

A treatment seeking population with Gambling Disorder

Internet treatment, severity and gender

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– till Emil och Marianne

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ABSTRACT

Gambling is a common pastime all over the world, but can become harmful in excess and can even develop into an addictive behavior, a Gambling Disorder (GD). The aim of this thesis was to contribute to the clinical understanding of treatment seeking individuals with GD, and relevant treatment options for this group. In **Paper I**, the Gamblers' Beliefs Questionnaire, a measure of cognitive distortions related to gambling, was translated and validated in a Swedish context. In **Paper II**, clinical differences between GD severity levels were examined among participants recruited at the "Clinic for Gambling Addiction and Screen Health" at Sahlgrenska University Hospital in Gothenburg. It was found that those with severe GD were more depressed and anxious, and more likely to gamble as a way of "escape". Gamblers with moderate and severe disorder had greater difficulties regarding emotion regulation. Increasing severity was also associated with more alcohol and drug problems, and an earlier gambling debut. **Paper III** explored gender differences in a similar clinical sample with GD. Women with GD were found to be older than men, and more commonly engaged in online casino gambling. They were also more often single parents, started gambling later in life, developed problems quicker, and were more often categorized as "emotionally vulnerable gamblers". Women also had more symptoms of depression and anxiety, while men had more problems with illicit drugs. In **Paper IV**, Internet-delivered Cognitive

Behavior Therapy (ICBT) was compared to a limited internet-delivered control treatment using a randomized controlled trial design. The ICBT was not found to be more effective than the control treatment. Both treatment groups had subclinical symptoms post-treatment and the largest change in gambling behaviors occurred between assessment and treatment start.

In conclusion, this thesis contributed a new instrument for use in the clinic and research alike, it found relevant differences among subgroups with GD, and it found that interventions of low intensity might be effective for gambling symptoms. This knowledge is a first step in the future individualization of the treatment of GD.

Keywords: Gambling Disorder, ICBT, Cognitive Distortions, Severity, Gender

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SAMMANFATTNING PÅ SVENSKA

Spel om pengar är vanligt såväl i Sverige som i övriga världen. I Sverige spelar ungefär 55% av befolkningen åtminstone någon gång om året. För mycket spelande kan dock leda till problem, och det är vanligt med ekonomiska svårigheter, problem i viktiga relationer, eller svårigheter relaterat till arbete och studier. I Sverige har ca 1,3% ett problemspelande. Spel om pengar kan även utvecklas till en beroendesjukdom. Hos personer med spelberoende är det vanligt med samtidiga komorbida psykiatriska tillstånd. I den här avhandlingen har vi studerat personer med spelberoende som sökt hjälp på "Mottagning för spelberoende och skärmhälsa" i Göteborg. Vi ville undersöka om olika grupper av personer med spelberoende som söker hjälp i sjukvården skiljer sig åt avseende viktiga kliniska karakteristika, för att öka förståelsen för olika patientgrupper inom spelberoende, och därigenom öka möjligheterna till kliniska anpassningar. Vi ville också undersöka om en behandling med Kognitiv Beteendeterapi som gavs över internet kunde hjälpa personer med spelberoende. Endast 21% av personer med spelproblem söker hjälp i någon form, men en behandling över internet skulle potentiellt kunna nå ut till fler. Utöver detta översatte och validerade vi ett formulär konstruerat för att mäta en persons irrationella tankar om spel.

I **Paper I** översatte vi ett självskattningsformulär som mäter irrationella tankar kopplade till spel om pengar. Dessa tankar kan t. ex. handla om misstolkningar kring hur slumpen fungerar, eller en tendens att överskatta sin kontroll över utfallet i spelet. Vi validerade sedan det översatta formuläret i en svensk population, och fann att formuläret var tillförlitligt och mätte det som det förväntades mäta även i svenska förhållanden. Irrationella tankar om spel kan påverka en persons risk för att utveckla och stanna kvar i ett spelberoende, och därför är det viktigt att kunna mäta dessa på ett korrekt sätt. Formuläret användes också i de andra studierna i avhandlingen.

I **Paper II** jämförde vi personer med spelberoende som sökt vård på "Mottagning för spelberoende och skärmhälsa" med olika grad av spelberoende, lindrigt, medelsvårt eller svårt, på en rad demografiska och kliniska karakteristika. Vi fann att de som hade ett svårt spelberoende hade mer känslomässiga problem, vilket yttrade sig på ett antal olika sätt. Denna grupp hade mer symtom på ångest och depression, de spelade oftare som ett sätt att fly, och de hade, tillsammans med de med medelsvårt spelberoende, större

svårigheter att reglera sina känslor. Ökad svårighetsgrad av spelberoende var också associerat till större problem med alkohol och droger.

