., 2015b; Prescott, 2020).

Acknowledgements

My doctoral thesis is dedicated to my beloved father, Björn Widinghoff, whom I lost far too soon. My father provided me a secure and happy childhood, and, as the researcher he was, inspired and encouraged me to explore and question the world. Unfairly, he never got a fair chance to battle cancer or finalize his doctoral thesis. Due to my heritage I had to fight the same disease, but I was in time, and I also inherited strength and patience to make it through. For that, I want to thank my father, my mother, and our Father in Heaven.

I had wished to spend more time in a white coat than in a hospital bed during my time as a doctoral student. However, it has been highly educative to change perspectives through these unique experiences. I am very grateful for my skilled colleagues at the departments of clinical genetics, surgery, and oncology, at Skåne University Hospital, who most likely saved my life.

Apart from surviving, I have been busy with psychiatric research in the addiction field, above all thanks to my excellent main supervisor Anders Håkansson. The first time you lectured my class during the psychiatry course in medical school, I asked for help to design a project for my master thesis, and you immediately offered to share your knowledge and ideas. This led to two scientific papers within the frames of the opioid interim project in Lund, and you encouraged me to continue with doctoral studies. During these years, you have always inspired me and our whole research group with your diligent work and optimistic attitude. Rarely, or never, you have put pressure on me, but your faith in me has always been motivating me to perform my best, and I look forward to future addiction research collaborations.

Jonas Berge, my co-supervisor, has shared his superior talent in statistics and psychiatric study designs, and helped me, with admirable endurance. You have also shared your thoughts and perspectives on psychiatry, and the challenges of psychiatric diagnostics and human existence, which has contributed to a critical approach that I hardly would have achieved without your knowledgeable contributions. Hopefully, we will also continue our collaboration in future projects.

Helena Hansson, my co-supervisor from the faculty of social sciences, has contributed with knowledge about social work, and perspectives which often risk being overlooked in medical research. Thank you for your kind and engaged support in my projects and writing. I believe that, ideally, psychiatric care should take social

and medical needs in regard, and I will aim to continue my work and development in both areas.

Anna Karlsson, colleague and co-author, thank you for your valuable contributions in the gambling research field, for fellowship and friendship during these years. I wish you the best in your ongoing and future projects.

Mathias Hallberg, colleague in charge of several of the courses at Uppsala University, in which I was given the possibility to teach. Thank you for inspiring meetings and sharing your excellent talent of teaching, I look forward to continued collaborations.

I am also grateful for the collaboration in the DAABS project, which enabled the first study in my thesis – thank you Björn Hofvander, Märta Wallinius, and Eva Billstedt.

Åsa Westrin, head of the research department, thank you for providing access to the facilities of the research department, and inspiring me to take part in the department group.

I am grateful to the present director of the Addiction Centre Malmö, Karina Stein, and to the co-workers who have always been supportive of my activities. Mats Zaar and Niroshani Broman for sharing your clinical experiences, Pia Bondesson, Cia Vendel, and Lisette Jelevi for administrative support. Thank you, Hedvig Krona, for dedicated clinical supervising and career support.

All members of the research group in Addiction Centre Malmö, thanks to you for contributing to our community, and sharing your work, on our lunch meetings. I am grateful to be part of such a meaningful and inspiring context and I look forward to our future meetings and collaborations.

My mother, Karin Bengtsson Widinghoff, has also been an essential part of this whole project. Apart from providing me an upbringing leading to the scientific interest and capacity to initiate a research career, you have helped me to accomplish all these challenges and you are the best possible grandmother to my precious daughters.

My brother, Anders, who has chosen a different life and career and sometimes has a hard time understanding my engagement in this field, but who I know is very proud of me.

Kristoffer, the father of my children, thank you for being an unconditionally loving and supporting parent and role model for our little daughters.

Lena Bengtsson, my dear aunt who is also a researcher and struggled through her doctoral studies long ago. Since I was little you have been a role model for independence, determination, spirituality, and natural sciences, to me.

My grandmother Gunvor Widinghoff, I miss you, and I believe you are all supporting me from Heaven!

My partner Björn who luckily came into my life in the exhausting late phase of this work and has been an unvaluable source of happiness and support. Thank you for loving me and providing me with wonderful food that I can't resist!

Desiree Joneken, my dearest friend and colleague, you have been by my side through the worst and the best times. 'There are friends who become family.'.

Sara Probert Lindström, my doctoral student-sister, you are the most wonderful friend, and I could never have wished for anyone better to share these years with. You know that you are irreplaceable to me, now and forever.

Simon Schmidbauer, my friend and colleague, undoubtedly deserves my gratitude; without you I would probably not have worked myself through the master thesis with such great success and ended up here! I look forward to celebrating your dissertation next year.

My friends, you know that you are always in my heart regardless of how often we get the chance to see each other. Lina, Joanna, Sussie, Emelie, Pia, Bella, Anders, and Stisse, love to all of you.

All my family and friends who care about me and take part in my life and my research – thank you!

Media-Tryck, Staffan Hellkvist in particular, thank you for being helpful and professional in the last critical time of the work with this thesis.

Finally, I want to thank Svenska Spel, Södra Sjukvårdsregionen, and Region Skåne, for the grants I have received.

Populärvetenskaplig sammanfattning

Hasardspel - spel som handlar om pengar eller motsvarande insatser - är en underhållningsform i kulturer världen över. I Sverige finns arkeologiska spår av spelande ända sedan järnåldern, och på medeltiden reglerades spelandet av strikta lagar med syfte att förhindra skadeverkningar och kriminella aktiviteter. För många människor är spel ett nöje, men för en del övergår rekreationen i kontrollförlust. Vid utveckling av spelberoende satsas allt högre summor, ofta i försök att vinna tillbaka tidigare förluster. Tillståndet karakteriseras, i likhet med beroende av alkohol eller narkotika, av negativa följder och oförmåga att minska eller sluta. Spelberoende kan ge svåra ekonomiska och psykiska konsekvenser på mycket kort tid, i synnerhet vid snabba spelformer på internet.

Regleringen av spel har skiftat genom tiderna, men i har Sverige mestadels varit relativt strikt fram till 1980-talet då spelindustrin kommersialiserades. I takt med att ny teknik och internet utvecklats, har spelindustrins vinster ökat kraftigt. År 2019 beräknades de globala vinsterna uppgå till 400 000 miljarder euro, vilket var en dubblering sedan början på 1900-talet. Baksidan var att en stor del av de satsade pengarna kom från personer med spelproblem. Nätcasino, nätpoker och livebetting utgör de spelformer som orsakar majoriteten av problemen i Sverige idag. Snabba spel, med kort tid från insats till resultat, och obegränsade möjligheter att öka insatserna, inverkar särskilt på hjärnans belöningssystem och har hög beroendepotential. År 2019 omreglerades den svenska spelmarknaden med syfte att öka kontrollen och spelansvaret, men många problem kvarstår.

