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# **HEALTHCARE WHEN THE BETS ARE OFF: SYMPTOMS, TRAJECTORIES AND TREATMENT OF INDIVIDUALS WITH GAMBLING DISORDER**

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# Healthcare when the bets are off: Symptoms, trajectories and treatment of individuals with gambling disorder

## Thesis for Doctoral Degree (Ph.D.)

By

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*To Kajsa, Tyra, Sanna and the rest of the herd.*

*If we knew what we were doing, it would not be called research, would it?*

Albert Einstein







# Popular science summary of the thesis

A proportion of individuals who gamble have difficulties controlling their gambling and experience negative consequences. At its worst, Problem Gambling (PG) can cause severe impairment in families and in social and working life and can be difficult to recover from. Within healthcare, the term Gambling Disorder (GD) is used to describe individuals having problems above the threshold of a clinical diagnosis and could be in need of treatment. Many of those developing GD also have other psychiatric disorders, such as depression, anxiety, or alcohol use disorders. There are effective treatments available, such as Cognitive Behavioral Therapy (CBT), but even with treatment, many find it difficult to control their gambling over longer periods of time. Researchers and clinicians need to gain better knowledge about the problem, its symptoms, and its consequences to improve the long-term outcome for those suffering.

To do this, we first need to find out more about those who have entered the healthcare system and map the treatments offered and those delivering treatment. Furthermore, two concepts that could be of importance for improving treatment outcomes that deserve to be explored are *gambling craving*, meaning the urge or strong desire to gamble when trying to abstain, and *emotion regulation*, knowing what emotions one experiences and how to influence them.

The current thesis comprises five studies. **Study I** address questions regarding sick leave among individuals with a GD diagnosis in healthcare. We investigated how sick leave evolved over six years, with the GD diagnosis registered at year three. When comparing individuals with GD to matched controls from the general population, we found that having GD was linked to an increased risk of being on sick leave and that this actually began the year before a diagnosis was registered. The results, however, indicated an uneven distribution with respect to females, those of older age, and those with symptoms of depression and anxiety showing a higher risk of being on sick leave.

In **Study II**, we mapped what treatments were available for GD and how counselors delivering treatment were experiencing their competence in working with clients presenting with PG. We found that CBT and Motivational Interviewing (MI) were the most common types of treatment offered. We also observed that the counselors had rather few clients with PG per month, a circumstance that was also connected to a sense of lower perceived legitimacy, adequacy, and willingness in their clinical work with clients with PG.

Moving towards qualitative studies, **Study III** was an in-depth interview study aiming to investigate the subjective experience of craving in addictive disorders and to explore what passes through the mind of an individual when experiencing craving. We interviewed individuals with GD and individuals with alcohol use disorder who had

recent craving experiences. We then transcribed and analyzed their responses according to thematic analysis. The participants described their cravings as most experienced as mental imagery, meaning mental representation of, for example, places or items, often as a picture or video in the mind. These imagery were often containing elements of anticipation and preparative rituals leading up to drinking or gambling behaviors. Those craving alcohol described more of a “wanting relief” content, whereas those craving gambling had more often an expectancy of gaining financial rewards. The findings might provide insights into how to advance the understanding of craving in relation to specific addictive behaviors and, in turn, possibly enhance the effectiveness of psychological treatment for addictive disorders.

**Study IV** evaluated the feasibility of emotion regulation strategies delivered as a group treatment for GD. We recruited patients with GD and offered them a treatment combining CBT with emotion regulation strategies. The participants improved on most outcomes assessed after treatment and at follow-up 12 months after treatment. Most of them had fewer symptoms of GD, spent less money on gambling, and had fewer symptoms of anxiety and depression. Most were satisfied and saw no ethical conflicts with the treatment. Some mentioned that increased individual tailoring and adding more sessions could improve the treatment. Since there was no control group, meaning participants could have improved due to reasons outside of treatment, we could not conclude that the treatment was effective. Nevertheless, incorporating emotional regulation strategies in the treatment is feasible in this patient group and within the clinical context and deserves further investigation.

And finally, during the early phase of the Covid-19 pandemic, researchers, clinicians, and the public raised concerns about whether the restrictions and changes in everyday life could lead to an increase in addictive behaviors, among them PG. **Study V** was not a part of the original doctoral plan but was initiated shortly after the outbreak of the Covid-19 pandemic. We recruited participants through social media and via the National Gambling Helpline in Sweden and surveyed them regarding gambling, PG, mental health, and how the pandemic was impacting their life. We did not find any significant associations between pandemic consequences and gambling, but those who experienced an increase in worries concerning their mental health (due to the pandemic) and those who initiated high-risk games, mainly online casino, reported more PG during the pandemic.

# Abstract

Gambling Disorder is a debilitating condition associated with several adverse outcomes. Despite available treatment, most of those suffering never seek help and those that do often present a complex clinical picture with a long duration of gambling problems and additional psychiatric disorders. Currently, there are several gaps in knowledge about this patient population, the care provided within addiction services, and the long-term consequences for these individuals in terms of functionality and work life. The current thesis, therefore, aims to address some of these gaps, with the goal of increasing knowledge about the patient group and improving treatments.

In addition, when disseminating scientifically evaluated treatment to clinical practice, the problem gambling counselor plays an important role. What treatments are actually offered, by whom, and the role of the counselor has not previously been explored. Moreover, factors contributing to the development and maintenance of GD have been proposed and deserve further investigation; gambling cravings and difficulties in emotion regulation.

Therefore, the overall aim of this thesis is to map the harms of GD, the treatment available and the characteristics of those delivering it, and track changes in gambling during the Covid-19 pandemic. Furthermore, the thesis aims to explore individual factors contributing to maintaining the disorder, i.e., craving and difficulties in emotion regulation.

**Study I** is a case-cohort study using merged national registries to investigate GD's association with work disability and trajectory groups in a longitudinal design over a six-year period. The results showed that GD is associated with an increased risk of work disability over a four-year period, starting the year before diagnosis and peaking at the time of diagnosis (AOR = 1.89, 95% CIs = 1.67–2.13). The risk was unevenly distributed: females, those with psychiatric comorbidities or having medicated for psychiatric symptoms, and older individuals were at higher risk of work disability. The results add knowledge to what social and financial harms are associated with GD.

**Study II** maps available treatment in a cross-sectional study surveying practicing PG counselors. This study found that CBT and MI are the most frequently offered treatments and that treating more clients monthly is associated with higher *adequacy* (OR = 1.49, 95% CIs = 1.12–1.95), *legitimacy* (OR = 1.38, 95% CIs = 1.08–1.75), and *willingness* (OR = 1.95, 95% CIs = 1.49–2.61) in their role as PG counselors. Standard CBT techniques and addressing motivation were rated as the most important to include in treatment. Notable, most PG counselors (>70%) saw fewer than two clients monthly with PG.

**Study III** is a qualitative study applying thematic analysis to interviews of individuals with GD or alcohol use disorder, all with recent experiences of craving, and exploring content and modes of thought when craving. Participants described their cravings as dominated by mental imagery often involving positive content of anticipation, carrying out the addictive behavior or expected outcomes. Craving for alcohol was more related to seeking relief and craving for gambling to gain financial assets.

**Study IV** evaluated the feasibility of a transdiagnostic intervention, emotion regulation-enhanced CBT, among treatment seekers in addiction care using a mixed methods design. Participants improved on gambling outcomes: a decrease in symptoms of GD from a pretreatment mean of 7.0 to 2.1 at 12 months follow-up and a reduction in gambling expenditure and comorbid symptoms of depression and anxiety. In addition, participants rated the treatment high in acceptance and credibility, and interviews indicated that individual tailoring and prolongation as potential improvements. Adding emotion regulation to the treatment of GD is feasible and deserves further investigation.

**Study V** investigated changes in gambling behavior during the Covid-19 pandemic in a cohort recruited from social media and a gambling helpline. We did not find associations between pandemic restrictions and increased problem gambling, worries about mental health due to the pandemic ( $OR = 2.85, p < 0.001$ ), and initiating high-risk gambling formats ( $OR = 7.44, p < 0.001$ ), such as online casino, were associated with PG. We did not observe any significant migrations between gambling formats despite the change in availability during the initial phase of the pandemic.

In conclusion, the findings demonstrate that GD is associated with an elevated risk of work disability, CBT and MI are treatments available, but PG counselors seem to lack important clinical practice; cravings are often experienced as mental imagery of anticipation, and emotion regulation could be added to the clinical toolbox in the treatment for GD and deserves further investigation. In addition, Swedish pandemic restrictions did not seem to have been linked to increased gambling, but those initiating a high-risk gambling format or being worried about their mental health during the pandemic were more likely to develop PG.

# List of scientific papers

- I. **Månsson, V.**, Pettersson, E., Mittendorfer-Rutz, E., Guterstam, J., Berman, A.H., Jayaram Lindström, N., Molero, Y. Associations between gambling disorder and work disability: a longitudinal nationwide case-cohort study in Sweden. Manuscript submitted.
- II. **Månsson, V.**, Samuelsson, E., Berman, A.H. Nilsson, A. Treatment for problem gambling and counselors' perception of their clinical competence: a national web survey in Sweden. *Addiction Science and Clinical Practice* 17, 70 (2022).  
<https://doi.org/10.1186/s13722-022-00347-w>
- III. **Månsson, V.**, Andrade, J., Jayaram-Lindström, N., & Berman, A. H. (2022). "I see myself": Craving imagery among individuals with addictive disorders. *Journal of Addictive Diseases*, 1-14.  
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- IV. **Månsson, V.**, Molander, O., Carlbring, P., Rosendahl, I., & Berman, A. H. (2022). Emotion regulation-enhanced group treatment for gambling disorder: a non-randomized pilot trial. *BMC psychiatry*, 22(1), 1-13.  
<https://doi.org/10.1186/s12888-021-03630-3>
- V. **Månsson, V.\***, Wall, H.\*, Berman, A. H., Jayaram-Lindström, N., & Rosendahl, I. (2021). A Longitudinal Study of Gambling Behaviors During the COVID-19 Pandemic in Sweden. *Frontiers in psychology*, 12.  
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## CONTRIBUTIONS TO THE PUBLIC DOMAIN

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## List of abbreviations

AOR	Adjusted Odds Ratio
AUD	Alcohol Use Disorder
CBT	Cognitive Behavioral Therapy
CEQ	Craving Experience Questionnaire
CI	Confidence Interval
CSQ	Client Satisfaction Questionnaire
DSM 5	Diagnostic and Statistical Manual of mental disorders, 5 <sup>th</sup> edition
G-SAS	Gambling Symptoms Assessment Scale
GD	Gambling Disorder
ICD 11	International Classification of Diseases, 11 <sup>th</sup> revision
OR	Odds Ratio
PG	Problem Gambling
PG counselor	Problem Gambling counselor
PGSI	Problem Gambling Severity Index
RCT	Randomized Controlled Trial
SAAPPQ	Short Alcohol and Alcohol Problems Perception Questionnaire
TAQ	Treatment Acceptability Questionnaire



# Introduction

I can recall the sound of coins hitting the metal tray, the carpeted floor, and the myriads of colored lamps signaling excitement about to happen. The cruise ship casino was magical in a sense, not like anything else. My friend Daniel won big on a trip to Germany in the mid-90s. The proudness on his face when he paraded down the hallway with his plastic bag filled with coins. Rich and joyful. He truly was the lucky one. I can also recall the blank faces of the slot machine players invisibly tied to the slot machines, chain-smoking while repeatedly entering coins and pushing the button. There was also a vague feeling of sadness in the air, in contrast to the joy and excitement the machines signaled.

The rumor had it that Daniel, the slot machine winner, came from a “messy” home with a single mother struggling to provide for her children. Daniel sometimes showed up late to sports practice, at times without proper shoes. On that trip, where he won big, he seemed to find gambling opportunities at any possible place, at diners and supermarkets. Suddenly, he was gone and then found somewhere in the corner of the restaurant by a slot machine. Later in his teens, he drifted away from school and towards involvement in criminal activities.

Fast-forward some ten years. I, a young adult at the blackjack table, experienced an uncontrollable excitement when the cards were dealt. Brief thoughts passed through my consciousness: what if this could be a way to earn money? What if I did not have to accept jobs I disliked, such as driving a truck in a warehouse, and could earn the same amount and enjoy myself while doing it? I recall the excitement before the hand was dealt, but also how fast my markers were swept away by the dealer. The feeling of emptiness and numbness afterward, contemplating what had happened, trying to “learn from the game.”

Fast-forward another 8 years, as a psychology student in my room in front of four Texas Hold Em poker tables on my laptop computer. Online gambling had arrived, and poker games were now offered in the comfort of your home. For some, online poker seemed as a realistic career opportunity. Poker, the game that encompasses competencies in statistics and in analyzing peoples’ behaviors, making predictions, and being able to spot a bluff. I used to enjoy showing up at live poker games, introducing myself as a psychology student, and instantly receiving some vague expectations of my skills at the table. “You know we (psychologists, or really, psychology student at the time) cannot read other people’s minds,” I claimed, but at the same time wanted to induce a bit of doubt regarding this.

Some got rich during those early days of internet gambling. These stories were told, about how a tight and aggressive playing style could get you anywhere. Poker players

got sponsorship from gambling operators, and tournaments received many viewers. "He bought a car from his tournament wins" and "leave the monotony of working 9 to 5!" were narratives told. Stories of success and gained autonomy. A friend told me his best advice to get rich during those early days of internet poker: "Stay awake, be sober when people return from the pub at night and go online to play poker against them. Play a tight game and let them be aggressive". That's when he made his best money, he said.

The stories of those at the losing end were seldom told. The ones that went online after many drinks, played poker, and lost money they really couldn't afford to lose. Those waking up with a double hangover from drinking and gambling, being able to recover from the alcohol but not knowing how to restore the finances. Or those returning to the table the next day to "get even," to "make things right," and get that money that "belongs to them." Those concealing, hiding, or even outright lying about what's going on until revealed by a friend or family member and having to "confess." Or the "Daniels", that did not have solid ground under their feet and where gambling, alcohol or drugs opened the door to something else.

When my uncle was in his final year after an incurable cancer diagnosis, one thing that kept him alert and offered a break from his illness was betting on horses. Every week he and his two male friends discussed over the phone, determining what horses to bet on and debating the tracks and the horses. Bets were small; 500 SEK could keep their betting firm up and running for several months. As somewhat stereotypical males, picking up the phone and calling each other was not something they were used to doing or perhaps even knew how it was done. But getting in touch and sorting out how to place this week's bets was a task worthy of a call! Gambling can be that. It can bring people together and introduce joy and excitement to people's life. This thesis is not about that, though.

This thesis is dedicated to those that lost control but decided to seek help. Those that stole their children's savings for "one last bet" and then lied about it. And, despite shame and embarrassment, not having money for the bus ticket, being on a waiting list, and not knowing if treatment would help, still sought help and were willing to undertake the steps towards a change. This thesis is about how that help could be improved.

*Viktor Månsson, Falun, March 2023*

# 1 Literature review

What harms are experienced by individuals who develop PG? How can the disorder be better understood? And how can we improve treatment outcomes for those with severe problems?

These questions are guiding the literature review and the studies included in this thesis. Although the questions appear simple, answering them is extensive work. A scientific endeavor must include a demarcation, a focus of the spotlight. This is a challenge when it comes to gambling and the psychiatric diagnosis of GD. Not only because gambling is an activity that most have tried at least once in their lifetime and is accepted in most societies. But also, the proportion of PG in society depends on factors on many levels. Laws, regulations, and social norms are of importance, as well as treatment availability, psychological and socioeconomic factors, and the brain's anatomy and neurotransmitters. This is hardly the case for most psychiatric disorders. One demarcation for the thesis, however, is that it deals with the minority seeking treatment for this specific disorder and, simultaneously acknowledging the huge treatment gap where most are dealing with their problems outside of healthcare.