I **Paper III** jämförde vi kvinnor och män med spelberoende som sökt vård på ”Mottagning för Spelberoende och Skärnhälsa” och fann då att kvinnor med spelberoende på gruppnivå var äldre än männen, och de spelade nästan uteslutande på online casinospel. De var oftare ensamstående föräldrar, började spela senare i livet, och spelandet övergick i problem på kortare tid. Kvinnor hade också mer ångest och depressionssymtom, och de klassificerades oftare som ”emotionellt sårbara spelare”, enligt den så kallade ”pathways” modellen för spelberoende. Emotionellt sårbara spelare antas ha mer emotionella problem före debut av spelberoendet, och använda spel mer för att hantera negativa känslor i större utsträckning. Män klassificerades å andra sidan i större utsträckning som ”antisociala impulsivister” i samma modell, vilket innebär att spelandet bland annat påverkas av förmågan till impulskontroll. Män hade också oftare problem med droger än kvinnorna.

Det finns alltså viktiga skillnader mellan män och kvinnor med spelberoende, men också mellan grupper med spelberoende av olika allvarlighetsgrad. Denna kunskap kan användas för att bättre förstå en person med spelberoende som söker behandling, och för att i framtiden utveckla mer anpassade behandlingar.

I **Paper IV** undersökte vi i en randomiserad kontrollerad studie, om Kognitiv Beteendeterapi över internet kunde hjälpa personer med spelberoende. Deltagare slumpades till 8 veckors internetbaserad Kognitiv Beteendeterapi, eller 8 veckors stöd- och motivationshöjande insatser över internet. Vi fann att den Kognitiva Beteendeterapin inte var bättre än den behandling som kontrollgruppen fick, vare sig vid slutet av behandlingen eller efter 6 månaders uppföljning. Däremot var deltagarna i båda grupperna förbättrade och hade på gruppnivå endast subkliniska symtom vid behandlingens slut. Vi upptäckte också att den största förbättringen skedde efter att man varit på ett första bedömningsamtal, men innan behandlingen startat. Båda dessa fynd, att även de som fått en mindre intensiv behandling var förbättrade, och att mycket förbättring skett redan innan behandlingen startade, kan betyda att väldigt enkla behandlingsformer eller interventioner potentiellt skulle kunna vara till hjälp för vissa personer med spelberoende. Denna kunskap kan användas för att fortsatt utveckla behandlingsutbudet för spelberoende, med behandlingar med lägre intensitet och lägre tröskel, i syfte att nå ut med behandling till fler av de drabbade.

LIST OF PAPERS

This thesis is based on the following papers, referred to in the text by their Roman numerals.

- I. **Mide M**, Karlemon P, Söderpalm Gordh A. Validation of a Swedish translation of the gamblers' beliefs questionnaire. *Current Psychology* 2023; 42:15156-15168.

- II. **Mide M**, Arvidson E, Söderpalm Gordh A. Clinical differences of mild, Moderate and Severe Gambling Disorder in a Sample of Treatment Seeking Pathological Gamblers in Sweden. *Journal of Gambling Studies* 2023; 39:1129-1153.

- III. Miller L, **Mide M**, Arvidson E, Söderpalm Gordh A. Clinical differences between men and women in a Swedish treatment-seeking population with gambling disorder. *Frontiers in Psychiatry* 2023; 13:1054236.

- IV. **Mide M**, Mattiasson J, Norlin D, Sehlin H, Rasmusson J, Ljung S, Lindskog A, Petersson J, Saavedra F, Söderpalm Gordh A. Internet-delivered therapist-assisted cognitive behavioral therapy for gambling disorder: A randomized controlled trial. *Frontiers in Psychiatry* 2023; 14:1243826.

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ABBREVIATIONS

ADHD	Attention-Deficit Hyperactivity Disorder
ASRS	The World Health Organization adult ADHD self-report scale
AUDIT	Alcohol Use Disorders Identification Test
BBQ	Brunnsviken Brief Quality of life scale
BC	Before Christ
CBT	Cognitive Behavioral Therapy
CFA	Confirmatory Factor Analysis
DERS-16	Difficulties in Emotion Regulation Scale, brief version
DSM-5	Diagnostic and Statistical Manual Version 5
DUDIT	Drug Use Disorders Identification Test
GAD-7	Generalized Anxiety Disorder Assessment
GBQ	Gamblers' Beliefs Questionnaire
GD	Gambling Disorder
GDIT	Gambling Disorder Identification test
GPQ	The Gambling Pathways Questionnaire
G-SAS	Gambling Symptom Assessment Scale
G-TLFB	Time-Line Follow Back adapted to gambling
GUS	Gambling Urge Scale
ICBT	Internet-delivered Cognitive Behavioral Therapy
IMI	Internet-delivered Motivational Interviewing