Omkring 0,7 % av den svenska befolkningen beräknas uppfylla kriterierna för spelberoende vid en given tidpunkt, men över tid är det betydligt fler. Tillståndet är förknippat med mycket ångest och skam, och de flesta söker aldrig hjälp för sina problem. Den psykiatriska samsjukligheten är stor och personer med spelberoende löper kraftigt ökad risk att dö i förtid, bland annat i självmord. I den här avhandlingen presenteras fyra olika populationer: våldsbrottsdömda män, patienter som fått spelberoendediagnos inom specialistsjukvård, nätspelare och personer som sökt hjälp för beroendeproblematik hos socialtjänsten. De undersöktes med olika metoder, med avseende på spelproblem, psykiatrisk samsjuklighet och relaterade faktorer. Det övergripande syftet var att öka kunskapen kring spelberoende och psykiatrisk samsjuklighet, som ett led i förbättrat förebyggande och behandlande arbete.

Arbete 1

Enligt tidigare forskning är spelberoende vanligt bland kriminella, men det finns relativt lite kunskap om detta samband. Sannolikt föreligger en biologisk sårbarhet, där hög impulsivitet och riskbenägenhet har betydelse. Målet med denna studie var att undersöka förekomsten av spelberoende i en grupp unga våldsbrottsdömda män. Eventuella samband mellan spelberoende och andra psykiatriska diagnoser, sociodemografiska variabler och brottstyper undersöktes också. Datamaterialet kom från en redan genomförd studie, *the Development of Aggressive Antisocial Behavior Study*, och var sammanfattat i en databas. Totalt inkluderades 263 män mellan 18 och 25 års ålder. Diagnoserna hade ställts utifrån en psykiatrisk diagnosmanual och deltagarnas liv hade kartlagts genom intervjuer, frågeformulär och genomgångar av kriminalvårdens journaler.

Studien visade en hög förekomst av spelberoende, 16 %, och den psykiatriska samsjukligheten var omfattande. I hela den studerade gruppen hade 84,5 % minst en substansberoendediagnos. I spelgruppen var det vanligare med beroende av kokain, cannabis och anabola steroider. De spelberoende uppvisade också högre förekomst av antisocialt personlighetssyndrom och hade klarat grundskolan sämre än de övriga i studien.

Arbete 2 och 3

Stora befolkningsstudier från Folkhälsomyndigheten har visat att nätspelande om pengar ökat, parallellt med antalet personer som har allvarliga spelproblem. I Sverige finns omfattande register som kan underlätta kartläggningen av förekomsten av olika diagnoser. Arbete 2 och 3 utgår ifrån det svenska nationella patientregistret, som täcker diagnoser ställda i specialistsjukvården. Specialistsjukvården omfattar vård som ges på öppna mottagningar eller sjukhusavdelningar, men inte i primärvård (vårdcentraler). Patienter över 18 år som fått spelberoendediagnos i somatisk eller psykiatrisk specialistsjukvård mellan 2005 och 2016 inkluderades i studierna. I arbete 2 presenterades antalet som fått spelberoendediagnos årligen, samt vilka andra psykiatriska diagnoser de hade när diagnosen ställdes. I arbete 3 användes även läkemedelsregistret, för att få en bredare bild av samsjukligheten i gruppen. Läkemedelsregistret täcker all förskrivning av läkemedel, även från primärvården. Via analyser av vilka psykiatriska läkemedel som förskrivits i anslutning till spelberoendediagnoserna, presenterades en tolkning av deltagarnas psykiska hälsa före och efter att spelberoendediagnoserna ställts. Läkemedlen delades in i åtta kategorier, enligt ett internationellt klassificeringssystem; antiepileptika, antipsykotika, bensodiazepiner, lugnande, antidepressiva, centralstimulerande och beroendeläkemedel.

Arbete 2 hade 2 099 deltagare, varav 23 % kvinnor. Antalet patienter som vårdades för spelberoende ökade kraftigt under den studerade perioden, från 87 patienter år

2005, till 324 patienter år 2016. Sjuttiotre procent hade minst en annan samtidig psykiatrisk diagnos. Den mest förekommande samsjukligheten var ångest- och depressionssjukdomar, vilka var överrepresenterade hos kvinnor.

Arbete 3 hade 2 018 deltagare, varav 23 % kvinnor. Förskrivningen av samtliga psykiatriska läkemedelsgrupper ökade under den studerade perioden, och var högre än i den generella befolkningen. I anslutning till att spelberoendediagnoserna ställdes minskade förskrivningen av bensodiazepiner, medan förskrivningen av centralstimulantia ökade. Det var vanliga med förskrivning av antiepileptika, ångestdämpande, lugnande och antidepressiva läkemedel bland kvinnor.

Arbete 4

Kasinospel och sportsbetting är de dominerande problemen bland patienter som söker hjälp för spelberoende i Sverige idag, men det har saknats studier som analyserat kopplingen mellan nätspelande, spelproblem och överskuldsättning. I arbete 4 undersöktes eventuella samband mellan spelproblem, speltyper, kön, psykisk ohälsa och substansbruk genom en enkät som skickades ut till en web-panel via marknadsundersökningsföretaget Ipsos. Svar inhämtades från 1 004 individer som spelat på internetkasino eller -sportsbetting minst tio gånger det senaste året.

Resultaten visade att spel på nätkasino senaste månaden var tydligt associerat med kommande överskuldsättning och att ha haft skulder till kronofogden senaste året. I den studerade gruppen av nätspelare var spelproblem mer än dubbelt så vanligt hos kvinnor som hos män och kvinnorna hade också ett sämre psykiskt mående. Nio av tio nätspelare som hade tagit ett lån för att finansiera spel hade spelproblem eller förhöjd risk.

Arbete 5

Arbetet med avhandlingens sista studie inleddes redan 2016, då vi utvecklade en svensk version av ett intervjuverktyg, ASI Spel, som publicerades på Socialstyrelsens hemsida. Bakgrunden var att det fanns ett stort behov av systematiska instrument för bedömning och uppföljning av spelproblem. Inom socialtjänsten fanns kunskap och rutiner kring användning av Addiction Severity Index (ASI), ett utvärderat och standardiserat intervjukoncept för kartläggning av alkohol- och narkotikaberoende. ASI-intervjuerna omfattar beroendeproblematik och ytterligare sex relaterade livsområden: fysisk och psykisk hälsa, arbete och försörjning, rättsliga problem, problematik i släkten samt familj och umgänge. Varje ASI-område har en formel för ett sammanfattande mått som indikerar hur stort det aktuella hjälpbehovet är. ASI Spel är ett tillägg till standardintervjun och samtliga svar kodas in i en nationell databas avsedd för individuell uppföljning och forskning. Syftet med arbete 5 var att undersöka spelmönster och karakteristika hos personer

som sökte hjälp hos socialtjänsten för beroendeproblematik, samt spelformulärets användbarhet.