## 1.1 Problem Gambling

Gambling can be defined as risking something of value, most often money or other valuables, on an event with an uncertain outcome. The anticipation of a reward and predicting future events seem to engage humans profoundly. Wagering money or material goods is an ancient pastime, illustrated by archeological findings of dice in caves dating from 3500 BCE, but has not been practiced in all cultures and has been utilized in various ways (Binde, 2005a; Hodgins et al., 2011). For gambling to take place, there needs to be commercial money or goods that can be exchanged, inequality in societies, and a culture that promotes risk-taking. For some, gambling can offer experiences of meaningfulness and a sense of competence and skillfulness. For others, it can distract from the monotony of everyday life and can appear as a quick route to financial assets. A lack of acceptance of the randomness in certain games seems important: humans want to see patterns and make predictions based on them.

PG has been described on a continuum, ranging from occasional episodes of spending more than intended to years of disordered gambling with devastating consequences on health and personal finances (Hodgins et al., 2011). The severity of past year's PG is often based on the number of items endorsed in the *Problem Gambling Severity Index* (PGSI), divided into the categories "no gambling problems," "at-risk gambling," "problem gambling," and "severe problem gambling" (Binde, 2005b; Ferris & Wynne, 2001). However, concerns have been raised about whether these intervals represent a true categorization of different levels of PG. Research indicates that the instrument only allows for a dichotomous categorization of PG, those scoring below or above 5 points on the scale (Binde et al., 2017; Williams & Volberg, 2014) and is not suitable for detecting at risk PG (Molander & Wennberg, 2022). Also, analysis of how individuals are distributed across the continuum shows that they more commonly cluster towards the ends, and there are difficulties discriminating between the proposed levels of severity (Strong & Kahler, 2007). However, the term PG with several levels of severity is commonly used in prevalence studies, such as the Swedish Longitudinal Gambling Study (SWELOGS) (Abbott et al., 2018).

A review concluded that the lifetime past year prevalence of PG worldwide lies between 0.2% and 5.8% worldwide (Calado & Griffiths, 2016). The large interval is due to discrepancies in how PG is measured, regional gambling legislation, availability, and cultural acceptance of gambling. The most recent prevalence study in Sweden, SWELOGS, estimated that 0.5% of Swedes had severe PG in the previous 12 months, and a total of 1.3% can be classified as having PG, including the more severe category (Public Health Agency, 2022). This study also concludes that PG is more common among males, in particular young males, and that the proportion of gambling online continues to grow.

## 1.2 Gambling Disorder

At the severe end of PG is the clinical diagnosis of Gambling Disorder (GD), outlined in The Diagnostical and Statistical Manual . Following years of research that highlighted that there were similarities between pathological gambling, defined as an impulse control disorder, and substance use disorders, GD was then re-classified as an addiction in the 5<sup>th</sup> version of DSM in 2013. This marked the first time a behavior not involving the intake of a substance was officially classified as an addictive disorder, acknowledging the overlap in the clinical features between substance-induced addictions and behavioral addictions such as GD. The DSM 5 lists nine criteria of the disorder, a mixture of symptoms of dependency, behaviors, and negative consequences stemming from gambling (paraphrased in the Table 1):

**Table 1.** DSM 5 symptoms of Gambling Disorder.

- 
- 1) development of tolerance, i.e., needs to gamble for more money to achieve the same effect
  - 2) irritability and restlessness when trying to cut down
  - 3) repeated unsuccessful attempts to quit or cut back
  - 4) being preoccupied with gambling
  - 5) often gambles when emotionally distressed
  - 6) chasing losses
  - 7) lying about one's gambling
  - 8) jeopardized career or relationships
  - 9) relies on others financially due to gambling debts
- 

*Note.* The diagnosis is met if the gambling has caused clinically significant impairment within the past 12 months and at least four out of the nine criteria are met.

The corresponding diagnostic system by the World Health Organization, the International Classification of Diseases, 11th revision (ICD–11), is not based on the number of criteria endorsed. The ICD–11 describes a phenotype with impaired control over gambling that gives increased priority to gambling and continues or escalates gambling despite negative consequences (World Health Organization, 2018). In the diagnostic assessment, there is no threshold for the number of gambling sessions or monetary spending used. This is since the money one can afford to lose is related to the individual's disposable income and savings and thus varies widely. On a population level, longitudinal studies show that those gambling more than eight times per month and

above 1.7% of their net income were four times more likely to report harm from gambling (Currie et al., 2017). A recent study using data from a Norwegian operator reported similar cutoffs: 8.7 gambling days per month and less than 118–140 euros a month spent on gambling (Jonsson et al., 2022), but harm can be experienced at lower levels of gambling.

A note on terminology going forward. This thesis will use the term GD when referring to individuals who could be offered assessment and interventions within healthcare. The broader term PG also includes individuals with less severe problems that could be the focus of preventive actions. In addition, PG will also be applied to those seeking help at an organization that does not conduct diagnostic assessments, such as a helpline and some municipality services.

### **1.3 Harms from Problem Gambling**

The harms from PG are multifaceted and affect both individuals who gamble and their families. A conceptual framework presents a definition of harms from gambling in the following domains: financial, relationship disruption, emotional and psychological distress, negative impact on health, reduced performance at work or in studies, and risk of criminal activity (Langham et al., 2015). Harms can be in the form of a legacy that continues to impact the individual even after gambling stops, such as financial debts or separation. Help-seeking typically occurs when an individual experiences a significant level of harm in one or more domains, e.g., a personal crisis.

#### **1.3.1 Psychiatric comorbidity**

Psychiatric symptoms, apart from GD, can be observed both as preceding and following GD. As GD is seldom an isolated disorder among those who seek treatment, many are already enrolled in treatment for other psychiatric disorders. In a systematic review, the most frequent comorbid psychiatric diagnoses among individuals seeking treatment for GD were:

- 1) mood disorders (23.1%, 95% Confidence Intervals[CI] = 14.9 – 34.0),
- 2) alcohol use disorder (21.2%, 95% CI = 15.6 – 28.1),
- 3) anxiety disorders (17.6%, 95% CI = 10.8 – 27.3) (Dowling et al., 2015).

A study using Swedish health registers confirmed the high rates of psychiatric comorbidity, where 73% of patients with GD had at least one comorbid diagnosis, and even more prevalent among women (77%) (Håkansson et al., 2018). Whether the psychiatric comorbidity is a consequence of years of GD or if comorbidity precedes GD is unclear, and both scenarios can apply. Nevertheless, a scoping review concludes that, regardless of type, having a comorbid psychiatric condition was associated with exacerbated PG; i.e., comorbidity could indicate the severity of GD (Yakovenko & Hodgins, 2018).

One reason for the significant prevalence of comorbid disorders is that many seek treatment for GD at a late stage when the problems are typically at their worst, commonly during a personal crisis. In a sample of 347 individuals with GD, patients had, on average, eight years of PG before entering the treatment (Petry, 2003), and in a study aggregating data from 448 individuals with GD, the mean duration of illness reported was more than ten years at treatment initiation (Medeiros et al., 2017). In continuation,

treatment-seeking for individuals with GD often co-occurs with legal consequences, suicidal ideations, or attempts where gambling has commonly reached the most severe stage possible (Evans & Delfabbro, 2005). Crisis in the relationship with a partner is also a common reason for treatment-seeking, and more than one-third of individuals with PG report being either victims or perpetrators of intimate partner violence (Dowling et al., 2016).

### **1.3.2 Harms on job and education**

As outlined in the diagnosis section, GD can also cause harm in work and educational activities. The literature has mainly described work-related harms such as increased absenteeism, lost career opportunities, and loss of productivity due to gambling (Castrén et al., 2018; Downs & Woolrych, 2010; Jacob et al., 2022). As gambling is socially accepted and highly available online, PG can endure at work undetected. Acknowledging having PG and its influence on work performance is not common due to embarrassment and financial incentives. An increased risk for having at least one period of sick leave has been observed among those with registered diagnoses in healthcare, in particular among females with a five-fold increase (Larsson & Håkansson, 2022). Estimates might not be accurate, though, due to insufficient adjustment for confounding factors, i.e., psychiatric comorbidities might be linked to increased risk of both GD and sick leave. Previous exploratory studies have reported that of individuals with GD, almost half reported that their gambling caused high rates of sick leave (Bergh & Kùhlhorn, 1994).

## **1.4 Societal factors**

The availability and practice of gambling vary across countries and cultures. In most countries, gambling is a legal activity but organized differently. In some countries (e.g., China and Japan), most forms of gambling are illegal and are only allowed in certain regions (e.g., Macau in China). In addition, countries (e.g., Norway) can have state-owned monopolies, while others (e.g., Sweden, Denmark, and the UK) have a license-based system allowing gambling operators to enter the market through state-issued licensing (Sulkunen et al., 2021). In the Nordic countries, gambling has transitioned from being mainly land-based to online gambling using smartphones or computers in the past 15–20 years (Pallesen et al., 2021). This has increased the availability, and citizens can now access gambling at any place, at any time. Recent legislative changes have considerably increased the responsibility to reduce PG for those offering gambling (Ministry of Finance, 2018). These strategies include referring to options to self-exclude, setting time and money limits on gambling, and offering screening for PG and referral to helplines.

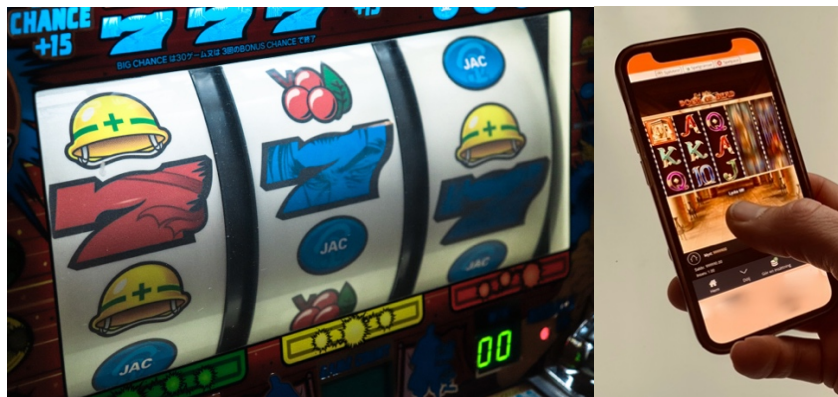
### **1.4.1 Gambling in Sweden**

Despite the increased availability of gambling opportunities, participation in gambling in Sweden has seemed to slowly decline. In 2018, the Swedish public health agency reported that about 58% of Swedes reported having gambled at least once a year, compared to 71.6% in 2009 and 88% in 1998 (Abbott et al., 2014, 2018; Public Health Agency, 2022). Swedes spend an average of about 3% of their household disposable income on gambling. However, this proportion does not apply to many individuals, given the extreme variations in expenditure, and many do not gamble at all. The reduction in overall gambling, in parallel with increased gross revenues, describes a polarization in that those who gamble do so for a considerably greater amount of money. In 2021 there was a gross gaming revenue (GGR) among those operators with a license in Sweden for (GGR) SEK: 26030 million SEK. This would yield a mean expenditure per inhabitant of



3150 SEK a year (Swedish Gambling Authority, 2022b). In addition to these figures, there is also an unknown amount of money placed on bets with unlicensed operators. In January 2019, the Swedish gambling market underwent a reorganization with a state-controlled issuing and monitoring of licenses for gambling operators. This has facilitated the self-exclusion process from all licensed gambling and fueled the debate regarding responsible gambling and advertisement. As of December 20<sup>th</sup>, 2022, 83611 Swedes were self-excluded from licensed gambling, among those quite possibly many with PG (Swedish Gambling Authority, 2022a).

#### 1.4.2 What makes a game risky?



**Figure 1.** Slot machine and online casino in mobile phone. ©DEAR Unsplash

The slot machine can be depicted as the prototype for the most potent reinforcement schedule invented by humankind. The random ratios, with rewards unevenly distributed in size and intervals, stimulate maximal attention and activity. The father of modern behaviorism, Burrhus Fredric Skinner, was recognizing this as he wrote in his book *Beyond Freedom and Dignity*, (Skinner 2002):

A gambling enterprise pays people for giving it money – that is, pays them when they make bets. But it pays on a kind of schedule which sustains betting even though in the long run, the amount paid is less than the amount wagered. At first, the mean ratio may be favorable to the bettor; he ‘wins’. But the ratio can be stretched in such a way that he continues to play even when he begins to lose. The stretching may be accidental (an early run of good luck which grows steadily worse may create a dedicated gambler). In the long run the ‘utility’ is negative: the gambler loses all (p.35).

Through these intermittent reinforcement schedules, Skinner commented that “trivial events can become highly important” (Skinner 1948, p. 179) but do not necessarily lead to increased survival chances for the species or to the flourishing of arts, sciences, and technology. Furthermore, in an ironic named research article, he showed how these reinforcement schedules could invoke “superstitious” behavior among pigeons (Skinner, 1948), where the pigeon associated a random behavior with the reward, i.e., food pellets. This association causes a reinforcing effect on the pigeon's behavior, and the pigeon thus repeats it to “increase” the chance of receiving the reward. The work of Skinner is highly relevant in understanding the addictive potential of gambling and its reinforcing effect on behavior.

The advent of online gambling has fast-forwarded gambling into a digital age. Within the last two decades, operators have offered 24-hour available online casinos and sports betting at the reach of a smartphone. Gambling formats that are quick, continuous, and highly available have been associated with a larger proportion of their users developing PG (Binde et al., 2017; Wall et al., 2021). Moreover, the games maximize the random ratio schedules, "losses disguised as wins," "near misses," and "illusion of control," all psychological features affecting decision-making (Murch & Clark, 2016).

In a study of treatment-seeking individuals with GD in Swedish addiction care, 84% reported that online casino or online sports betting was their most problematic form of gambling (Håkansson et al., 2017). However, it is not the games per se that create an increased risk but rather their structural characteristics, as researchers have argued (Griffiths & Auer, 2013). For example, a slot machine would be considered a low-risk game if one could place one bet weekly and a two-hour delay between the bet and the outcome. But combining the availability, unlimited bets, and short intervals between bets and outcomes makes a risky design. Moreover, the possibility to gamble anywhere has attracted a new type of consumer. Although gambling has historically been a male activity, recent Swedish population studies show a slight increase in PG among middle-aged women (Public Health Agency, 2019). Some of them have been described as naïve to gambling and develop GD through gambling on high-risk games such as online casinos (Håkansson & Widinghoff, 2020).

### **1.4.3 The Covid-19 pandemic's impact on gambling**

On the societal level, one unforeseen event needs to be covered. In the spring of 2020, the world was paused due to the spread of the new coronavirus. Several countries went into full or partial lockdown and disseminated either recommendations or forced restrictions to limit the spread of the virus. These restrictions also had an impact on gambling availability in Sweden.

Between March and July of 2020, most sports events, such as football or ice hockey, were either paused or canceled, leading to almost no conventional sports betting objects available. This circumstance might cause individuals who gamble regularly to switch to other types of gambling formats, such as going from sports betting to casino games. Simultaneously, citizens were encouraged to reduce traveling to a minimum, work from home if possible, and avoid activities involving physical contact with other people. Almost instantly, concerns from the research community were raised regarding whether these restrictive actions would impact the psychological well-being (Holmes et al., 2020) and increase PG in the population (Håkansson et al., 2020). The world was in a never-before-seen natural experiment with unknown consequences. Cross-sectional studies during the early phase of the pandemic (Håkansson, 2020) indicated that a small and vulnerable population with prior PG might experience a deterioration in their PG-status. The uncertainty of the situation led to many research projects being paused, and the focus was shifted to investigating the impact of the pandemic.

## 1.5 Individual factors

This section will briefly cover some of the individual factors' role in the development and maintenance of GD. First, genetic factors and neuroanatomy will be covered, and the neurotransmitters often cited in relation to PG and GD. Second, the most cited, often irrational, and distorted, gambling cognitions will be presented. Additional individual factors, i.e., craving and emotion regulation will be covered in sections further on.