JAS	Jonsson-Abbott scale
MAR	Missing at Random
MI	Motivational Interviewing
MINI	Mini- International Neuropsychiatric Interview
NEQ	Negative Effects Questionnaire short form
NODS	The NORC Diagnostic Screen for Gambling Problems
PGSI	Problem Gambling Severity Index
PHQ-9	Patient Health Questionnaire
RCT	Randomized Controlled Trial
SCI-GD	Structured Clinical Interview for Gambling Disorder
TCS	Treatment Credibility Scale
WAI-SR	Revised short version of the Working Alliance Inventory

1 INTRODUCTION

1.1 GAMBLING

The activity of gambling seems almost universal in human societies. Archeological evidence of gambling, such as dice and gaming boards, have been found in a range of different cultures and times, e.g., Ur, 2000 Before Christ (BC), Egypt (1600 BC), and India (1000 BC). As early as 4000 BC the Hittites was betting on horse racing (McMillen, 1996), a form of gambling that is still popular to this day.

In Sweden, and all over the world, recreational gambling is a socially acceptable pastime. Gambling engagement varies a great deal between countries, with the prevalence of past-year gambling being estimated between 39.2–92.5% in different countries. The highest rates of past-year gambling have been found in Hong Kong (81.1%), Australia (82%), South Africa (91.7%) and Norway (92.5%) (Williams et al., 2012). In a recent population study (Public Health Agency of Sweden, 2023) it was found that 55% of the Swedish population had gambled in some form during the past 12 months, and as many as 12% had gambled every week. The most popular form of gambling in Sweden was lotteries and number games (47%) followed by horse racing (14%), bingo (13%), sports betting (12%), casino gambling (3.4%) and poker (2.3%).

However, for some, gambling is not only a recreational activity. Excessive gambling can be problematic and lead to a host of negative consequences and can even develop into a psychiatric disorder.

1.2 GAMBLING DISORDER

In the scientific literature, excessive and problematic gambling is described in different ways. In population studies the term “problem gambling” is often used to describe excessive gambling paired with problematic behaviors and consequences, e.g., in (Calado & Griffiths, 2016; Public Health Agency of Sweden, 2023).

Problematic gambling can also be classified as a psychiatric disorder. Gambling Disorder (GD) is described in the Diagnostic and Statistical Manual Version 5 (DSM-5) (American Psychiatric Association, 2013) as a “persistent gambling behavior manifested by four or more out of nine criteria during the past 12 months” (Table 1). A simple symptom count is used to classify the disorder as mild (4-5 symptoms), moderate (6-7) or severe (8-9).

Table 1. DSM-5 diagnostic criteria for Gambling Disorder.

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

Gambling Disorder was previously classified as an impulse control disorder. However, due to similarities with other substance use disorders it was re-classified in the DSM-5 (Hasin et al., 2013). It is now the only behavioral addictive disorder recognized in the DSM (American Psychiatric Association, 2013).

The term GD is new in the DSM-5. In the Diagnostic and Statistical Manual Version IV (DSM-IV) the disorder was instead called “pathological gambling” (American Psychiatric Association, 2000). However, for ease of understanding, this thesis will use the term GD when describing the psychiatric disorder, even when referencing older works. “Problem gambling” will be used for problematic gambling behaviors in population studies or where a psychiatric diagnosis has not been confirmed.

1.3 CONSEQUENCES AND COMORBIDITY

Gambling Disorder is associated with several negative consequences, such as financial and health problems (Bergh & Kühlnhorn, 1994; Hilbrecht et al., 2020) and impaired relations to significant others (Bergh & Kühlnhorn, 1994). It might even have a direct negative impact on the family or social network of those affected (Hilbrecht et al., 2020). Increased rates of suicide attempts (Newman & Thompson, 2003), suicides, and all-cause mortality (Karlsson & Håkansson, 2018) are also associated with GD. However, the increased suicidality associated with GD might be partly explained by comorbid psychiatric disorders. In the study by Newman and Thompson (2003), the effect of GD on suicide attempts was no longer significant after controlling for comorbidities. Also, depression was a predictor of suicide in the study by Karlsson and Håkansson (2018).