I de slutliga analyserna inkluderades 1 772 deltagare, varav 1 607 hade substansproblematik (alkohol och/eller narkotika) och 165 hade spelproblem. Totalt 28.6 % var kvinnor, och manligt kön var något vanligare i spelgruppen. Den mest rapporterade problematiska spelformen var nätcasino, och hjälpbehovet för spel skattades högt av både deltagare och intervjuare. Det var tydliga samband mellan intervjuarskattningarna och de sammanfattande måtten för spel. Samsjukligheten mellan spelproblem och substansproblem var stor, och spelgruppen rapporterade högre förekomst av akuta depressions- och ångestsymtom.

Betydelse

Förekomsten av spelproblem och psykiatrisk samsjuklighet var omfattande inom de undersökta grupperna. Nätcasino var en återkommande problematisk spelform, förekomsten av ångest- och depressionssymtom var hög bland problemspelare och risken för överskuldsättning var förhöjd. Dessa resultat var generellt förväntade, och belyste samvariationen av psykiatriska problem och den underliggande biologiska och sociala sårbarheten. Antalet patienter som fick spelberoendediagnos inom specialistsjukvård ökade markant sedan år 2005, men var totalt sett mycket lågt i förhållande till det antal som beräknas vara drabbade i hela befolkningen. De flesta spelberoende var män, men det fanns indikationer på att spelproblemen ökade bland kvinnor, vilka utgjorde en särskilt sårbar grupp med högre förekomst av ångest och depression.

Betydelsen av slutsatserna i avhandlingens fem studier kan delas upp i två principiellt skilda områden: prevention och behandling. När det gäller prevention, är screening en central del, och studierna kan ge ledning och bekräftelse av i vilka kontexter den är relevant att utföra; exempelvis i kriminalvården, i sjukvården och inom socialtjänsten. Det förebyggande arbetet behöver starta tidigt, särskilt i socialt utsatta miljöer. Policy-arbete är en viktig del av de preventiva insatserna, där de sårbara grupperna behöver lyftas fram ytterligare. Impulsivitet och dåligt psykiskt mående är exempel på faktorer som både kan föregå spelberoendet, och förvärras av det, och konsumentskyddet på den rådande marknaden är otillräckligt. Det vore angeläget att minska exponeringen via reklam och att begränsa insatsmöjligheterna för de mest beroendeframkallande spelen, och för att sedan utvärdera effekten av sådana åtgärder. I behandlande sammanhang är kan kunskapen om psykiatrisk samsjuklighet bidra till nya hypoteser och strategier för personanpassade insatser.

Som all forskning, har de presenterade studierna begränsningar. De flesta undersökningarna som gjorts här ger en ögonblicksbild, och inte ett longitudinellt perspektiv. Det behövs mer forskning för att studera förlopp och variationer över längre tid, och för att värdera eventuella insatser som utförs.

References

Abbott, M., Romild, U., & Volberg, R. (2018, Apr). The prevalence, incidence, and gender and age-specific incidence of problem gambling: results of the Swedish longitudinal gambling study (Swelogs). *Addiction, 113*(4), 699-707. https://doi.org/10.1111/add.14083

Abbott, M. W. (2020, Jul). Gambling and gambling-related harm: recent World Health Organization initiatives. *Public Health, 184*, 56-59. https://doi.org/10.1016/j.puhe.2020.04.001

Abbott, M. W., Romild, U., & Volberg, R. A. (2014, Dec). Gambling and problem gambling in Sweden: changes between 1998 and 2009. *J Gambl Stud, 30*(4), 985-999. https://doi.org/10.1007/s10899-013-9396-3

Alegria, A. A., Petry, N. M., Hasin, D. S., Liu, S. M., Grant, B. F., & Blanco, C. (2009, Mar). Disordered gambling among racial and ethnic groups in the US: results from the national epidemiologic survey on alcohol and related conditions. *CNS Spectr, 14*(3), 132-142. https://doi.org/10.1017/s1092852900020113

Allami, Y., Vitaro, F., Brendgen, M., Carbonneau, R., Lacourse, E., & Tremblay, R. E. (2017, Mar 07). A Longitudinal Empirical Investigation of the Pathways Model of Problem Gambling. *J Gambl Stud*. https://doi.org/10.1007/s10899-017-9682-6

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders: DSM-IV-TR*. American Psychiatric Publishing.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of psychiatric disorders* (5th ed. ed.). American Psychiatric Publishing.

Swedish Enforcement Authority. (2018). *Alla vill göra rätt för sig. Överskuldsättningens orsaker och konsekvenser.* https://www.kronofogden.se/download/18.44812de6133c5768d6780007930/1371144370107/Slutrapport+Alla+vill+g%C3%B6ra+r%C3%A4tt+f%C3%B6r+sig+januari+2008.pdf

Swedish Gambling Authority (2019b). *Spelpaus*. Retrieved November 8, 2021 from https://www.spelpaus.se

Awaworyi Churchill, S., & Farrell, L. (2020, Mar). Australia's Gambling Epidemic: The Role of Neighbourhood Ethnic Diversity. *J Gambl Stud, 36*(1), 97-118. https://doi.org/10.1007/s10899-019-09865-w

Balodis, I. M., Grilo, C. M., Kober, H., Worhunsky, P. D., White, M. A., Stevens, M. C., Pearlson, G. D., & Potenza, M. N. (2014, May). A pilot study linking reduced fronto-Striatal recruitment during reward processing to persistent bingeing following treatment for binge-eating disorder. *Int J Eat Disord, 47*(4), 376-384. https://doi.org/10.1002/eat.22204

Binde, P. (2014, Feb). Gambling in Sweden: the cultural and socio-political context. *Addiction, 109*(2), 193-198. https://doi.org/10.1111/add.12103

Bjorkenstam, C., Ekselius, L., Berlin, M., Gerdin, B., & Bjorkenstam, E. (2016, Dec). Suicide risk and suicide method in patients with personality disorders. *J Psychiatr Res, 83*, 29-36. https://doi.org/10.1016/j.jpsychires.2016.08.008

Blaszczynski, A., & Nower, L. (2002, May). A pathways model of problem and pathological gambling. *Addiction, 97*(5), 487-499. http://www.ncbi.nlm.nih.gov/pubmed/12033650

Bodor, D., Ricijas, N., & Filipcic, I. (2021, Sep 1). Treatment of gambling disorder: review of evidence-based aspects for best practice. *Curr Opin Psychiatry, 34*(5), 508-513. https://doi.org/10.1097/YCO.0000000000000728

Bramley, S., Norrie, C., & Manthorpe, J. (2019, Jul 19). The nature of gambling-related harm for adults with health and social care needs: an exploratory study of the views of key informants. *Prim Health Care Res Dev, 20*, e115. https://doi.org/10.1017/S1463423619000549

Calado, F., Alexandre, J., & Griffiths, M. D. (2016, Jul 02). Prevalence of Adolescent Problem Gambling: A Systematic Review of Recent Research. *J Gambl Stud*. https://doi.org/10.1007/s10899-016-9627-5

Carlbring, P., Degerman, N., Jonsson, J., & Andersson, G. (2012). Internet-based treatment of pathological gambling with a three-year follow-up. *Cogn Behav Ther, 41*(4), 321-334. https://doi.org/10.1080/16506073.2012.689323