### 1.5.1 Biological factors

Biological factors investigated in relation to gambling can be categorized into genetic factors, the brain's anatomy, and the involvement of neurotransmitters in GD. Even though genetic factors are poorly investigated, and evidence should be viewed as preliminary, there is a suggested link between genetic factors and the development of GD (Hodgins et al., 2011). For instance, a study using the Vietnam Era Twin Registry estimated that 12–20% of GD is attributed to genetic factors (Slutske et al., 2000). However, disentangling genetic influence from environmental factors presents a significant challenge; genetically vulnerable populations are more likely to live in disadvantaged areas where adverse effects contributing to GD are more common (Potenza et al., 2019). Within genetic influence, Reward Deficiency syndrome has been proposed as a genetic risk factor for developing addictive disorders in general (Blum et al., 2000). This syndrome entails a genetic inability to experience rewards from everyday activities due to a low dopamine function (*hypodopaminergia*). The data to support whether this applies to GD are at present inconsistent (Clark et al., 2019).

Studies have investigated brain activity when individuals are exposed to gambling stimuli using functional MRI and neurotransmitter activity using PET-technique (Clark et al., 2019). A large part of this research has focused on the development of the prefrontal cortex and its role in inhibiting dysfunctional behavior through executive control (Navas et al., 2019). This part of the brain, which continues to develop until the age of 25 (Giedd et al., 1999), is crucial in organizing behavior, evaluating actions, and overriding short-term impulses. An integrative review found no evidence of neuroanatomical changes due to GD and inconsistent results in the studies reviewed (Clark et al., 2019).

Nevertheless, PG is more common among younger men, putatively partly due to the brain's development, which also implies better opportunities to exercise control over behavior with increasing age. The authors also conclude that a well-known problem within neurobiological investigations of the neuroanatomy of addictive disorders is the lack of a baseline measure, i.e., before developing GD. This limitation makes it hard to determine changes due to addictive behavior. Arguably, dysfunction in the pre-frontal cortex would theoretically be a risk factor for GD and hardly a consequence.

The most frequently investigated neurotransmitter within addictions is dopamine, initially described by the Swedish scientist Arvid Carlsson due to its linkage to the movement control (Carlsson, 1959). The mesolimbic pathway has been of particular interest, stemming from the ventral tegmental area (VTA) and through axons spreading to areas in the forebrain and amygdala (Arias-Carrión et al., 2010). The D2-receptors are essential and described as excitatory, "go" receptors promoting a motivational effect on behavior. These cells show a higher activation among individuals with GD when exposed to gambling stimuli as compared to individuals without GD (Clark et al., 2019)

The dopamine system has been described as a motivational system that defines a direction and amplifies the anticipatory response motivating action (Salamone & Correa,

2012). In addition to being a part of the motivational reward system, dopamine is involved in motor control, a deficiency among those diagnosed with Parkinson's Disease. Adding laboratory-produced dopamine enhances motor function but also stimulates the reward system. A clue to dopamine's involvement in GD is a commonly reported side effect of levodopa medication. These medications are commonly prescribed for Parkinson Disease and Restless Legs Syndrome/ Willis-Ekbom Disease, and about 17% of patients receiving medication develop any impulse control disorders, and GD is one of them besides, for example, hypersexuality and excessive shopping (Vargas & Cardoso, 2018; Voon et al., 2017).

Other neurotransmitters roles in PG have also been investigated, such as GABA, glutamate, noradrenaline, and serotonin, without conclusive results. Serotonin is hypothesized to be involved in learning from punishing consequences; alterations in binding levels of receptors might influence risk-taking (Clark et al., 2019). This might explain why individuals with PG continue to gamble after contingencies have changed, such as increasing bets after repeated losses, resembling a distorted learning process (Quintero et al., 2020). However, mirroring actual gambling in an experimental setting is challenging since it would involve risking a significant amount of money. In addition to the above-mentioned biological factors, studies have investigated the effects of other physiological parameters on gambling behavior. Being sleep deprived has been associated with slower processing of stimuli in decision-making tasks (Liu & Zhou, 2016), hunger seems to improve decision-making in favor of long-term large rewards (de Ridder et al., 2014), and intense physical activity has been shown to reduce gambling cravings (Angelo et al., 2013).

### 1.5.2 Gambling cognitions

In the late 1990s, treatment manuals for GD introduced distorted cognitions as central to the development and maintenance of the disorder (Ladouceur et al., 2001). These cognitions, often labeled cognitive *fallacies* are distorted perceptions of probabilities, an illusion of control in pure chance games, and the interpretation of gambling outcomes, e.g., responding to a loss in the same way as to a win. A metanalytic review concluded that the one specific cognition included in instruments measuring GD was highly associated with the severity of the GD, namely the *gambler's fallacy*. This fallacy refers to the belief that after a series of specific outcomes, the probability of an alternative outcome increases, not taking the independence of the draws into account. For example, after repeated losses, the chance of winning is perceived to increase, thus leading to more aggressive bets (Goodie & Fortune, 2013).

Separating cognitive fallacies from emotional reactions is challenging. One such example is the gambling cognition of *losses disguised as wins*. This phenomenon addresses draws where the sum of the outcome is negative but experienced as a win due to mechanisms in the game. Slot machines can obscure the actual outcome and reinforce this fallacy through reward signaling at various time points. This fallacy has been investigated in multiline slots gambling, where each play has several draws and accompanying winning signals causing a dual effect of losses disguised as wins and near misses (Sharman et al., 2015). This can be exemplified by wagering 1 euro, winning 50 cents, with a subsequent 30 cents win – but still ending up with an overall loss of 20 cents. Nevertheless, the feedback signaling during small wins from the slot machine can easily be misinterpreted as an overall win.

The *illusion of control* is another commonly cited fallacy (Goodie & Fortune, 2013). This involves the experience of being able to exercise control over a completely random event. This fallacy utilizes the human unacceptance of randomness and an inclination to see patterns in random events and base predictions on these. This fallacy is first and foremost discussed in luck games, such as different types of casino games. Whether this fallacy contributes to PG is unclear, but it forms a part of the gambling experience and human inclination to try to control events (Clark & Wohl, 2022).

## 1.6 Models of Problem Gambling

The heterogeneous population of individuals with GD has been subtyped to inform assessment and treatment. This section will briefly present four taxonomies: the *Biopsychosocial Model* (Sharpe, 2002), the *Pathways Model* (Blaszczynski & Nower, 2002), the *Gambling Space Model* (Navas et al., 2019), and the *Component Model of Addiction Treatment* (Kim & Hodgins, 2018a):

**Table 1.** Summary table of models of PG.

<i>Model (reference)</i>	<i>Key features</i>	<i>Comments</i>
<i>Biopsychosocial Model</i> (Sharpe, 2002)	<p>Is a general model, originally conceptualized by Engel (1981) and used to explain many behavioral problems and their biological, psychological and social correlates.</p> <p>As the name implies, GD stems from an interaction between biological, psychological, and social/societal factors, combined with the characteristics of the gambling product and the context where gambling takes place.</p>	<p>The model has been used to design prevention and treatment interventions. It has dominated the literature on the etiology of addictive behaviors as well as multiple other behaviors related to health and illness processes.</p> <p>Limitations: The model does not account for those who develop GD without having any risk factors. Also, the model does not consider the characteristics of the gambling format and how these interact with individual factors. Several studies report on increased risk with fast and highly available gambling formats on the one hand and the social, psychological, and biological risk factors on the other. However, GD occurs when all these coincide and the individual with their risk factors, in a given situation, is exposed to a certain type of game.</p>
<i>Pathways model</i> (Blaszczynski & Nower, 2002)  Updated version (Nower et al., 2022)	<p>The Pathways model proposes three etiological subtypes of problem gamblers:</p> <p>(a) behaviorally conditioned,</p> <p>(b) emotionally vulnerable, and</p> <p>(c) antisocial impulsive.</p>	<p>The model has been the most influential in subtyping GD and has the most empirical data.</p> <p>Limitations: Studies might suffer from recall bias and attributional errors when surveying individuals that have developed GD about the etiology of GD.</p> <p>There is a need for longitudinal designs in studies.</p> <p>Does not address motivation to gamble, gambling formats and the harms from gambling.</p> <p>Samples have been dominated by males.</p>
<i>Gambling Space Model</i> (Navas, 2019)	<p>The model proposes four distinct dimensions:</p> <p>(1) sensitivity to <i>positive reinforcement</i> incorporated in</p>	<p>Some implications for treatment are proposed:</p>

	<p>gambling, reward seeking and positive motives for gambling.</p> <p>2) Sensitivity to <i>negative reinforcement</i>: escape- and avoidance-driven gambling with typically negative motives to gamble.</p> <p>3) A <i>generalized affective dysregulation</i>: impaired inhibition, low problem awareness, high drop-out risk from treatment, and deficit in decision-making.</p> <p>(4) <i>Cognitive elaboration and self-deception</i>: interpretative biases and cognitive distortions commonly observed among individuals with GD.</p>	<p>Individuals sensitive to positive reinforcement are less motivated to quit or seek help and drop out of treatment more often.</p> <p>Individuals gambling due to negative reinforcement: often express neuroticism and boredom. This type has been referred to as coping-motivated (Stewart et al., 2008) and entails an emotional vulnerability and a high risk of relapses.</p> <p>The subgroup with general affective dysregulation is malfunctioning in emotion regulation is equivalent to common psychiatric comorbidity, and these individuals might be in treatment for reasons other than GD.</p> <p>Individuals showing cognitive elaboration and self-deception might prefer skill-based games and typically express low change motivation and are reluctant to seek treatment. Cognitive control strategies and self-deception can be used to justify gambling.</p> <p>Limitations: The model needs to be validated with more empirical data.</p>
<p><i>Component Model of Addiction Treatment</i></p> <p>(Kim &amp; Hodgins, 2018)</p>	<p>Addresses similarities across the addictions with six core components: 1) the addictive stimuli become salient and in the foreground of one's prioritization and a focus of urges, 2) addictive behavior is used to regulate negative mood, 3) tolerance is developed as outlined in the diagnostic criteria, 4) symptoms of withdrawal when abstinent, 5) inner or interpersonal conflict due to the behavior and 6) relapses, i.e., returning to the previous frequencies of the addictive behavior at its worst.</p>	<p>Has been proposed to be used for conceptualizing addictions, and new addictive behaviors particularly.</p> <p>A transdiagnostic model where different addictions can be treated within the same program. Can have the potential to treat individuals that are switching addictions.</p> <p>Limitations: The model needs to be validated with more empirical data and needs to be tested compared to disorder-specific treatment.</p>

### 1.6.1 Pathways model

Blaszczynski and Nower (2002) provide a taxonomy for three subtypes of individuals with GD's respective etiological pathways in their Pathways model. First, the *behaviorally conditioned gambler* phenotype acknowledges the features of classic and operant conditioning incorporated in gambling, in combination with developing irrational gambling cognitions regarding chances to win and illusions of control. Second, the *emotionally vulnerable gambler* typically has pre- and comorbid depressive symptoms and experiences chronic boredom where gambling can serve as a temporary distraction. Third, the *antisocial impulsive gambler* exhibits high levels of trait impulsivity and experiences difficulties in other domains of life, and shows antisocial traits. A review

synthesizing 14 studies aiming to validate the model concludes that among an adult population, the model is more or less confirmed with its three subtypes (Kurilla, 2021).

In contrast, studies among adolescents show four different subtypes (Kurilla, 2021). In a revised model, Nower et al. (2021) clarified that the third pathway, the antisocial impulsive, is distinct from the other two and not an aggregated version containing the other two as previously assumed. Furthermore, gambling in pathway three, the antisocial and impulsive, can be motivated by a search for meaning.

### 1.6.2 Gambling Space Model

Building on the Pathways Model, the *Gambling Space Model* (GSM) forms a dimensional model of the psychobiological basis for GD and aims to integrate theories of impulsivity, personality, cognition, and neurobiology. GD is viewed foremost as a disorder of learning and two components are central to developing GD. The first, initially presented by Berridge and Robinson (2016), is *incentive sensitization*, which is the process whereby previously ordinal cues become *incentive salient* and transformed into *motivational magnets* and the focus of attention and cravings (Anselme & Robinson, 2016). The system amplifies cues associated with reward, i.e., the individual becomes *sensitized*. The reward system can be “hijacked” by drugs or gambling, providing an over-amplification of reward signals.

Cue-elicited cravings are an example of *incentive sensitization*. The shift from recreational to disordered gambling is described as the transformation of *liking* into *wanting* and the development of cravings. Gambling-associated stimuli become over-attributed and incentive salient, a phenomenon that can occur outside the conscious awareness (Romer Thomsen et al., 2014a). A discrepancy is created between the behavior and the subjects verbally expressed wills, such as continued gambling despite overwhelming negative consequences and an intention to stop. An intermittent reinforcement schedule (uneven distribution and rewards size) maximizes the uncertainty in gambling and fuels prediction errors and cognitive fallacies. In addition, the Gambling Space Model acknowledges the addictive potential in games operating under random ratio reward schedules that maximize the uncertainty and the reward in any trial is independent of previous trials.

### 1.6.3 Component Model of Addiction Treatment

The *Component Model of Addiction Treatment* (CMAT) (Kim & Hodgins, 2018b) is a unified and transdiagnostic approach to the treatment of addictive behaviors. It states that many addictions share the same etiology, course, and neurobiology and therefore, treatment should target the underlying mechanism of the disorder. These shared features could be disturbances of motivation, lack of control, deficits in social support, and tendencies for compulsive behaviors. A transdiagnostic assessment and treatment for addictions is argued to reduce the workload compared to administering disorder-specific questionnaires and treatment protocols. However, empirical research investigating 10 substance and behavioral addictions did not fully confirm the model but provided preliminary support. Indicators, such as dependence, health harms, and physical signs, seem to vary across addictions, i.e., substance addictions typically have more physical indicators (Kim et al., 2020).

## 1.7 Craving

*"I felt how it started to crawl in my body and I became restless."*

Woman, participant in Study IV.

As a non-substance addictive behavior, GD offers an opportunity to study a "pure" psychological addiction. Some questions need to be raised: how does this behavioral addiction manifest itself? What learning processes remain when gambling stops? To answer this, one important point needs to be clarified. This thesis will argue that the addictive potential of gambling is not understood by focusing on the outcomes of a gamble but rather on the anticipatory effect before and during and in preparation to gamble. Therefore, the ability to regulate the motivational drive stemming from gambling and increase self-control when experiencing craving is crucial in the recovery from GD.

### 1.7.1.1 Craving theories

At the core of addictions theories are the constructs of *craving*, or *urge* or *desire*, outlined in psychiatric nosology for SUD but not for GD. It represents a state of acute wanting to give in to an addictive behavior despite its negative long-term consequences. As for gambling, one can describe the phenomenon as a cognitive, emotional, and physiological state of learned motivation to engage in gambling (Ashrafioun & Rosenberg, 2012), which in PG becomes in conflict with the motivation to abstain. The individual becomes sensitized towards the anticipatory effect of gambling, which overrides (healthier) long-term reinforcers. The theories of craving mirror theories of addiction, i.e., they span many areas of research and perspective.

The *conditional models'* view craving as a withdrawal symptom and a desire to escape unwanted experiences. This could be expressed as cravings typically emerge when experiencing stress or anxiety, or even boredom and gambling offers temporary distraction from these experiences. Furthermore, it has also been described as an automatic and unconscious reaction to a conditioned stimulus (Skinner & Aubin 2010). According to learning theory, a neutral unconditioned stimulus (US) is paired with a salient stimulus and elicits an automatic response (unconditioned response/UR). After the pairing, the US becomes a conditioned stimulus (CS) and now holds the potential of eliciting a conditioned response (CR) even when presented in isolation. That would imply that a stimulus that has been associated with gambling, e.g., a sound or smell, could elicit an automatic craving response even when a "gambling" stimulus is not present.