Indeed, comorbid psychiatric disorders are common in GD. In a meta-analysis of 36 studies (Dowling et al., 2015b) including either treatment seeking patients with GD or treatment seeking problem gamblers, weighted means for current comorbid disorders were high, with 17.6% having an anxiety disorder, 23.1% a mood disorder, 22.2% a substance use disorder and 9.3% attention-deficit hyperactivity disorder (ADHD). The most common mood disorder was major depression at 29.9% and the most common anxiety disorder was social phobia, 14.9%. Among substance use disorders, nicotine dependency was the most common at 56.4%, while 21.2% had any alcohol use disorder and 7.0% had an illicit drug use disorder (Dowling et al., 2015b). Similar results were found in an earlier meta-analysis of 11 population studies on participants with GD or problem gambling, with 37.9% displaying a mood disorder, 37.4% an anxiety disorder, 60.1% nicotine dependency and 57.5% a substance use disorder (Lorains et al., 2011). Finally, yet another meta-analysis found high rates of comorbid personality disorders, with 47.9% among treatment seeking problem gamblers displaying any personality disorder. The most common personality disorders were narcissistic (16.6%), antisocial (14.0%), avoidant (13.4%), obsessive-compulsive (13.4%) and borderline (13.1%) (Dowling et al., 2015a).

1.4 PREVALENCE

Population prevalence studies largely focus on problem gambling, rather than the prevalence of diagnosed GD. In a review of 202 studies from around the

world (Williams et al., 2012) prevalence rates of problem gambling were found to vary a great deal between different countries, ranging between 0.5–7.6% during the past year. The average prevalence was 2.3%, with Denmark having the lowest (0.5%) and Hong Kong the highest (7.6%). Another review of 69 studies found similar results with worldwide prevalence ranging between 0.1–5.8% (Calado & Griffiths, 2016).

There might be several reasons for between country differences, but one especially relevant factor might be the age composition in the population, where countries with a younger population tend to have higher rates of gambling problems (Williams et al., 2012). The most recent population study in Sweden found a 1.3% prevalence of past year problem gambling, with 0.5% having severe problems (Public Health Agency of Sweden, 2023). The prevalence of GD is less explored but has been estimated to around 0.5% or slightly higher worldwide (Potenza et al., 2019).

1.5 ETIOLOGY

Several types of etiological models of GD have been proposed, such as behavioral models (Weatherly & Dixon, 2007), cognitive-behavioral models (Sharpe, 2002), and social models (Ocean & Smith, 1993).

In addition to psychological and social factors, biological factors are also important. A host of neurotransmitters fulfilling different roles in the development of GD have been identified, such as Dopamine (rewards and reinforcement), Serotonin (impulse control), Norepinephrine (excitement), Glutamate (compulsiveness and cognitive inflexibility), Opioids (pleasure), and Cortisol (stress) (Potenza, 2013). Certain variants of genes associated to dopamine receptors, serotonin transporters, and monoamine-oxidase A, have also been associated with GD (Ibanez et al., 2003).

Due to the complexity of the etiology, a biopsychosocial model taking biological, psychological, and social factors into account is arguably the most accurate way of conceptualizing the development of GD (Ajdahi & Wolgast, 2008; Griffiths & Delfabbro, 2001; Sharpe, 2002). A biopsychosocial model is in essence broad. Therefore, sometimes models focusing more in detail on specific factors can be useful, for instance when developing a treatment.

Below, two theoretical models especially relevant for this thesis are explored in more detail.

1.5.1 A cognitive-behavioral model

A comprehensive biopsychosocial cognitive-behavioral model of GD is described by Sharpe (2002). This model postulates that some individuals are more vulnerable to develop GD due to both genetic and psychological factors. Genetic factors might be reflected as psychological traits, such as impulsivity. Psychological vulnerabilities can be specific traits or attitudes, such as positive attitudes towards gambling in one's family. Social factors might also influence the risk of developing GD. Even though gambling is widely accessible, it might be that belonging to certain social subgroups increases the risk of being exposed to gambling opportunities.

Further, according to this model, psychological factors such as cognitive biases related to gambling (these are further explored in section 1.6) and certain behavior patterns can develop from early experiences of gambling. Large wins, or a large number of small wins, early on in one's gambling experience might lead to an illusion of control over gambling, or an overestimation of one's chances of winning. Furthermore, gambling wins (and near wins) can lead to an experience of arousal. These experiences and cognitive biases interact to promote more gambling behaviors, which in turn automatizes these distortions and responses. When this is established, life events or experiences risk to cause the gambling behavior to spiral out of control. It is posited that gambling can be used both to avoid negative experiences as distress or boredom, but also to experience arousal. These experiences cause an urge to gamble, which an individual might act on if they do not have adequate coping strategies. The act of gambling then becomes reinforced by achieving the desired effect (e.g., relieving boredom or distress). Finally, the negative consequences caused by excessive gambling might further cement the gambling behaviors by causing more distress and raising the importance of winning back lost money (Sharpe, 2002).