Carlbring, P., Jonsson, J., Josephson, H., & Forsberg, L. (2010). Motivational interviewing versus cognitive behavioral group therapy in the treatment of problem and pathological gambling: a randomized controlled trial. *Cogn Behav Ther, 39*(2), 92-103. https://doi.org/10.1080/16506070903190245

Castren, S., Kontto, J., Alho, H., & Salonen, A. H. (2018, Jan). The relationship between gambling expenditure, sociodemographics, health-related correlates and gambling behaviour-a cross-sectional population-based survey in Finland. *Addiction, 113*(1), 91-106. https://doi.org/10.1111/add.13929

Davis, C. N., Slutske, W. S., Martin, N. G., Agrawal, A., & Lynskey, M. T. (2019, Jul). Genetic and environmental influences on gambling disorder liability: a replication and combined analysis of two twin studies. *Psychol Med, 49*(10), 1705-1712. https://doi.org/10.1017/S0033291718002325

Di Nicola, M., De Risio, L., Pettorruso, M., Caselli, G., De Crescenzo, F., Swierkosz-Lenart, K., Martinotti, G., Camardese, G., Di Giannantonio, M., & Janiri, L. (2014). Bipolar disorder and gambling disorder comorbidity: current evidence and implications for pharmacological treatment. *J Affect Disord, 167*, 285-298. https://doi.org/10.1016/j.jad.2014.06.023

Dowling, N. A., Cowlishaw, S., Jackson, A. C., Merkouris, S. S., Francis, K. L., & Christensen, D. R. (2015a, Dec). The Prevalence of Comorbid Personality Disorders in Treatment-Seeking Problem Gamblers: A Systematic Review and Meta-Analysis. *J Pers Disord, 29*(6), 735-754. https://doi.org/10.1521/pedi_2014_28_168

Dowling, N. A., Cowlishaw, S., Jackson, A. C., Merkouris, S. S., Francis, K. L., & Christensen, D. R. (2015b, Jun). Prevalence of psychiatric co-morbidity in treatment-seeking problem gamblers: A systematic review and meta-analysis. *Aust N Z J Psychiatry, 49*(6), 519-539. https://doi.org/10.1177/0004867415575774

Effertz, T., Bischof, A., Rumpf, H. J., Meyer, C., & John, U. (2018, Sep). The effect of online gambling on gambling problems and resulting economic health costs in Germany. *Eur J Health Econ, 19*(7), 967-978. https://doi.org/10.1007/s10198-017-0945-z

Ethier, A. R., Kim, H. S., Hodgins, D. C., & McGrath, D. S. (2020, Jun). High Rollers: Correlates of Problematic Cocaine Use Among a Community Sample of Gamblers. *J Gambl Stud, 36*(2), 513-525. https://doi.org/10.1007/s10899-020-09943-4

Ministry of Finance. (2018). Spelmarknadsutredningen (Fi 2018:03). *https://www.riksdagen.se/sv/dokument-lagar/dokument/kommitteberattelse/spelmarknadsutredningen-fi-201803_H6B2Fi03. Hämtad 2019-12-29.*

Ministry of Finance. (2020). *Ökat skydd och stärkt reglering på den omreglerade spelmarknaden. Slutbetänkande av spelmarknadsutredningen. SOU 2020:77.* https://www.regeringen.se/4aed3b/contentassets/4942818c09e14ab280d360ed3f1bbc64/okat-skydd-och-starkt-reglering-pa-den-omreglerade-spelmarknaden-sou-202077.pdf. Hämtad 2020-09-30.

First, M. (1997). *Structured Clinical Interview for DSM-IV Axis I Disorders: SCID-I: Clinician version: Administration booklet.* Washington, DC: American Psychiatric Press.

First, M., Gibbon M., Spitzer R., Williams JB., Benjamin LS. (1997). *Structured clinical interview for DSM-IV axis II personality disorders (SCID-II)* Washington, DC: American Psychiatric Press.

Forsström, D., & Samuelsson, E. (2018, March 22). Utbud av stöd och behandling för spelproblem. En studie om utmaningar inför förtydligat ansvar i lagstiftningen. Research Reports in Public Health Sciences. https://doi.org/10.17045/sthlmuni.6015458.v1

Furukawa, T. A., Kessler, R. C., Slade, T., & Andrews, G. (2003, Feb). The performance of the K6 and K10 screening scales for psychological distress in the Australian National Survey of Mental Health and Well-Being. *Psychol Med, 33*(2), 357-362. https://www.ncbi.nlm.nih.gov/pubmed/12622315

Gainsbury, S., Hing, N., & Suhonen, N. (2014a, Jun). Professional help-seeking for gambling problems: awareness, barriers and motivators for treatment. *J Gambl Stud, 30*(2), 503-519. https://doi.org/10.1007/s10899-013-9373-x

Gainsbury, S., Hing, N., & Suhonen, N. (2014b, 2014//). Professional help-seeking for gambling problems: awareness, barriers and motivators for treatment. *J Gambl Stud, 30*. https://doi.org/10.1007/s10899-013-9373-x

Gainsbury, S. M. (2015). Online Gambling Addiction: the Relationship Between Internet Gambling and Disordered Gambling. *Curr Addict Rep, 2*(2), 185-193. https://doi.org/10.1007/s40429-015-0057-8

Gillberg, C., Gillberg, C., Rastam, M., & Wentz, E. (2001, Mar). The Asperger Syndrome (and high-functioning autism) Diagnostic Interview (ASDI): a preliminary study of a new structured clinical interview. *Autism, 5*(1), 57-66. https://doi.org/10.1177/1362361301005001006

Goslar, M., Leibetseder, M., Muench, H. M., Hofmann, S. G., & Laireiter, A. R. (2019, Jun). Pharmacological Treatments for Disordered Gambling: A Meta-analysis. *J Gambl Stud, 35*(2), 415-445. https://doi.org/10.1007/s10899-018-09815-y

Goudriaan, A. E., Slutske, W. S., Krull, J. L., & Sher, K. J. (2009, Jul). Longitudinal patterns of gambling activities and associated risk factors in college students. *Addiction, 104*(7), 1219-1232. https://doi.org/10.1111/j.1360-0443.2009.02573.x

Grant, J. E., Odlaug, B. L., & Mooney, M. E. (2012, Nov). Telescoping phenomenon in pathological gambling: association with gender and comorbidities. *J Nerv Ment Dis, 200*(11), 996-998. https://doi.org/10.1097/NMD.0b013e3182718a4d

Guilcher, S. J., Bronskill, S. E., Guan, J., & Wodchis, W. P. (2016). Who Are the High-Cost Users? A Method for Person-Centred Attribution of Health Care Spending. *PLoS One, 11*(3), e0149179. https://doi.org/10.1371/journal.pone.0149179