The *cognitive models* focus primarily on information processing where negative and positive expectancies can function either to elaborate or regulate the craving experience. The metacognitive perspective adds desire-thinking and higher-order beliefs about gambling as superimposed on the craving experience. Here, the external and internal stimuli trigger automatic associations related to the desired target (i.e., gambling), and a higher-order cognitive process (such as desire-thinking) elaborates these associations (Fernie et al., 2014).

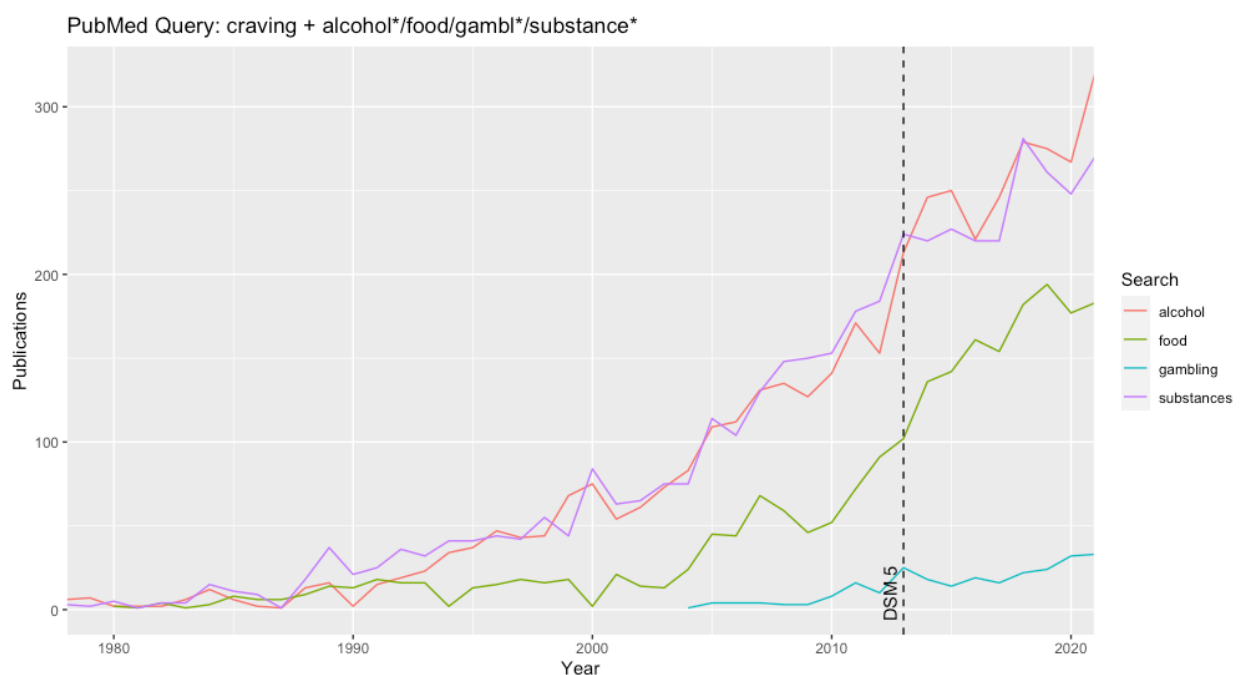
Recent studies have extended the cognitive model in that craving experiences can also involve the activation of sensory processes without actual sensory inputs (Cornil et al., 2018, 2021; Kavanagh et al., 2005). The *Elaborated Intrusion Theory of Desire* describes the cognitive processes emerging when a desire stimulus comes into attention as an "intrusive thought," which creates an intense desire. Environmental cues; sounds, smell and sight, trigger these intrusive thoughts and evokes an anticipatory response, and



associated thoughts of desire and relief are elaborated (Kavanagh et al., 2005). Certain gambling cues (auditory, tactile, visual) can evoke a craving response and become incentive salient, i.e., at the center of attention and motivating action. The rewarding “as if”- experience of craving becomes analogous to actual gambling.

## 1.7.2 Gambling craving in research

Within gambling research, attention to craving has been ambiguous, with different conceptualizations, and methods of assessing and addressing it in the treatment (Ashrafioun & Rosenberg, 2012; Mallorquí-Bagué et al., 2023). Some argue strongly for cravings' importance in GD, Limbrick-Oldfield et al. (2017, p. 1) state: “craving is not currently listed as a criterion for gambling disorder, despite the centrality of this feature to the development and maintenance of the disorder, and as a predictor of relapse and treatment attrition.” Moreover, dysregulation of cravings has been described as the path from recreational gambling to GD (Berridge & Robinson, 2016), a reason behind gambling relapses (Hodgins & el-Guebaly, 2004) and a predictor of gambling behavior the subsequent week (Quilty et al., 2017), as well as continued in-session gambling despite losses (Young & Wohl, 2009). The use of craving within gambling research is not as common as in research on other substance-induced addictions or even in relation to food. Figure 2 displays the annual reference to craving together with either alcohol, food, gambling, or substances in the title or abstract. The vertical line indicates the year 2013 when the DSM 5 was released, including craving as a symptom of substance use disorders, but not for GD. The number of references is shown on the y-axis.



**Figure 2.** Reference to craving in research articles from 1970–2022. PubMed search from December 2022.

## 1.7.3 Cravings and comorbidity

It has been suggested that experiencing frequent and intense craving are more common among individuals with GD and co-occurring psychiatric disorders. Studies have confirmed the association between high ratings of cravings with elevated symptoms of depression and anxiety (Potenza, 2001). In addition, individuals with GD and depressive

symptoms express more relief–craving, i.e., expectations that gambling would offer them temporal relief from unwanted experiences (Young & Wohl, 2009). Furthermore, having more relief cravings have been linked with more persistent gambling when facing losses in a VR slot-machine setting. Moreover, it is suggested that treatment for depression and anxiety reduces gambling behavior mediated by reduced gambling cravings, but this has not been confirmed empirically (Angelo et al., 2013). A causal effect of emotional states on gambling behavior is hard to establish. In a study of participants with mood disorders and problem gambling using an EMA design, negative emotional states did not predict gambling episodes. However, negative emotional states predicted an increased craving to gamble, which in turn was linked to gambling behavior (Quilty et al., 2017). The authors discussed that urges to gamble are the link between the common depressive symptomatology and gambling problems.

### *1.7.3.1 Cravings and treatment*

Even though not all individuals with GD report craving, a common component in the treatment for GD is management of craving. Deficits in self-control and intense cravings have been described as two sides of the same coin (Rømer Thomsen et al., 2014). Among individuals who participated in CBT treatment for GD, a common way to describe their cravings was through specific somatic symptoms, e.g., “heart-pounding”, “tightness in the stomach,” and non-specific bodily reactions, “jittery feeling.” Additional descriptions among the participants were emotions of stress and anxiety and a variety of cognitions (e.g., negative flashbacks and dreams of winning) (Morasco et al., 2007).

Detecting and raising awareness of one’s cravings and its contextual cues can be crucial in recovery from GD. Within CBT, a common intervention for cravings is “urge-surfing,” where the individual is instructed to elicit gambling cravings and taught acceptance strategies by staying non-reactive and observing while the craving diminishes (Tapper, 2018). This strategy is typically introduced at a later stage in treatment, after an initial period of avoidance strategies, such as not having access to money or avoiding situations that remind one of gambling. Recent approaches have tested the use of interference-based techniques, such as engaging in a competing cognitive task to occupy working memory to reduce the impact on behavior (Cornil et al., 2018). However, the individual's confidence in resisting craving seems to be important. In an Ecological Momentary Assessment study, the level of cravings was associated with subsequent gambling episodes. The amount spent at each gambling episode was partially moderated by craving self-efficacy, i.e., the individual’s confidence in the ability to exert control over gambling. (Hawker et al., 2021).

Exposure therapy has been tested to reduce cravings and increase self-control in the presence of a gambling opportunity. The assumption in exposure techniques is that near misses and the win-and-lose contingencies of gambling reinforce gambling cravings. As these responses are learned, they can also be “unlearned” (or extinguished), the authors argue (Oakes et al., 2008; Smith et al., 2015). Another perspective is that “unlearning” does not occur; new associations are added. The organism learns that gambling stimuli do not predict the associated outcome as a transformed reward valuation. Further on, exposure therapy stems from the view that gambling is driven by behavior completion processes (“only gambling can eliminate my craving”). By exposing individuals to gambling stimuli (both imaginally and in-vivo) and training clients to remain non-responsive, the link between gambling stimuli and gambling behavior gradually weakens. On the other hand, addictive behaviors are not purely driven by avoiding unwanted

experiences (i.e., negatively reinforced), which this model does not consider. Gambling episodes can also be triggered by deficits in regulating positive emotional experiences, which has been neglected in research to a large extent, a review points out (Mallorquí-Bagué et al., 2023)

## 1.8 Treatment of Gambling Disorder

The first diagnosis for pathological gambling was introduced in 1980 with the release of the DSM-III (American Psychiatric Association, 1980), classified as a mono-manic disorder (Rosenthal, 2020). The Swedish translation in 1994 incorporated this view ("*spelmani*"), portraying a phenotype obsessed with gambling, resembling a manic state with a single focus; gambling. Despite the diagnostic classification, treatment and help remained scarce for many years. It was not until the 1990s that treatment manuals emerged and clinical trials of psychosocial interventions and medications for the disorder emerged (Hansen, 2006; Potenza et al., 2019).

### 1.8.1 Pharmacological treatment

There is currently no approved medication for GD due to divergent results in studies and a lack of scientific support for the superior efficacy over placebo (Di Nicola et al., 2020). The foremost pharmaceutical candidates have been the opioid antagonists Naltrexone and Nalmefene, medications aiming at reducing the rewarding effect of gambling and achieving a dampening impact on the craving response (Grant et al., 2008). The effect of expectation seems to play a vital role, and individuals with GD have shown strong placebo responses compared to other psychiatric conditions (Navas et al., 2019). However, given the high rates of comorbid psychiatric conditions, individuals with GD in psychiatric care are commonly offered medical treatment for co-occurring psychiatric disorders; for example, about half of the patients with a GD diagnosis in Swedish healthcare are prescribed antidepressants during the two years following diagnosis (Widinghoff et al., 2021).

### 1.8.2 Psychological treatment

Two types of treatments have received the most attention within research, *Cognitive Behavioral Therapy* (CBT) and *Motivational Interviewing* (MI). Based on metaanalyses aggregating results from the available studies so far, these interventions are recommended for clients seeking help for PG and GD (Cowlshaw et al., 2012; Di Nicola et al., 2020; Petry et al., 2017).

#### 1.8.2.1 Cognitive Behavioral Therapy

The aim of CBT is to recognize behavioral patterns that maintain the disorder, learn and practice alternative behaviors, and increase self-control (Petry et al., 2003). A starting point for applying CBT for GD was targeting cognitive fallacies regarding randomness and illusion of control. Later, strategies derived from relapse prevention, such as identifying triggers and situations associated with gambling, were added, and a CBT package for gambling was created. CBT represents an umbrella encompassing several treatments with slightly varying focus: e.g., Acceptance and Commitment Therapy (ACT) (Dixon et al., 2016) and Dialectical Behavioral Therapy (DBT) (Christensen et al., 2013), which have been tested for GD with promising results. In addition, a growing body of research emphasizes the importance of metacognitions as a maintaining factor of GD (Rogier et al., 2021).

Metaanalyses conclude that CBT for GD effectively reduces time and money spent on gambling in the short term (Cowlshaw et al., 2012; Di Nicola et al., 2020; Petry et al., 2017). Despite an increasing number of studies, there is still uncertainty regarding the long-term effects of a treatment since a majority of the studies use short follow-up

periods, such as three months post-treatment or waiting list controls, a deficit noted by several researchers (Pfund et al., 2020; Pickering et al., 2018; Yakovenko & Hodgins, 2018).

### **1.8.2.2 *Motivational Interviewing***

The client-centered technique of MI stems from interventions directed at alcohol consumption reduction (Miller & Rollnick, 2012). The focus is to work with the client's readiness to change and resolve any ambivalence and promote change talk. Applying MI is commonly not based on step-by-step manuals but rather catalyzes behavior change through engagement, focusing, evoking, and planning processes in the treatment. Moreover, MI is a brief intervention that has shown promising outcomes in reducing gambling behavior in the short term, but uncertainty remains regarding whether changes are sustained over 12 months (Di Nicola et al., 2020; Yakovenko & Hodgins, 2018). The Swedish Board of Health and Welfare recommends that MI to be delivered in combination with CBT in the treatment of GD (National Board of Health and Welfare., 2018) .

### **1.8.3 *Modes of delivery***

A consensus has yet to be reached on which mode of delivery is most effective; each has its pros and cons. CBT has been delivered successfully as an online therapy (Carlbring et al., 2012), as group therapy (Carlbring et al., 2010) but most commonly as face-to-face individual counseling (Cowlshaw et al., 2012). The benefits of the group setting are treating more than one patient simultaneously and reducing stigma through recognizing commonalities in the difficulties. One study allocating 56 females with GD to either group, individual, or control (waiting list) concluded better outcomes for individual therapy over time (Dowling et al., 2007). A Swedish study allocating 150 individuals with PG or GD to individual MI or group CBT concluded significant improvements but no differences in the outcome of past-month PG between MI and CBT (Carlbring et al., 2010). Whether more is better is uncertain: a review has pointed out that, in some cases, more treatment sessions are associated with better outcomes (Pfund et al., 2020).

#### **1.8.3.1 *Challenges in treatment research***

There are many knowledge gaps to fill regarding psychological help for individuals with GD. We know little about what change techniques work in treatment or how patients experience participating in treatment for GD. Another issue is that even for individuals who have participated in treatment, relapses are frequent. A study following individuals with GD one year after treatment found that 41% kept complete abstinence, one-third continued gambling but did not meet the criteria for GD, and one-third still met the criteria for GD (Müller et al., 2017). Dropout from psychological treatment is also common, a review aggregating 24 studies showed that 39% of patients dropped out from treatment (Pfund et al., 2021). In addition, and to further the knowledge of treatment outcomes, studies must therefore track changes over longer periods of time and not base all assessments on self-reports but rather use additional sources of data.

## 1.9 Emotion regulation: a transdiagnostic treatment

*"You cannot be wise and in love at the same time."*

–Bob Dylan in "No direction home."