1.5.2 The Pathways model

The pathways model of problem gambling (Blaszczynski & Nower, 2002) has many similarities with the cognitive behavioral model described above, but

also suggest three distinct pathways into gambling problems or GD. This makes it possible to divide gamblers with GD into three different subtypes, which can potentially inform treatment approaches. The pathways model can also be said to be a biopsychosocial approach as it integrates biological, psychological (e.g., learning theory, cognitive) and social/environmental factors into the model. It postulates that a habitual gambling behavior can be established by principles of operant conditioning, that frequent gambling establishes cognitive biases, and that negative consequences of gambling such as accumulation of debt instigate the “chasing of losses”, that is trying to win back money lost to resolve debts.

In addition, the model postulates three subtypes of problem gamblers: 1) the behaviorally conditioned gamblers, which are the group with the least difficult problems, and that are mainly affected by the conditioning- and cognitive processes described above, 2) the emotionally vulnerable gamblers, who in addition to conditioning- and cognitive processes also have a history of depression and anxiety, negative life experiences and poor coping skills, and gamble to escape negative mood states, and 3) antisocial-impulsivist gamblers, who are distinguished by trait impulsivity and antisocial personality disorder (Blaszczynski & Nower, 2002).

The pathways model has later been revised based on empirical evidence (Nower et al., 2022), making a further distinguishment between pathway 2 and 3. Whereas the emotionally vulnerable gamblers are characterized by anxiety and depression before onset of gambling symptoms, and might also have a history of childhood maltreatment, the antisocial-impulsivist gamblers generally do not have these characteristics. Further, both these subtypes can use gambling to relieve stress, but the antisocial-impulsivist gamblers can also use gambling as a way to find meaning and purpose.

There is increasing empirical evidence confirming the validity of the pathways model (Allami et al., 2017; Bonnaire et al., 2022; Kurilla, 2021; Valleur et al., 2016) although more longitudinal studies are needed to confirm not only the existence of the subgroups of gamblers, but also the causality of the proposed factors (Kurilla, 2021).

1.6 GAMBLING-RELATED COGNITIVE DISTORTIONS

The above theoretical models postulate that cognitive biases are important in the development and maintenance of GD (Blaszczynski & Nower, 2002; Sharpe, 2002). A number of gambling specific cognitive distortions, meaning irrational beliefs held by gamblers, have been identified in the literature. A 2012 review (Fortune & Goodie, 2012) identified eight distortions specific for gambling: 1) “Gamblers fallacy”, where an inherently random outcome is believed to be influenced by earlier outcomes, 2) “Illusory correlations”, that is connecting certain events, items or persons with winning or losing, 3) “Illusion of control”, overestimating ones control over gambling outcomes, 4) “Trends in number picking”, 5) “Overconfidence”, 6) “Availability of others wins”, a belief that winning is a common occurrence, 7) “Inherent memory bias”, where wins are more frequently recalled than losses, and 8) “Switching and double switching”, where the ability to think rationally is lost during gambling. A more recent review identified three additional distortions 1) “Hot hand fallacy” where a winning streak is seen as increasing the chance of winning again, 2) “Base rate neglect”, where the chance of winning is overestimated, and 3) “Insensitivity to sample size”, where the gambler makes predictions based on a small number of events or outcomes (Leonard & Williams, 2015).

Gambling related cognitive distortions are present among all gamblers (Leonard & Williams, 2016; Leonard et al., 2021), but they are more common in GD and problem gamblers (Joukhador et al., 2003; Myrseth et al., 2010). These distortions are also associated with more severe problem gambling even when controlling for genetic and shared environmental influences (Xian et al., 2008). They have also been found to predict future problems and relapse into gambling behavior in longitudinal studies (Leonard & Williams, 2016; Leonard et al., 2021; Smith et al., 2015). They do not however seem to be the strongest or only predictor of gambling problems and should therefore not be the sole focus of treatment (Leonard et al., 2021).