Gyollai, A., Griffiths, M. D., Barta, C., Vereczkei, A., Urban, R., Kun, B., Kokonyei, G., Szekely, A., Sasvari-Szekely, M., Blum, K., & Demetrovics, Z. (2014). The genetics of problem and pathological gambling: a systematic review. *Curr Pharm Des, 20*(25), 3993-3999. https://doi.org/10.2174/13816128113199990626

Hakansson, A., Kostevski, A., & Ekblad, S. (2019, Jun). Gambling habits, gambling norms, and problem gambling in foreign born and native populations in Denmark - A general population survey. *Addict Behav Rep, 9*, 100183. https://doi.org/10.1016/j.abrep.2019.100183

Hakansson, A., Mardhed, E., & Zaar, M. (2017). Who Seeks Treatment When Medicine Opens the Door to Pathological Gambling Patients-Psychiatric Comorbidity and Heavy Predominance of Online Gambling. *Front Psychiatry, 8*, 255. https://doi.org/10.3389/fpsyt.2017.00255

Hakansson, A., & Widinghoff, C. (2019, Jun). Television gambling advertisements: Extent and content of gambling advertisements with a focus on potential high-risk commercial messages. *Addict Behav Rep, 9*, 100182. https://doi.org/10.1016/j.abrep.2019.100182

Hakansson, A., & Widinghoff, C. (2020a). Gambling Despite Nationwide Self-Exclusion-A Survey in Online Gamblers in Sweden. *Front Psychiatry, 11*, 599967. https://doi.org/10.3389/fpsyt.2020.599967

Hakansson, A., & Widinghoff, C. (2020b). Gender Differences in Problem Gamblers in an Online Gambling Setting. *Psychol Res Behav Manag, 13*, 681-691. https://doi.org/10.2147/PRBM.S248540

Hammersley, R. (1994, Mar). A digest of memory phenomena for addiction research. *Addiction, 89*(3), 283-293. https://doi.org/10.1111/j.1360-0443.1994.tb00890.x

Heiwe, S., Kajermo, K. N., Tyni-Lenne, R., Guidetti, S., Samuelsson, M., Andersson, I. L., & Wengstrom, Y. (2011, Apr). Evidence-based practice: attitudes, knowledge and behaviour among allied health care professionals. *Int J Qual Health Care, 23*(2), 198-209. https://doi.org/10.1093/intqhc/mzq083

Heiwe, S., Nilsson-Kajermo, K., Olsson, M., Gafvels, C., Larsson, K., & Wengstrom, Y. (2013). Evidence-based practice among Swedish medical social workers. *Soc Work Health Care, 52*(10), 947-958. https://doi.org/10.1080/00981389.2013.834029

Hellberg, S. N., Russell, T. I., & Robinson, M. J. F. (2019, 2019//). Cued for risk: evidence for an incentive sensitization framework to explain the interplay between stress and anxiety, substance abuse, and reward uncertainty in disordered gambling behavior. *Cogn Affect Behav Neurosci, 19*. https://doi.org/10.3758/s13415-018-00662-3

Hing, N., Russell, A. M., Gainsbury, S. M., & Blaszczynski, A. (2015). Characteristics and help-seeking behaviors of Internet gamblers based on most problematic mode of gambling. *J Med Internet Res, 17*(1), e13. https://doi.org/10.2196/jmir.3781

Hochberg, Y., & Benjamini, Y. (1990, Jul). More powerful procedures for multiple significance testing. *Stat Med, 9*(7), 811-818. https://www.ncbi.nlm.nih.gov/pubmed/2218183

Husky, M. M., Michel, G., Richard, J. B., Guignard, R., & Beck, F. (2015, Jun). Gender differences in the associations of gambling activities and suicidal behaviors with problem gambling in a nationally representative French sample. *Addict Behav, 45*, 45-50. https://doi.org/10.1016/j.addbeh.2015.01.011

IBM Corp. Released 2019. IBM SPSS Statistics for Windows, Version 26.0. Armonk, NY: IBM Corp

Ioannidis, K., Hook, R., Wickham, K., Grant, J. E., & Chamberlain, S. R. (2019, Jul). Impulsivity in Gambling Disorder and problem gambling: a meta-analysis. *Neuropsychopharmacology, 44*(8), 1354-1361. https://doi.org/10.1038/s41386-019-0393-9

Jansson, I. (2001). *Problem i sammanfattande mått i ASI* (2001:10). https://www.stat-inst.se/globalassets/publikationer/allmanna-rapporter/2001/2001-10--problem-i-sammanfattande-matt-i-asi.pdf

Johnson, E. E., Hamer, R., Nora, R. M., Tan, B., Eisenstein, N., & Engelhart, C. (1997, Feb). The Lie/Bet Questionnaire for screening pathological gamblers. *Psychol Rep, 80*(1), 83-88. https://doi.org/10.2466/pr0.1997.80.1.83

Jonsson, J., Hodgins, D. C., Munck, I., & Carlbring, P. (2020, Aug). Reaching out to big losers leads to sustained reductions in gambling over 1 year: a randomized controlled trial of brief motivational contact. *Addiction, 115*(8), 1522-1531. https://doi.org/10.1111/add.14982

Karlsson, A., & Hakansson, A. (2018, Dec 1). Gambling disorder, increased mortality, suicidality, and associated comorbidity: A longitudinal nationwide register study. *J Behav Addict, 7*(4), 1091-1099. https://doi.org/10.1556/2006.7.2018.112

Karlsson, T. (2020, Apr). Opinions on alcohol policy in Sweden. *Nordisk Alkohol Nark, 37*(2), 201-202. https://doi.org/10.1177/1455072520914456

Kendell, R., & Jablensky, A. (2003). Distinguishing between the validity and utility of psychiatric diagnoses. *Am J Psychiatry, 160*. https://doi.org/10.1176/appi.ajp.160.1.4

Langham, E., Thorne, H., Browne, M., Donaldson, P., Rose, J., & Rockloff, M. (2016, Jan 27). Understanding gambling related harm: a proposed definition, conceptual framework, and taxonomy of harms. *BMC Public Health, 16*, 80. https://doi.org/10.1186/s12889-016-2747-0

LaPlante, D. A., Nelson, S. E., LaBrie, R. A., & Shaffer, H. J. (2008, Jan). Stability and progression of disordered gambling: lessons from longitudinal studies. *Can J Psychiatry, 53*(1), 52-60. https://doi.org/10.1177/070674370805300108

Larkin, G. L., & Beautrais, A. L. (2010). Emergency departments are underutilized sites for suicide prevention. *Crisis, 31*(1), 1-6. https://doi.org/10.1027/0227-5910/a000001

Leifman, H., & Trolldal, B. (2014). *Hur mycket dricker svensken? – alkoholkonsumtionen i siffror 2001–2012* (140). C. Centralförbundet för alkohol- och narkotikaupplysning. https://www.can.se/app/uploads/2020/01/can-rapport-140-hur-mycket-dricker-svensken-1.pdf

Lesieur, H. R., & Blume, S. B. (1992). Modifying the addiction severity index for use in pathological gamblers. *The American Journal on Addictions, 1*(3), 240-247.