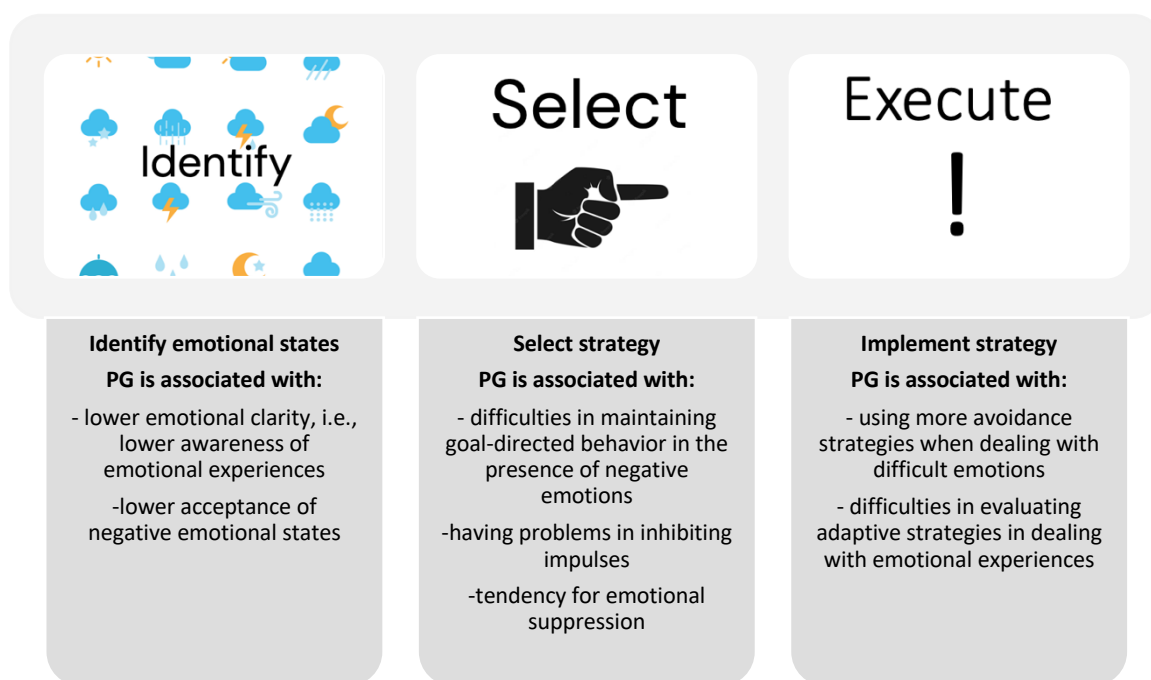
Strong emotional experiences impact human decision-making. One such, gambling, seems to hijack human motivation and discount long-term consequences. Recently, more attention has been paid to the transdiagnostic concept of Emotion Regulation and its relation to a range of psychiatric disorders (Lincoln et al., 2022). Well-functioning emotion regulation has been described as; "adaptive ways of responding to emotional distress, including the awareness, understanding, and acceptance of emotions and an ability to control impulsive behaviors and engage in goal-directed behaviors when experiencing negative emotions" (Gratz et al., 2015, p. 2). The emotion regulation literature often distinguishes between automatic and controlled strategies, where the former implies processing without conscious scrutiny and is more direct. The latter involves cognitive control, re-appraising events to reduce their emotional impact, and labeling emotional experiences. These two "systems" operate in parallel and are not active simultaneously. Regarding brain activation, the literature points towards that controlled strategies activating the dorsolateral prefrontal cortex, the ventrolateral prefrontal cortex, the parietal insula, the insula, and the parietal cortex, and the supplemental motor area (Etkin et al., 2015, p 694). The more automatic and implicit strategies are associated with activating the ventral anterior cingulate cortex and the ventromedial prefrontal cortex (Etkin et al., 2015).

There are different ways to regulate emotional experiences outlined. One involves the use of reappraisals, i.e., challenging, taking perspective, and adapting the way we think about certain situations to regulate their emotional impact. It can also entail controlling or suppressing one's behavior to decrease the expressive behaviors but not the emotional experience (Gross, 2002). Responses can be overt or covert and modulate, evaluate, and monitor emotional reactions. Recently, treatment based on emotion regulation has been developed and shown promise in reducing symptoms in various disorders such as anxiety, depression, substance use disorders (SUD) and eating disorders (Sloan et al., 2017), and self-harm (Bjureberg et al., 2018).

As a concept with many different applications, Braunstein et al. (2017) provides a framework for emotion regulation-based goals and processes to guide treatment. The nature of goals in emotion regulation ranges from implicit to explicit, and the processes range from automatic to more controlled, where the latter can become automatized over time if practiced continuously. Put in another way, if one deliberately attempts to control gambling cravings, individuals might notice over time that from initially being effortful, the task becomes automatized and less demanding of cognitive control.

### 1.9.1 Emotion regulation and Problem Gambling

A recent meta-analysis concludes an overall association between emotional dysregulation and PG (Velotti et al., 2021). More specifically, PG is associated with difficulties in the three steps of regulation of emotions; identifying, selecting action and execute (Barrault et al., 2017; Maniaci et al., 2017; Marchica et al., 2019; Navas et al., 2019; Neophytou et al., 2023; Orlowski et al., 2019). Figure 3 describes a theoretical model of difficulties in emotion regulation among individuals with GD in three steps, adapted from Rogier & Velotti (2018).



**Figure 3.** Difficulties in Emotion regulation and PG. Images by anindyanfitri on Freepik.

The association between emotion regulation difficulties and PG is complex. One might point out that individuals with GD might be highly effective in influencing their emotional experiences through gambling in the short term. Individuals can use gambling to cope with emotional states and to handle situations of low stimulus and deprivation. When individuals with GD were asked to report triggers to gamble, the ones most commonly reported were negative mood, boredom, unstructured time, having access to money, and being reminded of gambling (Rogier & Velotti, 2018). This broadens the view that individuals with GD gamble perhaps not primarily in the presence of antecedent negative mood or stress but also in low-stimuli situations, e.g., boredom, lack of interest, and deprivation.

Negative urgency, a dimension of emotion regulation, refers to the tendency to act rashly under the influence of negative emotions. In combination with cravings, negative urgency in a lab experiment was showed to interfere with extinction learning (Quintero et al., 2020); i.e., participants kept choosing a response that contingencies no longer supported, demonstrating an inflexibility and difficulty in evaluating strategies and their consequences. Furthermore, in a cross-sectional study, rumination strategies, blaming others, and using re-appraisals were positively associated with elevated distorted gambling cognitions. Commonly others were blamed for adverse outcomes, while positive outcomes were attributed to personal skills (Ruiz de Lara et al., 2019). The relationship between emotion regulation strategies and gambling cognitions is a bit

counterintuitive. In a sample of treatment-seeking individuals with GD, emotion regulation strategies that are viewed as primarily functional, such as reappraisal and re-focusing, were used to justify risky gambling. Reappraisals might function as a strategy to deal with losses and re-focus on the negative consequences of gambling by adapting how we think about the event. This decreases the emotional impact of gambling consequences and could also play a role in maintaining GD, by lowering problem awareness and motivation for treatment.

Recognizing and accepting emotional experience has also been suggested to impact help-seeking a review suggests (Velotti et al., 2021). As previously pointed out, individuals with GD seek help at low rates, and non-acceptance of emotional states and re-appraising negative events might be a part of this pattern. Furthermore, the review concludes that research so far has been limited to cross-sectional studies and complete dominance of regulation strategies applied to negative emotional states.

#### *1.9.1.1 A treatment manual based on Cognitive Behavioral Therapy enhanced with Emotion Regulation strategies*

For the present PhD-project, a treatment manual was developed, first initiated by a colleague at the Centre for Psychiatry Research. This manual is based on learning theory and the traditional adaptation of CBT for GD, such as addressing gambling cognitions, promoting alternative activities, and preventing relapses. Added to the typical CBT component were techniques derived from Emotion Regulation Therapy (see, e.g., Bjureberg et al., 2018), aiming at raising awareness of emotions and increasing emotional clarity. Emotions are analyzed as antecedents to gambling and consequences in the short and long term. In addition, participants are trained to develop and practice alternative behaviors when struggling with difficult emotions. Table 2 provides an overview of an eight-session group treatment delivered in Study IV (Månsson et al., 2022b). The columns describe the theme, content, exercises during the session, and homework assignments between sessions.



**Table 2.** Emotion Regulation Enhanced CBT for Gambling Disorder.

<b>Sess ion</b>	<b>Theme</b>	<b>Content</b>	<b>Exercises</b>	<b>Homework assignment</b>
1	<i>Introduction Emergency measures Functional analysis</i>	Session structure and homework assignment, Restrictions on gambling accounts and money and functional analysis (FA)	<i>Goal setting Brief Mindfulness Exercise (BME) FA</i>	Prepare for collecting information for FA
2	<i>Values and steps in valued direction</i>	Values, goals and steps in valued direction	<i>Values clarification “How gambling affected my life” BME FA</i>	FA of a gambling situations “Something precious” <i>Exploring values and steps in valued direction</i>
3	<i>Emotions relation to gambling</i>	Introduce the participant to emotion triggered gambling.	<i>Emotion reconnaissance BME FA</i>	FA of a gambling situation Emotion reconnaissance
4	<i>Acceptance and problem solving</i>	Acceptance as a strategy Problem solving	<i>Collaborative problem solving BME FA</i>	FA of a gambling situation or a Using problem solving skills
5	<i>Coping with emotions</i>	Strategies to cope with emotional states	<i>Relieve with sensory impression “If you had a 100 million” Coping with impulses BME FA</i>	FA of a gambling situation or a situation where cravings emerge. Relieve with sensory impression
6	<i>Cognitions and gambling</i>	Role of cognitions in gambling Common erroneous beliefs	<i>Common erroneous beliefs Functional analysis with cognitions BME FA</i>	FA of a gambling situation or a situation where cravings emerge Cognitive reconnaissance
7	<i>Cognitions and defusion</i>	Defusion from cognitions Consequences of controlling, fighting or accepting thoughts and emotions	<i>Observing thoughts At the crossroad BME FA</i>	FA of a gambling or craving situation Preparing for a relapse prevention plan
8	<i>Continuing life plan</i>	Values Identifying obstacles Obstacles Economy Relapse and lapses	<i>Making my life plan Using problem solving skills Values Deal with obstacles BME FA</i>	
Boos ter	<i>Repetition and relapse prevention</i>	Repetition of treatment components Relapse prevention	<i>FA of relapses Treatment review</i>	

## **1.10 Reducing harm from Problem Gambling**

This section is shifting the focus to the context where prevention and treatment are to be implemented and where the present studies have been conducted. As gambling is a legal, but potentially harmful activity, society has multiple functions regarding minimizing the harms. At the same time, responsibly offering gambling, society must prevent individuals from shifting from recreational gambling into risk and problem gambling and organizing help in different modalities. Broadly speaking, the continuum of prevention efforts and treatment ranges from school information pamphlets to psychotherapy and institutional care. A common way to depict the organization of help for various conditions is the stepped care model (Bower & Gilbody, 2005). This model assumes that from the point where the disorder is identified, the help-seeking individual is provided with care at the least complex and most cost-effective level of care that alleviates the condition. This also assumes a help-seeking behavior where individuals seek help at an early stage of their problem. In the case of GD, this is seldom true.

### **1.10.1 Screening and Brief Intervention**

As GD is often portrayed as progressing undetected, described as “the hidden addiction” (Downs & Woolrych, 2010, p 323), screening in vulnerable groups is essential. Studies show that PG is more prevalent among patients in primary care, where an average about three percent of patients report PG, but studies show noted large variations (1-16%) (Roberts et al., 2021). Implementing systematic screening in primary care would raise awareness of PG and potentially aid more people in seeking help. Adding a brief intervention to screening has been found to be more effective in reducing PG than just screening (Quilty et al., 2017), and a single session with a motivational focus has shown comparable outcomes as treatment of longer duration (Toneatto, 2016). In the context of screening, perhaps the most common brief intervention is the self-screening of PG, offered by gambling operators and at gambling helplines.

### **1.10.2 Self-help groups**

Within the addictions, there has been a tradition of organized help outside the healthcare system, such as different forms of peer support and self-help groups. These groups for individuals with GD and their concerned significant others are available across the country. The effect of participating in self-help is unknown, or at least not scientifically evaluated. Studies conducted with participants in Gamblers Anonymous show mixed findings (Schuler et al., 2016), and qualitative evaluations point at participation in self-help groups has the benefits of decreasing stigma and activating peer-support (Binde, 2012). Self-help groups continue to have high credibility among the population; in a survey on the general population's view, people would recommend peer support rather than professional treatment for GD (Håkansson & Ford, 2019).

### **1.10.3 Treatment in Swedish healthcare**

Therapeutical help for PG relied on a few clinicians even in the late 1990s (Hansen, 2006), and despite efforts to educate staff, treatment offers remained scarce. An important but often neglected part in bridging between science to practice are the ones delivering treatment, the PG counselors. In the years following the recognition of GD as an addictive disorder in 2013, a process of new Swedish legislation was initiated. As of January 2018, the responsibility of offering help to individuals with PG and their peers now became divided between healthcare and the municipalities' addiction care, as has

been the case with substance use disorders. From this point onward, GD was to be treated by the same professionals treating individuals with substance use disorders. This spurred educational activities all over Sweden, aiming to increase the overall level of awareness of PG as well as educate prospective gambling counselors ready to deliver treatment.

However, individuals with GD seldom seek help on their own, only between 5–12% report seeking any kind of help (Braun et al., 2014; Slutske, 2006). Studies have highlighted shame and stigma as common barriers to help-seeking and the fear of peers finding out about one's gambling (Evans & Delfabbro, 2005). Furthermore, the lack of different treatment options and low competence among treatment facilitators were additional obstacles to treatment, as concluded in an interview study of key stakeholders in the problem gambling field in Sweden (Forsström & Samuelsson, 2018).

Given that the help for PG in Sweden has been divided between healthcare and social services organized by the municipalities, there are many uncertainties about the availability and characteristics of the treatment. In health care, the national patient register can provide an overview of the number of individuals receiving a GD diagnosis, their demographics, and comorbid disorder. In contrast, social services do not keep a record of how many individuals they offer treatment for PG or the number of PG counselors available.

#### **1.10.4 Providers of treatment**

Within recent years two trends have been emerging within the treatment of addictive disorders. One is to provide evidence-based treatment, often stemming from the aggregated results of randomized controlled trials. This is a shift from the previous emphasis on the personal and clinical experience of addiction recovery, and this obligates clinicians to keep up with research. This shift has been termed the professionalization of addiction treatment and has involved a transition from paraprofessionals to licensed healthcare workers (Mulvey et al., 2003). Second, given the high prevalence of comorbid psychiatric disorders, there is also an increasing demand for integrative treatment. This means that the treatment providers need to have knowledge and skills in the assessment and treatment of common psychiatric disorders and provide interventions simultaneously, or at least be able to assess and refer to treatment for comorbid conditions. This combination places a higher demand on the workforce that treats addictions. In addition, counseling for PG can be challenging in that clients may have experienced harm in several domains, e.g., financial, health and worklife. Given their essential role in bridging research into practice, surprisingly little attention has been paid to treatment providers. In addition, in the analysis of longitudinal data from clinical trials, therapists are assumed to be equally effective, a strong assumption that does not hold (see e.g., Magnusson et al., 2018).

## 2 Knowledge gap and contribution of this work

To summarize, there are many knowledge gaps that remain regarding the harms of PG and the treatment of GD.

- First, there is almost an absence of research into GD and its relation to disability in the work domain. Studies have indicated that GD can reduce work performance through absenteeism and employees being preoccupied with gambling. Still, we do not know if GD is linked to an increased risk of work disability, i.e., sick leave and disability pension.
- Second, it is important to understand the effect of disseminating treatment and educating PG counselors on a national level. Not much is known about what treatments are available, nor about the characteristics of those providing treatment and their perception of what change techniques are important in treatment.
- Third, there is a need to better understand the cognitive type, content, and contexts in the proposed link in transitioning between recreational to disordered gambling: the experience of cravings.
- Fourth, difficulties in emotion regulation have been linked to PG in cross-sectional studies, but there are no empirical data on if and how it could be included in the treatment of GD.
- And finally, on a societal level, there is a need to track how significant societal changes, such as a pandemic, influence recreational gambling and PG in the population.

### 3 Research aims

The overall aim of this Ph.D. project is to further the research field of PG by investigating the harms, symptoms, trajectories, and treatment of individuals with GD.

The specific aims of the studies are:

I: To examine the risk and evolution of work disability among individuals diagnosed with GD in specialized healthcare.

II: To map the treatment offered for PG by practicing counselors, their role security, and prioritization of change techniques in treatment.

III: To explore the cognitive mode, content, images, and contexts of gambling cravings experienced by abstinent individuals with GD and contrast it with individuals with alcohol use disorder.

IV: To test the feasibility and acceptability of adding emotion regulation strategies to a CBT treatment for GD.

V: To track the changes in gambling behaviors during the COVID-19 pandemic and associations with the consequences and restrictions of the pandemic.

## 4 THE EMPIRICAL STUDIES

### 4.1 Study I: Associations between Gambling Disorder and work disability: A longitudinal nationwide case-cohort study in Sweden

Being able to work is an essential indicator of functioning and integration in society. To what extent individuals with GD are at increased risk of work disability has not yet been investigated. Therefore, this study aimed investigate work disability among individuals that have received a GD diagnosis in Swedish specialized healthcare.