1.7 SEVERITY OF GAMBLING PROBLEMS

The impact of gambling severity has been studied both in population studies, and more rarely among gamblers seeking treatment. In population studies, a broad range of gamblers have been included, from non-gamblers, through recreational/low-risk gamblers to problem gamblers and gamblers with GD. It

has been found that with increasing severity of gambling problems there is an increased association with mood disorders, anxiety disorders, substance use disorders (Barry et al., 2011), personality disorders (Barry et al., 2011; Ronzitti et al., 2018), antisocial behaviors (Moghaddam, Yoon, Campos, et al., 2015), suicidal ideation (Moghaddam, Yoon, Dickerson, et al., 2015), and poor general health (Butler et al., 2020). Severity has also been found to vary between types of gambling, with those engaging in online casino gambling having more severe problems (Wall et al., 2021).

The clinical relevance of the severity level of diagnosed GD (mild, moderate, or severe) has been explored in an earlier study of 574 gamblers enrolled in various clinical trials. Participants with moderate or severe GD were found to be older, had a later age of onset, lost more money gambling, had higher state anxiety and depression, lower quality of life, and consumed more nicotine when compared to those with a mild disorder (Grant et al., 2017). In another study on a sample of 398 participants diagnosed with GD undergoing treatment with Cognitive Behavioral Therapy (CBT), it was found that more severe GD was associated with positive and negative urgency, which are aspects of impulsivity. Severity did however not predict relapse or dropout during treatment, or drop-out at 24 month follow-up (Mestre-Bach et al., 2019).

1.8 GENDER DIFFERENCES

It has been indicated that women and men with problem gambling and GD differ in several important ways. Some of the indicated differences seem robust across studies, while the literature is mixed regarding others (Gartner et al., 2022). It has been shown repeatedly that gambling problems are more common among men than women worldwide (Gartner et al., 2022; Williams et al., 2012), and this is also true in Sweden where 1.3% of women and 3.0% of men had some level of gambling problems in the most recent population study (Public Health Agency of Sweden, 2023). However, some studies have indicated that the difference in prevalence might be narrowing (Abbott et al., 2018; Castren et al., 2018; McCarthy et al., 2018). The difference in prevalence of gambling problems is also reflected in the rate of treatment seeking for GD across genders, where although the rates vary significantly between different studies (7.5%-46%), women always seem to be the minority (Crisp et al., 2004; Granero et al., 2009; Håkansson et al., 2017; Lahti et al., 2013; Ronzitti et al., 2016).

Besides prevalence, there are some additional differences between male and female gamblers which seem consistent across studies. Men generally start to gamble at a younger age, have higher monthly incomes, and play a larger variety of games - with an inclination toward more strategic games than women (Gartner et al., 2022). Several other gender differences have been highlighted in various studies, such as women having higher rates of comorbidity and more often gamble to regulate emotions, and the so-called telescoping effect where women are proposed to progress quicker to GD. However, regarding these findings, the literature is not as uniform, with some studies failing to replicate these differences (Gartner et al., 2022). Women are also assumed to be overrepresented in the emotionally vulnerable subtype outlined in the pathways model (Blaszczynski & Nower, 2002; Nower et al., 2022). However, although this seems to be a relatively common finding (Kurilla, 2021; Nower et al., 2022), the literature is somewhat mixed here as well (Kurilla, 2021).

1.9 TREATMENT OF GAMBLING DISORDER

A wide variety of treatment approaches for GD have been studied, both pharmacological and psychological. Even so, while some treatments clearly have stronger evidence than others supporting them, no single treatment approach can be considered a gold-standard at this time. Both pharmacological treatments (Pallesen et al., 2007) and psychological treatments have been shown to be better than no treatment (Pallesen et al., 2005) but psychological treatments are the generally more studied of the two. A number of different treatment approaches, both pharmacological and psychological, are detailed below.

1.9.1 Pharmacological treatment

Several different types of pharmacological substances have been evaluated as a treatment of GD, such as mood-stabilizers, antidepressants, atypical antipsychotics, and opioid antagonists (Di Nicola et al., 2020; Dowling et al., 2022). Of these, opioid antagonists (Naltrexone, Nalmefene) and atypical antipsychotics (Olanzapine) seem to be the most promising as both show medium effects on gambling symptom severity when compared to a placebo control. However, so far, the evidence is limited due to the low number of studies performed (Dowling et al., 2022). In general, the available evidence at

this time is stronger for psychological treatments of GD, especially for CBT (Di Nicola et al., 2020).