Lorains, F. K., Cowlishaw, S., & Thomas, S. A. (2011, Mar). Prevalence of comorbid disorders in problem and pathological gambling: systematic review and meta-analysis of population surveys. *Addiction, 106*(3), 490-498. https://doi.org/10.1111/j.1360-0443.2010.03300.x

Lord, C., Risi, S., Lambrecht, L., Cook, E. H., Jr., Leventhal, B. L., DiLavore, P. C., Pickles, A., & Rutter, M. (2000, Jun). The autism diagnostic observation schedule-generic: a standard measure of social and communication deficits associated with the spectrum of autism. *J Autism Dev Disord, 30*(3), 205-223. https://www.ncbi.nlm.nih.gov/pubmed/11055457

Ludvigsson, J. F., Andersson, E., Ekbom, A., Feychting, M., Kim, J. L., Reuterwall, C., Heurgren, M., & Olausson, P. O. (2011, Jun 9). External review and validation of the Swedish national inpatient register. *BMC Public Health, 11*, 450. https://doi.org/10.1186/1471-2458-11-450

Makela, K. (2004, Apr). Studies of the reliability and validity of the Addiction Severity Index. *Addiction, 99*(4), 398-410; discussion 411-398. https://doi.org/10.1111/j.1360-0443.2003.00665.x

McCarthy, S., Thomas, S., Pitt, H., Daube, M., & Cassidy, R. (2020, Oct). 'It's a tradition to go down to the pokies on your 18th birthday' - the normalisation of gambling for young women in Australia. *Aust N Z J Public Health, 44*(5), 376-381. https://doi.org/10.1111/1753-6405.13024

McCarthy, S., Thomas, S. L., Bellringer, M. E., & Cassidy, R. (2019a, Mar 4). Women and gambling-related harm: a narrative literature review and implications for research, policy, and practice. *Harm Reduct J, 16*(1), 18. https://doi.org/10.1186/s12954-019-0284-8

McCarthy, S., Thomas, S. L., Bellringer, M. E., & Cassidy, R. (2019b, 2019//). Women and gambling-related harm: a narrative literature review and implications for research, policy, and practice. *Harm Reduct J, 16*. https://doi.org/10.1186/s12954-019-0284-8

McCarthy, S., Thomas, S. L., Randle, M., Bestman, A., Pitt, H., Cowlishaw, S., & Daube, M. (2018, Apr 24). Women's gambling behaviour, product preferences, and perceptions of product harm: differences by age and gambling risk status. *Harm Reduct J, 15*(1), 22. https://doi.org/10.1186/s12954-018-0227-9

McCormack, A., Shorter, G. W., & Griffiths, M. D. (2014, Mar). An empirical study of gender differences in online gambling. *J Gambl Stud, 30*(1), 71-88. https://doi.org/10.1007/s10899-012-9341-x

McLellan, A. T., Kushner, H., Metzger, D., Peters, R., Smith, I., Grissom, G., Pettinati, H., & Argeriou, M. (1992). The Fifth Edition of the Addiction Severity Index. *J Subst Abuse Treat, 9*(3), 199-213. http://www.ncbi.nlm.nih.gov/pubmed/1334156

Melby, L., Indredavik, M. S., Lohaugen, G., Brubakk, A. M., Skranes, J., & Vik, T. (2020, Jan 30). Is there an association between full IQ score and mental health problems in young adults? A study with a convenience sample. *BMC Psychol, 8*(1), 7. https://doi.org/10.1186/s40359-020-0372-2

Meyer, G., Fiebig, M., Häfeli, J., & Mörsen, C. (2011). Development of an assessment tool to evaluate the risk potential of different gambling types. *International Gambling Studies, 11:2*, 221-236.

Moghaddam, J. F., Yoon, G., Campos, M. D., & Fong, T. W. (2015, Dec 15). Social and behavioral problems among five gambling severity groups. *Psychiatry Res, 230*(2), 143-149. https://doi.org/10.1016/j.psychres.2015.07.082

Mora-Salgueiro, J., Garcia-Estela, A., Hogg, B., Angarita-Osorio, N., Amann, B. L., Carlbring, P., Jimenez-Murcia, S., Perez-Sola, V., & Colom, F. (2021, Sep). The Prevalence and Clinical and Sociodemographic Factors of Problem Online Gambling: A Systematic Review. *J Gambl Stud, 37*(3), 899-926. https://doi.org/10.1007/s10899-021-09999-w

Muggleton, N., Parpart, P., Newall, P., Leake, D., Gathergood, J., & Stewart, N. (2021, Mar). The association between gambling and financial, social and health outcomes in big financial data. *Nat Hum Behav, 5*(3), 319-326. https://doi.org/10.1038/s41562-020-01045-w

Muller, K. W., Wolfling, K., Dickenhorst, U., Beutel, M. E., Medenwaldt, J., & Koch, A. (2017, Jun). Recovery, relapse, or else? Treatment outcomes in gambling disorder from a multicenter follow-up study. *Eur Psychiatry, 43*, 28-34. https://doi.org/10.1016/j.eurpsy.2017.01.326

Myles, D., Carter, A., & Yucel, M. (2019, Aug). Cognitive neuroscience can support public health approaches to minimise the harm of 'losses disguised as wins' in multiline slot machines. *Eur J Neurosci, 50*(3), 2384-2391. https://doi.org/10.1111/ejn.14191

Oksanen, A., Savolainen, I., Sirola, A., & Kaakinen, M. (2018, Sep 3). Problem gambling and psychological distress: a cross-national perspective on the mediating effect of consumer debt and debt problems among emerging adults. *Harm Reduct J, 15*(1), 45. https://doi.org/10.1186/s12954-018-0251-9

Orford, J. (2005). Complicity on the river bank: the search for the truth about problem gambling: reply to the commentaries. *Addiction, 100*(9), 1235-1239. https://doi.org/10.1111/j.1360-0443.2005.01219.x

Pachur, T., Hanoch, Y., & Gummerum, M. (2010, Oct). Prospects behind bars: analyzing decisions under risk in a prison population. *Psychon Bull Rev, 17*(5), 630-636. https://doi.org/10.3758/PBR.17.5.630

Papineau, E., Robitaille, E., Samba, C. P., Lemetayer, F., Kestens, Y., & Raynault, M. F. (2020, Jul). Spatial distribution of gambling exposure and vulnerability: an ecological tool to support health inequality reduction. *Public Health, 184*, 46-55. https://doi.org/10.1016/j.puhe.2020.03.023

Parhami, I., Siani, A., Rosenthal, R. J., & Fong, T. W. (2013, Jun). Pathological gambling, problem gambling and sleep complaints: an analysis of the National Comorbidity Survey: Replication (NCS-R). *J Gambl Stud, 29*(2), 241-253. https://doi.org/10.1007/s10899-012-9299-8

Petry, N. M. (2003, Jun). Validity of a gambling scale for the addiction severity index. *J Nerv Ment Dis, 191*(6), 399-407. https://doi.org/10.1097/01.NMD.0000071589.20829.DB