#### 4.1.1 Methods

##### 4.1.1.1 *Participants and procedure*

We used data from Swedish national registries between 2002 and 2021 and included individuals aged 19–62 with a GD diagnosis (F63.0 according to ICD-10) in specialized health care between 2005–2018 ( $n = 2830$ ; 71.1% men, mean age: 35.1). For each identified individual with GD, ten comparison individuals without GD in registers between 2001 – 2020 were selected from the general population. The comparison cohort was matched on age (in years, at cohort entry), sex (male/female), highest educational attainment, country of birth, and type of place of residence ( $n = 28300$ ), total  $N = 31130$ . See Table 3 for a description of the sample, their clinical diagnoses, and dispensed psychotropic medications before registered GD and equivalent variables among controls during the same period.

##### 4.1.1.2 *Measure/outcome*

We operationalized work disability as the aggregated net days of sickness absence and disability pension, measured during the three years before and three years after the first registered GD diagnosis. In addition, we measured psychiatric and somatic disorders and dispensed psychotropic medication during the same period.

##### 4.1.1.3 *Statistical analysis*

First, we used Generalized Estimating Equation Models (Liang & Zeger, 1986) to compare long-term work disability (>90 days of work disability/year) among individuals with GD in relation to the matched cohort, adjusting for socioeconomic and health-related covariates. Second, we ran Group-based Trajectory Models (Nagin & Odgers, 2010) on yearly mean net days of work disability in individuals with GD. After participants were assigned to a trajectory group, we carried out multinomial regression analyses with sociodemographic and health-related covariates for trajectory group assignment.

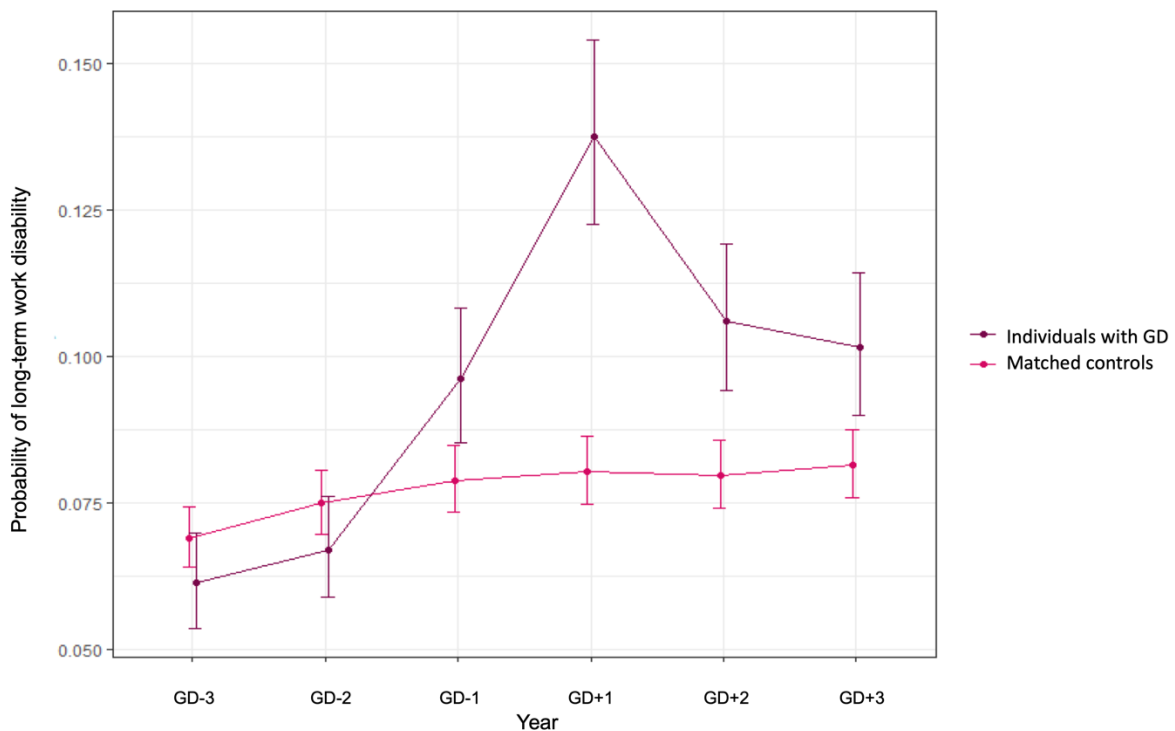
**Table 3.** Summary of sample descriptives.

	GD individuals, n (%)	Controls, n (%)
N	2830	28300
Women	649 (22.9%)	6490 (22.9%)
Age, mean (sd)	35.1 (10.4)	35.1 (10.4)
<b>Diagnoses before GD</b>		
Any somatic diagnosis excluding	2137 (75.5%)	15865 (56.1%)
Injuries	873 (30.8%)	4747 (16.8%)
Any psychiatric diagnosis except GD	2052 (72.5%)	2757 (9.7%)
Anxiety disorders	1161 (41.0%)	1270 (4.5%)
Mood Disorders	1024 (36.2%)	958 (3.4%)
Alcohol use disorder	541 (19.1%)	428 (1.5%)
Drug use disorders (except nicotine)	401 (14.2%)	513 (1.8%)
Suicidal attempts and self-harm	282 (10.0%)	253 (0.9%)
ADHD	282 (10.0%)	552 (2.0%)
<b>Dispensed medicine before GD</b>		
Antidepressants	1370 (48.4%)	3509 (12.4%)
Hypnotics	946 (33.4%)	2622 (9.3%)
Anxiolytics	911 (32.2%)	2582 (9.1%)
Drugs used in addictive disorders	244 (8.6%)	457 (1.6%)
Psychostimulants	233 (8.2%)	500 (1.8%)

## 4.1.2 Results

### 4.1.2.1 GEE-model

We found an increased risk of long-term work disability during four years, starting one year before being diagnosed with GD (Adjusted Odds Ratio, [AOR] = 1.32; 95% CIs = 1.17–1.48) peaking at the time of diagnosis (AOR = 1.89; 95% CIs = 1.67–2.13)) and continuing up to three years after the diagnosis (AOR = 1.28, 95% CIs = 1.13–1.44). Figure 4 displays the *GEE model* adjusted for age, gender, education, birth country, living area, family, the number of somatic and psychiatric diagnoses, and psychotropic medication. Y-axis shows the probability of long-term sick leave (>90 days/year), and the X-axis displays the years in relation to GD diagnosis.

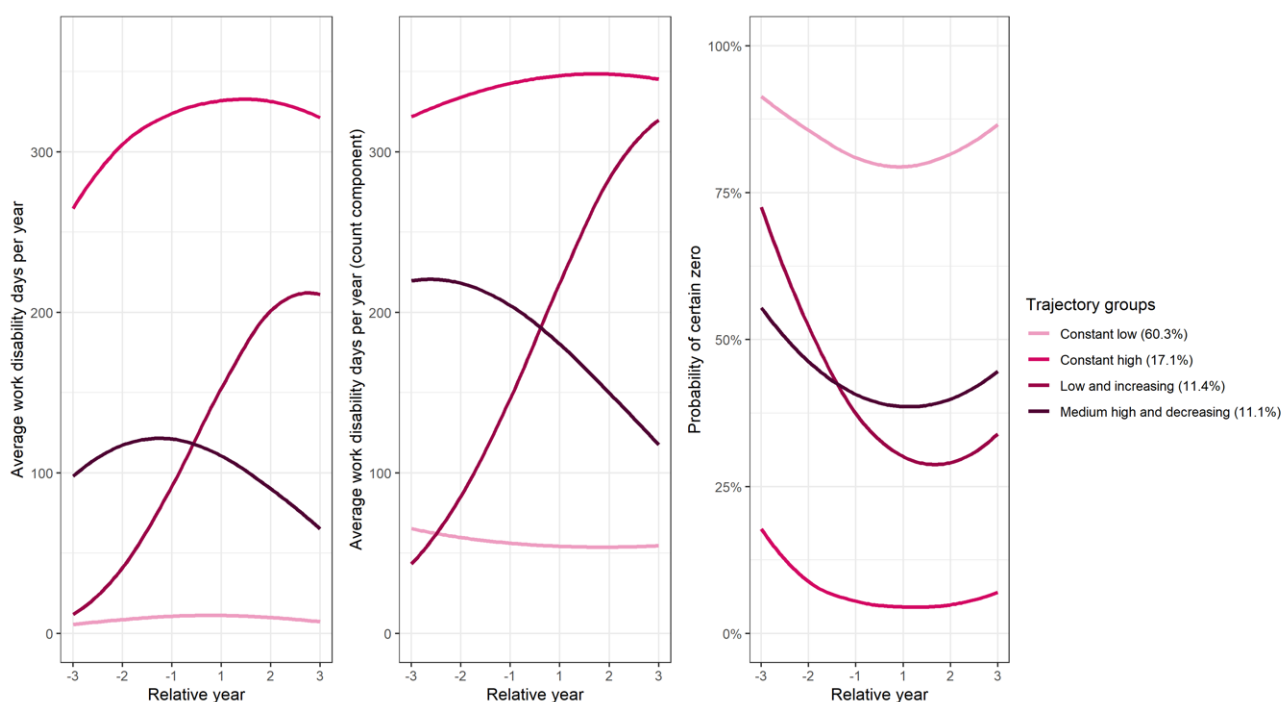


**Figure 4.** Adjusted GEE-model.



#### 4.1.2.2 Group-Based Trajectory Model

Four trajectory groups (Figure 5abc) of work disability days/year were identified: the *constant low* (60.3%, 5.6 to 11.2 days), *low and increasing* (11.4%, 11.8 to 152.5 days), *medium-high and decreasing* (11.1% 65.1 to 110 days), and *constant high* (17.1%, 264 to 331 days). Patients who were female, older, had a prior psychiatric diagnosis, and had dispensed psychotropic medication, particularly antidepressants, were more likely to be assigned to groups other than the *constant low*. These findings add knowledge about the social and financial harms linked with GD and highlight the importance of earlier detection and prevention of GD among these groups.



**Figure 5abc.** Trajectory groups and three different work disability measures over six years.

## **4.2 Study II: Treatment for Problem Gambling and counselors' perception of their clinical competence: A national web survey in Sweden**

Study II was a cross-sectional survey focusing on the counselors delivering treatment for PG since they are essential in bridging science to practice. In this study, we aimed to map the treatment offered, how counselors chose to prioritize among change techniques, and how secure they experience their role and competence in the work with clients with PG.

### **4.2.1 Methods**

#### *4.2.1.1 Participants and procedure*

We sent an invitation to a cross-sectional web survey to all municipalities and regions in Sweden, aiming to recruit all practicing PG counselors within the public domain in the spring of 2020.

#### *4.2.1.2 Measures*

A version of the *Short Alcohol and Alcohol Problems Perception Questionnaire* (SAAPPQ) (Richardson et al., 2020) specifically adapted for PG was used. In this questionnaire, counselors rated their willingness, competence, adequacy, and legitimacy to work with individuals with PG. They were also asked to provide details regarding what type of treatment was offered, what type of change technique they prioritized, and their demographic details.

#### *4.2.1.3 Statistical analysis*

Predictors of role security: age, gender, years as a PG counselor, number of clients with PG monthly, and whether or not counselors were offering CBT, were entered in a multivariate regression model using the subscales of SAAPQ as dependent variables. The prioritization of treatment components was presented descriptively, and response patterns were analyzed with a Principal Component Analysis.

### **4.2.2 Results**

We recruited 188 (67 % females) PG counselors working within the social services organized by the municipalities or addiction centers within healthcare. The most common treatment offered for PG was CBT, followed by MI.

There was a wider range of treatment provided within social services as compared to health care; the mean number of treatment types was 3.8 there, compared to 2 within health care.

**Table 4.** Descriptive of the PG counselors and the treatment offered.

N full sample	188
Age, mean	49.39
Women (%)	67
Employed in social services n (%)	163 (86)
<b>Years working with PG treatment (%)</b>	
0-1	8.4
2-3	45.2
4-6	28.7
7-10	9.6
>10	8.5
<b>Most common treatment offered (%)</b>	
CBT	76.5
MI	74.3
Supportive counseling	54.6
Support for concerned significant others	37.2
Twelve step facilitation	35.5
Community Reinforcement Approach	28.4

Noteworthy was the low number of clients the counselor reported seeing; more than 70% of the counselors saw two or fewer clients monthly. However, seeing more clients was significantly associated with a higher *willingness* (OR = 1.95, 95% CI = 1.49-2.61), *adequacy* (OR = 1.49, 95% CI = 1.12 -1.95), and *legitimacy* (OR = 1.38, 95% CI = 1.08 – 1.75) in the clinical task. Offering CBT was associated with higher *adequacy* (OR = 2.72, 95% CI = 1.41 -5.21). Years of working with counseling for PG, age, gender, workplace, or length of education were not associated with any of the factors of the SAAPPQ.

#### 4.2.2.1 Prioritization of change techniques

The Principal Component Analysis described the most common type of change techniques prioritized by practitioners yielding the following sub-types: 1) *standard CBT* package including craving management, gambling cognitions, behavior activation, relapse prevention, and providing psychoeducation to clients; other subtypes of counselors' prioritization were: 2) *screening and self-help*; 3) *involving peers and family* in the treatment or; 4) focusing on *exposure* strategies and not being self-excluded from gambling.

**Table 5.** Output from Principal Component Analysis. Type of change technique and its factor loadings. Loadings >.40 presented.

<i>Standard CBT</i>	<i>Assessment and self help</i>	<i>Family</i>	<i>Exposure</i>
Gambling Cognitions(0.82)	Functional analysis(0.40)	Attention to children(0.50)	Exposure(0.72)
Craving Management(0.76)	Mindfulness(0.60)	Involving CSOs(0.81)	Self-Exclusion(-0.73)*
Preventing relapses(0.76)	Assessment(0.79)		
Avoiding risk situations (0.73)	Self-Exclusion(0.40)		
Psychoeducation(0.67)			
Finding alternative activities(0.57)			
Motivation(0.51)			
<i>% of variance explained by factor</i>			
<b>32.28</b>	<b>9.69</b>	<b>8.02</b>	<b>6.82</b>

\*self-exclusion was negatively correlated with exposure.

### **4.3 Study III: "I see myself": Craving imagery among individuals with addictive disorders**

Study III aimed to further knowledge about what the craving experience constitutes in terms of cognitive mode and content, how it is experienced, and how individuals with addiction cope with their cravings.

#### **4.3.1 Methods**

##### *4.3.1.1 Participants and procedure*

The focus of the study was individuals with addictive disorders, GD, and Alcohol Use Disorder (AUD) with recent craving experiences. Clinicians working with the target group were contacted and asked to recruit participants who matched the inclusion criteria and were willing to participate in an explorative interview.

##### *4.3.1.2 Measures*

A semi-structured interview explored the type and content of thought when craving, the context during craving, and how the participants coped with their craving. An additional web survey collected data on demographics, psychiatric comorbidity, and craving experiences according to the Craving Experience Questionnaire adapted for gambling (CEQ) (Cornil et al., 2018).

##### *4.3.1.3 Analysis*

Transcribed interviews were analyzed with thematic analysis (Braun & Clarke, 2012, 2021). Transcripts were read and re-read to categorize their content in domains with themes and sub-themes. Themes and sub-themes were discussed and reviewed by a co-author. Responses from the web survey were presented descriptively.

### 4.3.2 Results

Twenty-one participants (10 with AUD and 11 with GD) were recruited and completed the interview and web survey. Table 6 presents the demographics and the clinical correlates in the sample.