1.9.2 Cognitive Behavioral Therapy

As a treatment, CBT involves analyzing dysfunctional behavior patterns and thoughts, and together with a therapist modify these by using various behavioral and cognitive strategies. Generally CBT for GD involves a number of different interventions, which can vary somewhat between different treatment programs. Common components are identifying triggers and finding alternative activities to gambling, and cognitive work where distortions related to gambling are identified and challenged (Petry et al., 2017). As a treatment for GD, CBT has been evaluated in three recent and comprehensive meta-analyses. It has been found to have larger effects than other psychological treatments- while at the same time being the most studied treatment modality (Eriksen et al., 2023) with large effects on gambling symptom severity (Eriksen et al., 2023; Pfund, Forman, et al., 2023). Treatment also seems to improve symptoms of anxiety and depression, and increase the perceived quality of life (Eriksen et al., 2023; Pfund, King, et al., 2023). However, the long-term effect of CBT is largely unknown due to a lack of follow-up studies (Eriksen et al., 2023; Pfund, Forman, et al., 2023). CBT treatment studies have been made both with the treatment delivered in a classic face-to-face fashion, but also with remote delivery via the internet.

1.9.3 Motivational Interviewing

Another treatment approach that has been studied for GD is Motivational Interviewing (MI), which can be described as a set of communication principles designed to help people make behavior changes. It generally involves techniques for eliciting “change talk”, meaning statements indicative of motivation for change (Miller & Rollnick, 2013). For GD, MI has been studied both as a standalone treatment, and in combination with CBT (Eriksen et al., 2023; Yakovenko et al., 2015). It has previously been indicated to have at least a short-term effect on gambling frequency (Yakovenko et al., 2015), however, in the most recent meta-analysis, although a moderate effect on gambling symptom severity was found when MI was given in combination with CBT, no effect was found for MI alone (Eriksen et al., 2023).

1.9.4 Brief interventions

Rather than employing a full program of interventions over several weeks like regular CBT-treatments, brief interventions are short and minimal types of interventions that have been studied as a treatment option for GD. These include brief single-session advice or personalized feedback (Quilty et al., 2019) or even single-session CBT (Toneatto, 2016). Brief interventions, including personalized feedback interventions, have been found to have small but significant effects on gambling behaviors when compared to controls. However, once again effect on the long-term is unknown due to a lack of follow-up studies (Peter et al., 2019; Quilty et al., 2019). Personalized feedback was found most efficacious when combined with educational content and in combination with MI (Peter et al., 2019). Interestingly, some studies found a similar effect of brief or single-session interventions when compared directly to longer interventions (Quilty et al., 2019; Toneatto, 2016). However, in a 2020 meta-analysis of treatments for GD including CBT, motivational treatments, and brief personalized feedback, it was found that treatment dose (number of sessions) was related to treatment outcome, favouring longer treatments (Pfund et al., 2020).

1.10 TREATMENT SEEKING IN GAMBLING DISORDER

Taking the step to seek out treatment for GD, or any type of gambling problem, is quite uncommon. In a meta-analysis of 24 studies on help seeking behavior among problem gamblers globally, a mean of 21% were found to have sought some form of help (Bijker et al., 2022). However, in this meta-analysis help-seeking was defined in the broadest possible fashion, and did not only include professional counselling, but also turning to family and friends for help, or taking part of self-help or self-exclusion services. Studies focusing solely on accessing professional treatment for GD are less common. One US study found that only between 7–12% with a lifetime history of GD had ever sought treatment, defined as accessing formal treatment or attending meetings with Gamblers Anonymous (Slutske, 2006). Another study on gamblers in Canada found that lifetime treatment use (excluding self-help services) was 10% among problem gamblers, and as high as 29% among those with GD (Suurvali et al., 2008).

It does however seem to be clear that many with problem gambling or GD never seek any form of formal treatment. A number of studies have been made

to try and understand the motivations for those gamblers that do seek treatment, and also the barriers in seeking out treatment. The most common reasons a gambler seeks treatment cited in the literature are that they experience financial problems, difficulties in relationships, or negative emotions due to their gambling (Suurvali et al., 2010; Suurvali et al., 2012). Indeed, the finding from the Canadian study where those with GD were more likely to seek treatment than problem gamblers also point to the problem burden being a strong motivator for treatment (Suurvali et al., 2008). Having a positive perspective on treatment has also been associated with an increased likelihood of starting treatment (Khayyat-Abuaita et al., 2015), and one Australian study found that gamblers who sought some form of help were more likely to be divorced and being born in Australia (Gainsbury et al., 2014).