Petry, N. M. (2007, Jul-Aug). Concurrent and predictive validity of the Addiction Severity Index in pathological gamblers. *Am J Addict, 16*(4), 272-282. https://doi.org/10.1080/10550490701389849

Potenza, M. N. (2014a, Aug). The neural bases of cognitive processes in gambling disorder. *Trends Cogn Sci, 18*(8), 429-438. https://doi.org/10.1016/j.tics.2014.03.007

Potenza, M. N. (2014b, Jan). Non-substance addictive behaviors in the context of DSM-5. *Addict Behav, 39*(1), 1-2. https://doi.org/10.1016/j.addbeh.2013.09.004

Potenza, M. N., Balodis, I. M., Derevensky, J., Grant, J. E., Petry, N. M., Verdejo-Garcia, A., & Yip, S. W. (2019, Jul 25). Gambling disorder. *Nat Rev Dis Primers, 5*(1), 51. https://doi.org/10.1038/s41572-019-0099-7

Prescott, D. S. (2020, May 28). Motivational Interviewing: as Easy as It Looks? *Curr Psychiatry Rep, 22*(7), 35. https://doi.org/10.1007/s11920-020-01158-z

Rabe & Kobberstad (2021). Database: ASI Net-Klient. Provider: Råbe & Kobberstad, Trefasgatan 4, 721 30, Västerås, SWEDEN.

Rai, D., Hall, W., Bebbington, P., Skapinakis, P., Hassiotis, A., Weich, S., Meltzer, H., Moran, P., Brugha, T., Strydom, A., & Farrell, M. (2014, Jun). Estimated verbal IQ and the odds of problem gambling: a population-based study. *Psychol Med, 44*(8), 1739-1749. https://doi.org/10.1017/S0033291713002195

Raylu, N., & Oei, T. P. (2004, Jan). Role of culture in gambling and problem gambling. *Clin Psychol Rev, 23*(8), 1087-1114. https://doi.org/10.1016/j.cpr.2003.09.005

R Core Team (2019). A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. . https://www.R-project.org/.

Rossow, I. (2019, Apr). The total consumption model applied to gambling: Empirical validity and implications for gambling policy. *Nordisk Alkohol Nark, 36*(2), 66-76. https://doi.org/10.1177/1455072518794016

Siemens JC, K. S. The influence of online gambling environments on self-control. . *Journal Public Policy Mark. 2011;30:279–293*. https://doi.org/10.1509/jppm.30.2.279

Slabbert, I., Greene, M. C., Womersley, J. S., Olateju, O. I., Soboka, M., & Lemieux, A. M. (2020). Women and substance use disorders in low- and middle-income countries: A call for advancing research equity in prevention and treatment. *Subst Abus, 41*(1), 6-10. https://doi.org/10.1080/08897077.2019.1680481

Slutske, W. S. (2006, Feb). Natural recovery and treatment-seeking in pathological gambling: results of two U.S. national surveys. *Am J Psychiatry, 163*(2), 297-302. https://doi.org/10.1176/appi.ajp.163.2.297

Slutske, W. S., Eisen, S., True, W. R., Lyons, M. J., Goldberg, J., & Tsuang, M. (2000, Jul). Common genetic vulnerability for pathological gambling and alcohol dependence in men. *Arch Gen Psychiatry, 57*(7), 666-673. https://www.ncbi.nlm.nih.gov/pubmed/10891037

The Swedish Agency for Health Technology Assessment and Assessment of Social Services. (2016). Spel om pengar – Behandling med psykologiska metoder eller läkemedel vid beroende eller problemspelande. Stockholm: Statens beredning för medicinsk och social utvärdering (SBU). SBU-rapport nr 254. ISBN 9789185413973. https://www.sbu.se/sv/publikationer/sbu-bereder/spel-om-pengar--behandling-med-psykologiska-metoder-eller-lakemedel-vid-beroende-eller-problemspelande/

The Swedish Association of the Pharmaceutical Industry (2020). Pharmaceutical specialities in Sweden. Farmaceutiska specialiteter i Sverige, FASS. www.fass.se

The Swedish Government. (2020). Samordnade insatser vid samsjuklighet i form av missbruk och beroende och annan psykiatrisk diagnos eller närliggande tillstånd. Dir. 2020:68.

https://www.regeringen.se/49dc19/globalassets/regeringen/dokument/socialdepartementet/fokhalsa-och-sjukvard/samordnade-insatser-vid-samsjuklighet-i-form-av-missbruk-och-beroende-och-annan-psykiatrisk-diagnos-eller-narliggande-tillstand.pdf?TSPD_101_R0=088d4528d9ab2000ac2211f485d60b6dbe5222b298035ffa2bc639bf107eedc1639e36d2ee48cc3308db9a973014300078a271bf2c371b125540b8693a255c9b44d3f9c141769ec7a47f2a2ffa8e6a9a0988cb67234280434a45beaef4489b64

The Swedish National Board of Health and Welfare (2017). Håkansson, A., & Widinghoff, C. *ASI Spel*., https://www.socialstyrelsen.se/globalassets/sharepoint-dokument/artikelkatalog/kunskapsstod/2017-3-18-asi-spel-grund.pdf

The Swedish National Board of Health and Welfare. (2018). Behandling av spelmissbruk och spelberoende. Kunskapsstöd med rekommendationer till hälso- och sjukvården och socialtjänsten. https://www.socialstyrelsen.se/globalassets/sharepoint-dokument/artikelkatalog/kunskapsstod/2018-12-5.pdf

The Swedish National Board of Health and Welfare. (2020a). *Information för Patientregistret, registerår 2018, version 5*. https://www.socialstyrelsen.se/globalassets/sharepoint-dokument/dokument-webb/statistik/information-for-patientregistret-registerar-2018.pdf

The Swedish National Board of Health and Welfare. (2020b). *Statistic Database of National Drug Prescription*. Retrieved 20th of June from

The Swedish Public Health Authority. (2008). *Ojämlikhet och spel.* Retrieved October 8, 2021 from https://www.folkhalsomyndigheten.se/spelprevention/om-spelproblem/ojamlikhet/

The Swedish Public Health Authority. (2019). *Resultat från Swelogs 2018*. https://www.folkhalsomyndigheten.se/globalassets/livsvillkor-levnadsvanor/andts/spel/swelogs/resultat-swelogs-2018-2019.pdf

Spitzer, R. L. (1983, Sep-Oct). Psychiatric diagnosis: are clinicians still necessary? *Compr Psychiatry, 24*(5), 399-411. https://www.ncbi.nlm.nih.gov/pubmed/6354575

Stark, S., Zahlan, N., Albanese, P., & Tepperman, L. (2012, Sep). Beyond description: Understanding gender differences in problem gambling. *J Behav Addict, 1*(3), 123-134. https://doi.org/10.1556/JBA.1.2012.3.5

Statistics Sweden. (2018). Educational attainment of the population. https://www.scb.se/en/finding-statistics/statistics-by-subject-area/education-and-research/education-of-the-population/educational-attainment-of-the-population/.