**Table 6.** Sample descriptives.

Variable	Scale	Participants with AUD (n=10)	Participants with GD (n=11)
Women		6 (60%)	5 (45.5%)
Men		4 (40%)	6 (54.5%)
Age, mean (range)		49.1 (27–62)	38.5 (27–54)
In a relationship		3 (30%)	9 (81.8%)
<b>Clinical correlates</b>		<b>Mean (sd)</b>	<b>Mean (sd)</b>
Acceptance and Action Questionnaire (AAQ) (Lundgren & Parling, 2017)	6–42	22.50 (10.3)	19.20 (11.4)
Difficulties in Emotion Regulation Questionnaire (DERS) –16 – item version (Bjureberg et al., 2016)	16–80	39.90 (14.1)	37.60 (11.9)
Patient Health Questionnaire (PHQ–9) (Kroenke et al., 2001)	0–27	12.60 (7.5)	11.70 (7.5)
Generalized Anxiety Disorder (GAD–7) (Spitzer et al. 2006)	0–21	14.70 (5.9)	14.20 (5.5)
WHO Adult ADHD Self-Report Scale (ASRS) (Adler et al. 2006)	0–72	29.50 (10.2)	32.00 (13.1)
Alcohol Use Disorder Identification Test (AUDIT) (Saunders et al., 1993)	0–40	15.50 (12.0)	5.20 (3.8)
Drug Use Disorder Identification Test (DUDIT) (Berman et al., 2005),	n > 1	1	1
NORC Diagnostic Screen for Gambling Problems* (NODS) (Hodgins, 2004).	0–10	–	3.81 (3.8)

\*NODS = last 30 days

#### 4.3.2.1 Themes in content of craving

The imagery descriptions reflected situations of drinking and gambling and the preparative routines before consumption. These were labeled as *anticipation and rituals* involving a high level of expectancy. Under this theme, participants described their routine in buying alcohol or preparing for a gambling session, e.g., transferring money or positioning themselves where they commonly gamble. Under the theme *me, there and then* participants portrayed themselves carrying out the addictive behavior in a positive manner, with descriptions such as being in their “favorite place” or “being in control.”

The theme *something good will come out of it* summarized the expected outcomes from drinking or gambling. Individuals with GD more commonly had outcomes related to gaining financial assets and descriptions such as “I want to give to other people” or “solving debts,” whereas craving related to alcohol more involved an expected dampening effect or escape from stress to a greater extent than craving related to GD. See Figure 6.



**Figure 6.** Themes of craving content and abbreviated quotes. Images by Master 1305 and Winter on Freepik

#### 4.3.2.2 Modes of thought

A common phenomenon that characterized respondents’ descriptions was that craving was initially dominated by mental imagery, and that verbal thought constituted a secondary, contemplative, or even conflictual phase.



**Figure 7.** The conflict between mental imagery and verbal thoughts.

Cravings related to gambling were more associated with external stimuli (upcoming sports events or receiving money) and gaining financial assets, whereas alcohol cravings were, to a larger extent, described in relation to expected internal emotional outcomes, such as reducing stress or anxiety through drinking.

## **4.4 Study IV: Emotion regulation-enhanced group treatment for gambling disorder: a non-randomized pilot trial**

Study IV added to research showing that difficulties in emotion regulation are linked to PG by testing treatment enhanced with emotion-regulation content in a pilot and feasibility trial.

### **4.4.1 Methods**

This was a non-randomized pilot trial using a mixed methods design, integrating quantitative within-group outcomes on GD symptoms and psychiatric comorbidity with interviews on the participant's experience of the treatment. Components from emotion regulation treatment were added to a CBT treatment protocol for GD. The trial was pre-registered at ClinicalTrials.gov (Identifier NCT03725735).

#### *4.4.1.1 Participants and procedure*

Participants were recruited from the waiting list at the Stockholm Center for Dependency Disorders and offered participation in emotion regulation-enhanced group CBT-treatment over eight sessions with an additional booster session. Given the large proportion of individuals with GD who fulfill an additional psychiatric diagnosis, we did not exclude participants with comorbid psychiatric diagnoses.

#### *4.4.1.2 Measures*

All participants were interviewed with the Structured Clinical Interview for Gambling Disorder (Grant et al., 2004; Molander et al., 2023) and the M.I.N.I. screener for psychiatric disorders (Sheehan et al., 1998). In addition, participants completed self-reports of anxiety, depression, alcohol use, gambling cravings, and difficulties in emotion regulation. During treatment, participants reported weekly symptoms of GD, gambling expenditures, anxiety, and depression in a web survey.

For an analysis of treatment feasibility and credibility, we used a semi-structured feasibility interview combining the Client Satisfaction Questionnaire (CSQ-8) (Attkisson & Greenfield, 1996) and the Treatment Acceptability Questionnaire (TAQ) (Hunsley, 1992) with additional open-ended questions about the participant's experience of the treatment. Transcripts were analyzed according to thematic analysis (Braun & Clarke, 2012, 2021).

### **4.4.2 Results**

We recruited twenty-one adults (17 men and four women) with GD. Online casino was the most common gambling format (played by 52%), followed by online sports betting (29%) and Electronic Gaming Machines (24%). The sample showed high rates of comorbid anxiety and depression: 80% screened positive for any depressive disorder, 19% for panic disorder, and 14% for alcohol use disorder.

#### *4.4.2.1 Symptoms of Gambling Disorder and psychiatric comorbidity*

Symptoms of GD, measured by the Gambling Symptoms Assessment Scale (G-SAS), showed a 47% decrease between baseline and 12-month follow-up. Additionally, clinical interviews supported the improvement in outcomes; from initially having a mean of 7



criteria of GD at pre-treatment, there was a reduction to 2.1 criteria fulfilled at the 12-month follow-up.

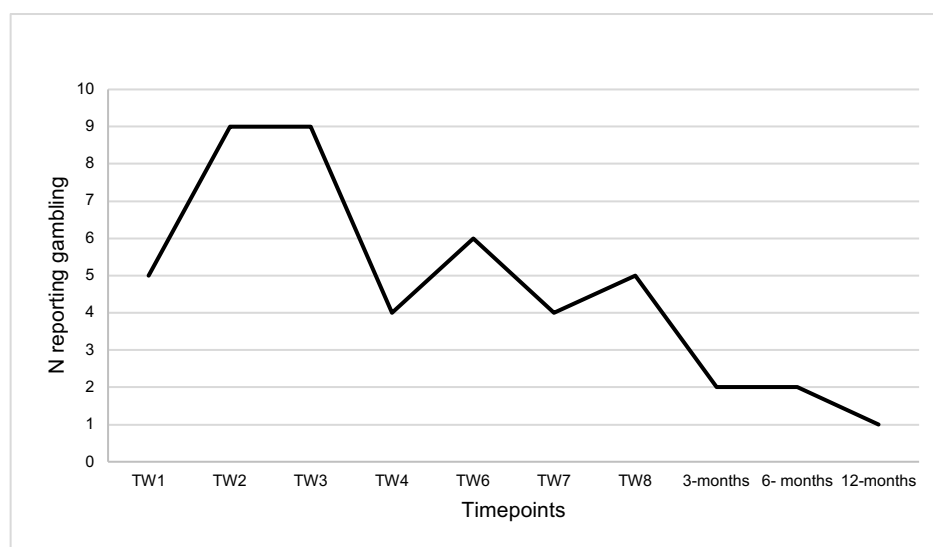
**Table 7.** Means and standard deviations of outcomes.

Outcome	Pre-treatment	Post-treatment	3-month follow-up	6-month follow-up	12-month follow-up	Hedges' <i>g</i> Pre- to 12-month follow-up (95% CI)
G-SAS	25.8 (10.68)	16.7 (9.59)	16.1 (8.04)	13.6 (8.70)	13.7 (10.19)	1.03 (0.59, 1.49)
GUS	13.4 (10.93)	5.5 (7.33)	3.8 (5.55)	2.2 (5.78)	6.6 (8.39)	0.44 (0.07, 0.81)
DERS-16	25.1 (14.66)	19.1 (9.51)	15.7 (9.92)	14.2 (9.02)	20.4 (17.18)	0.10 (-0.25, 0.45)
GAD-7	16.3 (5.54)	5.7 (3.54)	6.0 (4.18)	5.2 (3.75)	5.8 (7.21)	1.73 (1.16, 2.34)
PHQ-9	12.7 (5.53)	6.4 (4.73)	6.4 (4.83)	6.4 (4.91)	8.3 (6.93)	0.59 (0.21, 0.98)

*Note.* G-SAS = Gambling Symptoms Assessment Scale (S. W. Kim et al., 2009), GUS = Gambling Urge Scale (Raylu & Oei, 2004), DERS = Difficulties in emotion regulation Scale, GAD-7 = Generalized Anxiety Disorder Scale, PHQ-9= Patient Health Questionnaire.

#### 4.4.2.2 Gambling expenditure

At every session and at three-, six- and 12-month follow-ups, participants reported their weekly expenditure on gambling. The number of participants reporting any expenditure declined from an initial five participants (of 21) at baseline to one participant at 12-month follow up. The mean weekly expenditure ranged from 0 to 3500 SEK and peaked during the fourth session and was at its lowest at 12-month follow-up. See Fig. 8.



**Figure 8.** Number of participants reporting any gambling expenditure the previous week during Treatment Week (TW) 1-8 and at 3-, 6- and 12-month follow-ups.

#### 4.4.2.3 Adherence and feasibility interviews

The participants completed an average of 6.3 sessions and rated the treatment high in credibility (mean CSQ-8: 27.3 of 32) and acceptability (mean TAQ: 32.3 of 36). The results from the thematic analysis suggested a need for prolongation of treatment and individual tailoring. In conclusion, adding emotion regulation strategies to the treatment for GD is feasible and acceptable and deserves further investigation.

## 4.5 STUDY V: A Longitudinal Study of Gambling Behaviors During the COVID-19 Pandemic in Sweden

Study V was rapidly initiated during the early stage of the COVID-19 pandemic. It aimed to address the concerns raised regarding the pandemic restrictions' impact on gambling and PG.

### 4.5.1 Methods

This longitudinal study used three measure points; one retrospective where participants were asked to rate their gambling and PG before the pandemic, and two measure points during the pandemic to track changes over time.

#### 4.5.1.1 Participants and procedure

We used various channels to recruit participants; the majority were recruited from social media, mainly Facebook, as well as through the national Gambling Helpline's website. We targeted adults living in Sweden who had gambled within the previous 12 months and were willing to participate in a survey on gambling during the pandemic. See Figure 9.



**Figure 9.** Image from recruitment advertisement.

#### 4.5.1.2 Measures

Given the novelty of the situation, we constructed items covering different types of consequences from the pandemic, e.g., being in home quarantine, having a home office, being infected with the Corona virus or experienced financial consequences. In addition, we added items measuring whether the pandemic had caused increased worries over finances, or mental or physical health. We also measured the presence of PG in the last 12 months according to the PGSI and conducted a short-term assessment of PG within

the past month. Participants were also asked to report the gambling formats and the money and time spent on each type.

#### *4.5.1.3 Statistical analysis*

We analyzed data on PG (past year and past month) and gambling frequency with a generalized linear model with a binomial link function. We dichotomized the past year's PG by using the cutoff of  $\geq 5$  points on the PGSI to be classified as an individual with PG. Restrictions, e.g., home office or quarantine, due to the pandemic were analyzed as time-varying covariates in a longitudinal model.

#### **4.5.2 Results**

We recruited 325 participants (mean age 39.8, 64.8% males), where a sub-sample ( $n=139$ ) completed a follow-up survey during the second wave of the pandemic. We did not find any significant association between restrictions and consequences due to the pandemic and a change in gambling or increased PG; i.e., we could not confirm the concerns raised.

We observed no significant changes between gambling formats. However, participants who initiated gambling on a high-risk gambling format ( $OR = 7.44, p < 0.001$ ) or were worried about their mental health due to the pandemic ( $OR = 2.85, p < 0.001$ ) were more likely to report past year PG and increase their gambling during the pandemic.

The direction of the association is unknown, but it indicates that those at risk for PG and with previous PG are more vulnerable to the impact of a pandemic and in need of preventive actions. Table 8 displays money spent on gambling, PG (monthly and yearly) and worries related to the pandemic at the three measure points: pre-pandemic, a retrospective assessment, and at the first and second wave of the pandemic.

**Table 8.** Gambling and worries during the Covid-19 pandemic.

	Pre-pandemic (n=283)	First wave (n=267)	Second wave (n=137)
<b>Money spent on gambling (SEK), median (IQR)</b>	195 (2,000)	90 (3,000)	0 (200)
PGSI 5+, n (%)		79 (31.3)	31 (25.0)
<b>Gambling problems past month, n (%)</b>			
Not at all	200 (76.0)	189 (71.3)	104 (78.8)
Some	35 (13.3)	22 (8.3)	11 (8.3)
Quite a lot	16 (6.1)	18 (6.8)	8 (6.1)
To a large extent	12 (4.6)	36 (13.6)	9 (6.8)
<b>Worried about personal finances due to the pandemic, n (%)</b>			
No, not at all		140 (48.3)	76 (55.5)
Yes, some		103 (35.5)	37 (27.0)
Yes, quite a lot		30 (10.3)	12 (8.8)
Yes, very much		17 (5.9)	12 (8.8)
<b>Worried about physical health due to the pandemic, n (%)</b>			
No, not at all		131 (46.3)	55 (40.1)
Yes, some		101 (35.7)	50 (36.5)
Yes, quite a lot		39 (13.8)	24 (17.5)
Yes, very much		12 (4.2)	8 (5.8)
<b>Worried about mental health due to the pandemic, n (%)</b>			
No, not at all		131 (46.3)	55 (40.1)
Yes, some		101 (35.7)	50 (36.5)
Yes, quite a lot		39 (13.8)	24 (17.5)
Yes, very much		12 (4.2)	8 (5.8)

## 4.6 Ethical Considerations

All included studies have been conducted in accordance with the principles of the declaration of Helsinki, with a stated purpose of research involving human subjects: “to understand the causes, development and effects of diseases and improve preventive, diagnostic and therapeutic interventions” (World Medical Association, 2013, p1). The involvement of participants in the studies has been based on weighing the benefits against the potential risks of participating. Studies I, III, IV, and V were reviewed and ethically approved, and study II was discussed with senior researchers concluding that there was a minimal risk for the PG counselors to participate in the study and ethical application required according to Swedish legislation on research ethics.

**Study I** used data from national registers and did not involve contact with participants and no identification on an individual level. Most inhabitants in Sweden are probably unaware of the amount of research they have contributed to with their data. In comparison to other health-related issues, GD is a relatively rare condition, at least in terms of registered diagnosis in health care. Presenting data on a specific level, such as subjects with GD and an additional rare diagnosis, could at least theoretically allow for identification and therefore has been avoided. After the registers were linked, the personal identity number was removed, hindering the identification and securing the integrity of each individual. Notably, most information available in these registers can be considered less private than what many people are willing to share on the internet and social media.

In **Study II**, the PG counselors reported their views on their professional role in the treatment, provided demographic data, and rated the importance of change techniques in treatment. We avoided details regarding their personal health or occupational well-being despite the awareness that such factors could affect their clinical work. To prevent the potential identification of individuals, we choose to aggregate professions with fewer participants, i.e., combining medical doctors and nurses into one category of “medical professions.”

**Study III** recruited a vulnerable sample of patients with addictive disorders and craving experiences and exposed them to an interview with the risk of eliciting symptoms. To ensure the safety of the participants, they were all either enrolled in treatment or offered, if needed, referral to treatment in addition to check-up calls from the researcher. All were informed that this study did not involve treatment, and we did not expect them to improve in their symptoms. Instead of monetary reimbursement, they were given movie vouchers as a token of gratitude for their participation.

**Study IV** also recruited a vulnerable sample of individuals with GD, and most of them also had comorbid psychiatric disorders. This recruitment strategy was decided upon to improve the ecological validity by mirroring the target group of individuals with GD seeking help within addiction care. All participants provided their informed consent and were followed weekly during treatment and at three, six, and 12 months. The counselors providing treatment in the project were all clinical psychologists with competence in addictive disorders and the possibility to assess and address any deterioration in psychiatric symptoms.