Sulkunen, P., Babor, T. F., Cisneros Ornberg, J., Egerer, M., Hellman, M., Livingstone, C., Marionneau, V., Nikkinen, J., Orford, J., Room, R., & Rossow, I. (2021, Jan). Setting Limits: Gambling, Science and Public Policy-summary of results. *Addiction, 116*(1), 32-40. https://doi.org/10.1111/add.15241

Sundqvist, K., & Rosendahl, I. (2019a, Sep). Problem Gambling and Psychiatric Comorbidity-Risk and Temporal Sequencing Among Women and Men: Results from the Swelogs Case-Control Study. *J Gambl Stud, 35*(3), 757-771. https://doi.org/10.1007/s10899-019-09851-2

Sundqvist, K., & Rosendahl, I. (2019b, 2019//). Problem gambling and psychiatric comorbidity-risk and temporal sequencing among women and men: results from the Swelogs case-control study. *J Gambl Stud, 35*. https://doi.org/10.1007/s10899-019-09851-2

Svensson, J., & Romild, U. (2014). Problem Gambling Features and Gendered Gambling Domains Amongst Regular Gamblers in a Swedish Population-Based Study. *Sex Roles, 70*, 240-254. https://doi.org/10.1007/s11199-014-0354-z

Swann, A. C., Lijffijt, M., O'Brien, B., & Mathew, S. J. (2020). Impulsivity and Suicidal Behavior. *Curr Top Behav Neurosci, 47*, 179-195. https://doi.org/10.1007/7854_2020_144

Tavares, H., Zilberman, M. L., Beites, F. J., & Gentil, V. (2001, Summer). Gender differences in gambling progression. *J Gambl Stud, 17*(2), 151-159. https://doi.org/10.1023/a:1016620513381

Trevorrow, K., & Moore, S. (1998, 1998/12/01). The Association Between Loneliness, Social Isolation and Women's Electronic Gaming Machine Gambling. *Journal of Gambling Studies, 14*(3), 263-284. https://doi.org/10.1023/A:1022057609568

Tulsky, D. S., Saklofske, D. H., Wilkins, C., & Weiss, L. G. (2001, Dec). Development of a general ability index for the Wechsler Adult Intelligence Scale--Third Edition. *Psychol Assess, 13*(4), 566-571. https://www.ncbi.nlm.nih.gov/pubmed/11793899

Turner, N. E., Preston, D. L., McAvoy, S., & Gillam, L. (2013, Sep). Problem gambling inside and out: the assessment of community and institutional problem gambling in the Canadian correctional system. *J Gambl Stud, 29*(3), 435-451. https://doi.org/10.1007/s10899-012-9321-1

Turunen, E., & Hiilamo, H. (2014). Health effects of indebtedness: a systematic review. *BMC Public Health, 14*, 489-489. https://doi.org/10.1186/1471-2458-14-489

Valleur, M., Codina, I., Venisse, J. L., Romo, L., Magalon, D., Fatseas, M., Chereau-Boudet, I., Gorsane, M. A., Guilleux, A., Groupe, J. E. U., Grall-Bronnec, M., & Challet-Bouju, G. (2016, Jun). Towards a Validation of the Three Pathways Model of Pathological Gambling. *J Gambl Stud, 32*(2), 757-771. https://doi.org/10.1007/s10899-015-9545-y

Varghese, F. P., Charlton, S. R., Wood, M., & Trower, E. (2014, May). Temporal discounting and criminal thinking: understanding cognitive processes to align services. *Psychol Serv, 11*(2), 171-178. https://doi.org/10.1037/a0035004

Vittinghoff, E., & McCulloch, C. E. (2007, Mar 15). Relaxing the rule of ten events per variable in logistic and Cox regression. *Am J Epidemiol, 165*(6), 710-718. https://doi.org/10.1093/aje/kwk052

Wallinius, M., Delfin, C., Billstedt, E., Nilsson, T., Anckarsater, H., & Hofvander, B. (2016, Oct). Offenders in emerging adulthood: School maladjustment, childhood adversities, and prediction of aggressive antisocial behaviors. *Law Hum Behav, 40*(5), 551-563. https://doi.org/10.1037/lhb0000202

Wardle, H., Bramley, S., Norrie, C., & Manthorpe, J. (2019, Jun). What do we know about gambling-related harm affecting migrants and migrant communities? A rapid review. *Addict Behav, 93*, 180-193. https://doi.org/10.1016/j.addbeh.2019.01.017

Wardle, H., Keily, R., Astbury, G., & Reith, G. (2014, Mar). 'Risky places?': mapping gambling machine density and socio-economic deprivation. *J Gambl Stud, 30*(1), 201-212. https://doi.org/10.1007/s10899-012-9349-2

Wardle, H., Reith, G., Langham, E., & Rogers, R. D. (2019, May 8). Gambling and public health: we need policy action to prevent harm. *BMJ, 365*, l1807. https://doi.org/10.1136/bmj.l1807

Wechsler D. (2002). *WAIS-III, Wechsler Adult Intelligence Scale, technical manual.* 3. San Antonio, TX: Psychological Corporation.

Williams, R. J., Royston, J., & Hagen, B. F. (2005). Gambling and problem gambling within forensic populations: A review of the literature. *Criminal Justice and Criminal Behaviour, 32*(6), 665-689. https://doi.org/10.1177/0093854805279947

Wing, L., Leekam, S. R., Libby, S. J., Gould, J., & Larcombe, M. (2002, Mar). The Diagnostic Interview for Social and Communication Disorders: background, inter-rater reliability and clinical use. *J Child Psychol Psychiatry, 43*(3), 307-325. https://doi.org/10.1111/1469-7610.00023

Worhunsky, P. D., Malison, R. T., Rogers, R. D., & Potenza, M. N. (2014, Dec 1). Altered neural correlates of reward and loss processing during simulated slot-machine fMRI in pathological gambling and cocaine dependence. *Drug Alcohol Depend, 145*, 77-86. https://doi.org/10.1016/j.drugalcdep.2014.09.013

Wynne, H., & Ferris, J. (2001). *The Canadian Problem Gambling Index: Final Report*. O. C. C. o. S. A. (CCSA).

Yakovenko, I., Quigley, L., Hemmelgarn, B. R., Hodgins, D. C., & Ronksley, P. (2015, Apr). The efficacy of motivational interviewing for disordered gambling: systematic review and meta-analysis. *Addict Behav, 43*, 72-82. https://doi.org/10.1016/j.addbeh.2014.12.011

Yakowicz, W. (2021). U.S. Gambling Revenue To Break $44 Billion Record In 2021. *Forbes*. https://www.forbes.com/sites/forbes-personal-shopper/2021/10/08/coffee-tools/?sh=4720b6943741

Yuodelis-Flores, C., & Ries, R. K. (2019, Apr). Addiction and Suicide: A Review. *Focus (Am Psychiatr Publ), 17*(2), 193-199. https://doi.org/10.1176/appi.focus.17203