**Study V** used Facebook ads for recruitment, which could potentially be experienced as an intrusion in the feed for users. Nevertheless, the harm from participating was estimated to be minimal, and the benefits outweighed the downside of time spent

completing the survey. On the contrary, self-screening for PG can evoke concern and raise awareness of gambling habits and problems, and direct individuals at risk toward change. The participants were all informed about the purpose of the study and how to contact the Gambling Helpline if needed, where they could be offered support and advice on how to access treatment.

Overall, the potential benefits of the studies outweighed the risk to the participants. We have collected informed consent in Studies II-V, and participants were informed that they could withdraw at any time without providing a reason. We also have adhered to the principle that participation in research should never be forced upon, demanded, or presented as the only alternative for help.

One final comment on what society communicates to the citizens in terms of gambling. Numerous individuals have contacted me throughout the Ph.D. project to express their concerns about being exposed to gambling advertisements in many domains of their everyday life. Even after being self-excluded from gambling due to GD, some have received offers from gambling companies. In addition, it is virtually impossible to watch a sports event without being exposed to marketing from gambling companies. The risk of harm from research invitations can be considered negligible in this broader view of gambling communication in society.







## 5 Discussion

This thesis aimed to gain a broader and deeper understanding of the harms from PG and to further the treatment of the disorder from the perspective of the treatment providers and the change techniques used in treatment. The first two studies had a national scope covering 1) all working-age individuals with GD in healthcare registers and 2) most practicing PG counselors. An overarching conclusion from these studies is that the disorder is still rare in healthcare and that counselors do not receive adequate training in treating GD due to few seeking help. Studies III and IV narrowed the focus to the individual with GD, their experience of craving, and the acceptability of emotion regulation in treatment, and Study V tracked changes in gambling behavior during a pandemic.

With the introduction of the GD in 2013, the concept of an addictive disorder not involving the intake of a substance was recognized. This has spurred research into conceptualizing other behavioral addictions, such as internet gaming disorder, excessive shopping, pornography use, and internet addiction, to name a few (Grant et al., 2010). In parallel, there has been a debate about whether “normal” excessiveness is being pathologized, and uncertainties about how to define an addictive behavior have been highlighted (Kardefelt-Winther et al., 2017). The growing number of diagnoses has also raised questions regarding their utility in research and clinical practices. Recent transdiagnostic approaches, such as the Component Model of Addiction Treatment, have instead highlighted the importance of addressing similarities across addictions, e.g., loss of control, transitioning from liking to wanting, and dysfunction in emotion regulation and the motivational system. Moreover, the Research Domain Criteria (RDoC) (Cuthbert & Insel, 2013), proposed by the National Institute of Mental Health suggests that instead of the number of criteria endorsed, research and, subsequently, interventions should target common neurobiological and behavioral features that cut across different diagnostic categories. In an international Delphi study surveying forty-four addiction experts, seven constructs were endorsed as the most relevant in the understanding of addictive behaviors according to RDoC (Yücel et al., 2019). First, the most important constructs related to the Positive Valence System (i.e., seeking reward and behavior mainly positively motivated) were *reward valuation*, *expectancy*, *action selection*, and *reward learning*. These constructs mirror the content of the craving imagery described in Study III, with different states of expecting positive reward and elements of affective forecasting. As highlighted in the review, states of deprivation and pre-existing biases can affect the valuation of rewards and thus increase expectancy and anticipatory responses. The common notion in the development of GD that an early big win is essential to these learning processes has not been confirmed in the research

(Weatherly et al., 2004) but remains to be anecdotally cited. Second, and in addition to these constructs, *habit formation* (behaviors not under rational cognitive control), dysfunction in *inhibition*, and *compulsivity* (often described as the loss of control or “being taken over”) were rated as important during the later stages of the addictive process. However, one lesson from the craving interviews is that despite the cumulative punishing consequences of GD, initial reward learning and its anticipatory response remains.

The concepts investigated in the present thesis, craving and emotion regulation, both have the potential to further the treatment for GD. Current CBT treatment emphasizes the correction of irrational and dysfunctional thoughts, not all of them have proven to be connected to PG. Emotion regulation strategies, on the other hand, relates to many of the RDoC-constructs and focus on continued goal-oriented behaviors in the presence of strong emotional experiences. In addition, a more thorough analysis of the motives to gamble could provide better opportunities for tailoring treatment. Arguably, individuals that are sensitive to negatively reinforced gambling, as described in the Gambling Space Model, or the Emotionally Vulnerable pathway, might have a greater utility of emotion regulation treatment.

Moreover, given the low number of individuals seeking treatment for GD, which has consequences on the clinical experience among counselors, implementing transdiagnostic treatment could have the effect that counselors would receive important training in the treatment of addictive behaviors. Such treatment could focus on the shared features of addictive behaviors and the commonalities in the change techniques applied. The research on transdiagnostic treatments for addictive behaviors is still in its infancy, and more empirical data is needed, however.

## 5.1 Clinical implications

What lessons are to be learned for detection, prevention, and treatment? A critical implication of **Study I** is that healthcare needs to identify individuals with PG at an earlier stage and offer prevention and treatment. When entering healthcare, the problems have endured for a long time and are connected with work disability. One way forward could be screening on a selective level and putting GD on the agenda in healthcare, including primary care. Another strategy would be to continue educational efforts and primary prevention directed at the general population to reduce the shame and stigma surrounding the disorder and which hinders treatment seeking. Furthermore, since gambling at work is not only possible for many, but it may also be reinforced by colleagues betting, prevention efforts at work seem justifiable.

**Study II** points to the evident conclusion that clinical staff develops role security in the tasks they perform routinely. However, gaining experience in routine PG treatment is undoubtedly a challenge, given the low rate of individuals seeking treatment. The implication is, however, that clinics need to consider this when organizing their care and offer an opportunity for clinicians to gain adequate experience in the assessment and treatment of PG.

The role of craving within GD can and will be debated. **Study III** adds to the knowledge of how the cognitive content of cravings is experienced by individuals with addictive disorders. The dominance of mental imagery and anticipatory rituals points towards that the outcome of gambling or drinking is not exclusively present when craving but also the preparation. Additionally, the presence of imagery in descriptions of craving is not reflected in the current treatment models, see discussion in Study IV for an overview (Månsson et al., 2022a). However, when targeting craving in treatment, one cannot solely focus on their content, frequency, or intensity. One neglected aspect in both research and clinical practice is the individual's perceived ability to control behavior when experiencing a prominent craving: i.e., the craving self-efficacy. This concept has been investigated for alcohol craving and recently for gambling and deserves further attention.

The craving imagery's content involved anticipation and expectations of positive outcomes. This circumstance was, for some of the participants, a bit shameful, given the plethora of negative consequences experienced from drinking or gambling. However, this observation connects to the identified research gap within emotion regulation: the scarcity of research investigating difficulties regulating positive emotions and their connection to addictive behaviors. The finding of positive, anticipatory content and imagery-based thoughts during craving could provide more knowledge in developing interventions to help individuals with addictive disorders to regulate cravings.

Using transdiagnostic treatment for GD, tested in **Study IV**, seems promising and has the potential to address both PG and develop alternatives to cope with difficult emotions. Whether emotion regulation-based treatments are equally effective as standard CBT remains to be answered, but it could be a way forward for individuals struggling with emotion regulation in addition to GD. Adding functional strategies to deal with difficult emotions can tentatively be helpful for individuals using gambling to regulate emotional experiences, as the DSM 5 criteria state: “often gambles when emotionally distressed.” Noteworthy is that there were larger observed within-group changes in symptom-based measures of depression and anxiety than difficulties in emotion regulation, indicating that difficulties in emotion regulation strategies are more stable and trait-like. Preventive and psychoeducational interventions could be implemented at earlier stages of the addictive process.

And finally, what can be learned from a pandemic relevant to the clinic? As shown in **Study V**, those initiating high-risk games and experiencing worries are more likely to experience PG during a pandemic. Research following our study has shown that risk factors previously known, young individuals and those with prior PG were most likely to deteriorate during the pandemic (Quinn et al., 2022). There were also some positive effects on clinical practice during the pandemic, such as increasing the availability of treatment through teletherapy and online interventions.

## 5.2 Limitations

**Study I** addressed limitations in previous studies using national registers that could be viewed as insufficiently adjusted for confounding factors. With that said, this study might suffer from over-adjustment and may have controlled for factors that could be on the mediational path between GD and work disability. We did not control for psychiatric symptoms registered after GD; however, the temporal order between GD and psychiatric comorbidity is uncertain. The registers only detail when a diagnosis is registered and not the onset of symptoms. In addition, data on sick leave does not contain the first 14 days, i.e., does not capture whether individuals with GD have several shorter periods of sick leave.

Another limitation concerns the generalizability of the findings when the sample consists of individuals with GD participating in specialized healthcare. This sample represents a selected group, less than 1% of Sweden's estimated population of adults with past-year PG, i.e., >8 points on the PGSI in the Swedish prevalence survey. Those entering specialized healthcare typically have more severe problems of longer duration but have in common that they have overcome the obstacles of shame and stigma and sought help. **Studies I–IV** analyze data from treatment seekers, and results should be interpreted in this context.

**Studies II, IV, and V** used self-reports as the primary data source. Online questionnaires are easy to administer and a common and reliable way of collecting data; however, they have limitations. Many of the items in the questionnaires require a certain level of language skills in addition to an ability to adequately remember and report behaviors that might be problematic and shameful. Other concepts, such as being aware of and reporting emotional experiences or cravings, also demand the capability to observe and reflect upon private psychological events. These subjective phenomena might also be highly susceptible to recall bias, e.g., post hoc attribution of gambling episodes to craving or emotional difficulties; "I gambled, therefore I must have had cravings." Repeated measures might also cause a learning effect; the participant is inclined to provide the expected "correct" answer (i.e., less anxiety) after repeated administrations. These limitations in self-report data are in addition to the known statistical effect of regression to the mean, interpreting natural variation as a change (Barnett et al., 2005). This applies mainly to **Study IV**, and therefore we have been very modest in interpreting the reduction in outcomes among participants.

Furthermore, when recruiting participants for studies, sampling bias is always an issue, and one hardly ever ends up with an entirely representative sample. Here are three examples:

- 1) When inviting participants for feasibility interviews after treatment (**Study IV**), those with positive experiences might be more inclined to enroll, and those negative to treatment might be more likely to drop out or decline the invitation to be interviewed. This might cause a skewed sample and affect the results towards more positive descriptions.
- 2) When recruiting participants for a web survey of gambling during a pandemic (**Study V**), self-selection is an issue. Individuals who are worried or that have had a recent shift in their gambling might be more inclined to enroll and bias the sample towards more dramatic changes.
- 3) Even though **Study II** probably recruited most practicing PG counselors in Sweden at the time, one could easily imagine that more conscientious counselors with more time available (perhaps due to the absence of PG clients?) may have been more likely to participate in a web survey.

Finally, **Study V** was conducted without knowing the duration of the pandemic and what measures would be taken by the Swedish government. In retrospect, one must mention that Sweden did not use draconic measures during the pandemic, and everyday life was not as affected as it was in many other countries. In addition, between the measure points (wave one and wave two), there was also a government-issued restriction on online gambling, which could have impacted the results.



## 6 Conclusions

The conclusions from each of the studies are as follows:

**Study I:** GD is associated with an increased risk of work disability even after controlling for comorbid psychiatric disorders. The risk starts the year before diagnosis and remains elevated for three years after diagnosis. Comorbid conditions seem to have a synergistic effect when combined with GD, and individuals of female sex, with depression and anxiety disorders or medicating for depressive symptoms are at increased risk. Furthermore, the trajectory groups of work disability are heterogeneous, and most individuals remained at constant low risk of work disability throughout the six years, most of them males of younger age. This study adds to the knowledge of what financial and social harms are experienced by individuals with GD.

**Study II:** CBT and MI are the most commonly offered interventions for PG in Sweden (Månsson et al., 2022c). It also concludes that 70% of the counselors treat less than two clients with PG monthly, a circumstance linked to lower perceived *adequacy, legitimacy, and willingness* in their clinical work. In addition, most counselors reported that addressing motivation and *general CBT* techniques were important to include in treatment. In addition, subgroups of counselors emphasized either *involving family members* in treatment, focusing on *assessment and self-help*, or *exposure techniques*.

**Study III:** Descriptions of cravings from individuals with addictive disorders are dominated by mental imagery, typically involving preparative rituals and anticipation. The imagery of carrying out the addictive behavior, drinking or gambling, and an expectancy of positive outcomes were also common. Alcohol craving is related to seeking relief from aversive emotional states, and gambling craving typically involves gaining financial assets. Verbal thoughts were often described as inhibitory self-talk, attempting to refrain from gambling or drinking.

**Study IV:** Adding emotion regulation strategies to CBT for GD is feasible and potentially adds to the clinical toolbox in the treatment of GD. More studies are needed involving larger samples and a control condition to investigate the efficacy of the treatment. There is also a need for further individual tailoring and opportunities for a prolongation of treatment.

**Study V:** Those initiating a high-risk game or worrying about their mental health during the covid 19 pandemic were more likely to increase their gambling and experience PG (Månsson et al., 2021). Furthermore, there were no observed links between pandemic restrictions such as quarantine or home office and increased gambling or PG, and no significant migrations between different gambling formats despite the change in availability.





## 7 Points of perspective and future directions

In this section, in a bullet-point manner, I will discuss future directions regarding gambling research, prevention, and treatment based on experiences from the present Ph.D. project.

- Continue to work towards *increasing awareness of PG* and reduce stigma among those that develop problems. This work is already underway, with educational activities of staff in the public domain, but changing attitudes and working methods seem to take time.
- Disentangle *what works in treatment*. There is a growing number of randomized controlled trials, but still, we need to answer what techniques in treatment work best, for whom, under what conditions, delivered by whom, in what dose, and in what mode of delivery.
- Promote gambling research that is *independent and publicly funded*. Solid research should be separated from those earning money on PG, and funds distributed according to the quality of applications. As responsible gambling practices become a marketing strategy among operators, research might contribute to legitimizing business. This has been pointed out by several well-known researchers in the field (Bowden-Jones et al., 2022).
- Conduct more *long-term follow-ups* of treatment. As often mentioned, quitting or reducing gambling in the short term is one thing, but maintaining control of gambling over time is another. At least 12 months follow-ups after treatment termination should be a rule of thumb, and longer follow-ups will also shed light on functionality and quality of life.
- *Investigate what characterizes an effective PG treatment provider* and not just the treatment. This area is hugely neglected, and we need to know more about empowering the workforce that treats addictive disorders. In addition, we should conduct more research investigating the effect of the vast amount of time and money spent on training clinical staff.
- Integrate the *triad of risk factors*: individual, circumstances (social and societal), and type of gambling format. What types of games are riskier, for what individual, and under what circumstances?
- Increased *screening in vulnerable populations*. For many, mentioning gambling problems during a healthcare visit does not come naturally. Therefore, PG (amongst other problems humans tend to conceal) must be part of routine screening.
- *Offer GD treatment in healthcare* by clinicians with adequate knowledge of common comorbid conditions. In the Swedish context, help-seeking has been

complicated by dividing addiction care between municipalities and health care, an organization debated, criticized, and now proposed to be changed (Swedish Government, 2020). Given the high rates of comorbid conditions, treatment providers need to know how to treat common psychiatric disorders and not just the addictions.

- *Validate measures.* Collecting data from human subjects can sometimes be a mess, with missing data and, at times, needing clarification about what data actually means. What does “being constantly preoccupied with gambling” represents? And: “how many hours have you craved gambling within the last week?” Such items can be difficult to answer and are subject to measurement errors. Always pilot and assess the measures' feasibility, interpretability and data collection strategy. Not to mention collecting data on gambling expenditures or the growing exhaustion of responding to questionnaires in the population.

Altogether, reducing harm from gambling requires effort in many domains. Much remains to be done, but improving knowledge, screening, and treatment in healthcare could be one path forward. In addition, a continued professionalization of treatment and its providers would improve the quality and credibility of services.

With that said, I want to thank you for your time and attention in reading this thesis.

## 8 Acknowledgments

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