A number of barriers for treatment seeking have also been identified, with the most common being an unwillingness to admit problems (Gainsbury et al., 2014; Khayyat-Abuaita et al., 2015; Suurvali et al., 2009) and perceived shame or stigma in seeking treatment (Gainsbury et al., 2014; Suurvali et al., 2009). Other barriers identified are lack of treatment availability (Gainsbury et al., 2014; Khayyat-Abuaita et al., 2015), a wish to handle the problems without seeking help, and issues with the treatments offered (Suurvali et al., 2009). Another reason that not everyone seek treatment could be that it is not uncommon to experience a natural recovery without treatment. In the US study where only between 7–12% with a lifetime prevalence of GD were found to have sought treatment, 36–39% still did not report past-year gambling-related problems (Slutske, 2006).

Seeking treatment of one's own volition, when motivated seems to be important. In a study where a number of low-intensity treatments over the internet (e-mail counselling, self-help, guided self-help) was offered to non-treatment seeking gamblers recruited on a poker site, treatment attrition rates were high, with a mean attrition rate of 83% across all groups (Luquiens et al., 2016). Thus, it would seem important to offer treatments that lower the barriers to treatment-seeking. Offering treatment via the internet could potentially address barriers such as shame/stigma in seeking treatment, a wish to handle the problem oneself, and treatment availability.

1.11 INTERNET-DELIVERED TREATMENTS

One aspect of psychological treatment is mode of delivery. The classical mode of delivery is providing the treatment via face-to-face sessions, or even in group format. However, psychological treatments can also be delivered via the internet – and this is true also for treatment of GD. Internet treatments are usually delivered in one or more modules, including content such as psychoeducation, monitoring, and various exercises. Treatment can be either guided, where support is given by a therapist either via text-messages or telephone, or unguided/self-directed.

CBT delivered over the internet has proven effective for a great deal of psychiatric disorders, e.g. depression and anxiety syndromes (Adelman et al., 2014; Mamukashvili-Delau et al., 2022, 2023; Olthuis et al., 2016; Pang et al., 2021) and has even been used successfully to reduce functional impairment in chronic somatic conditions (Tao et al., 2023). When directly compared to similar treatments face-to-face, therapist-guided internet-delivered cognitive behavioral therapy (ICBT) has been found to be equally effective as their face-to-face counterparts (Hedman-Lagerlof et al., 2023). Importantly, this effect has specifically been seen for CBT-based treatments with therapist guidance. Indeed, guidance might be an important factor in successful internet treatments as there are indications that guided treatments have lower rates of treatment attrition (Musiat et al., 2022) and larger effects compared to unguided treatments (Baumeister et al., 2014). Possible additional benefits of internet-delivered treatment are that it can be accessed at any place and time of day, it is likely cost-effective due to consuming less therapist time, and it might have the potential to reach new groups with treatment (Gratzer & Khalid-Khan, 2016; Hedman et al., 2012).

Internet treatments for GD are not as well researched as for some other psychiatric disorders, but the rate of published studies have increased in recent years. A wide variety of treatment content have been offered in these studies, such as CBT, personalized normative feedback, cognitive bias modification and different types of gambling related self-help content, with CBT being the most common (Boumparis et al., 2022). In a recent meta-analysis of psychological treatments for GD, internet-delivered treatments were found effective, but effects were substantially larger for treatments delivered face-to-face (Eriksen et al., 2023). Two other studies, one systematic review (Boumparis et al., 2022) and one meta-analysis (Sagoe et al., 2021), specifically focusing on internet-delivered treatments for GD found positive

within group effects of treatment. However, when treatments have been compared to a control group, the effects have been somewhat lacking. In a review of internet treatments for GD, most studies did not find the experimental treatment more effective at reducing GD symptoms than a control group (Boumparis et al., 2022). The only four (out of 22) studies in where the experimental treatment was more effective, pitted it against a wait-list control (Bücker et al., 2018; Carlbring & Smit, 2008; Casey et al., 2017; Jonas et al., 2020). In all cases (n=12) where an active control was used no differences were found between groups.

It should however be noted that most studies were feasibility studies, and several of them were performed without appropriately calculating power beforehand (Boumparis et al., 2022). Another finding of note is that in a meta-analysis including 13 studies on internet-delivered treatment for GD, those that had some form of therapist guidance had substantially larger effects on GD symptoms (Sagoe et al., 2021).

In summary, internet-delivered treatments and ICBT in particular is generally a proven and effective treatment with several potential benefits. However, in the field of GD, internet treatments have so far not been proven effective at reducing gambling symptoms when compared to active controls. Research in this field is however still in its infancy, with most studies being feasibility trials. Even so, as discussed earlier the potential benefits internet-delivered treatments have in lowering barriers for treatment seeking make them a promising mode of treatment for GD, and worthy of more research.

2 AIM

The overall aim of the thesis was to further develop the understanding of relevant clinical considerations and treatment options for individuals with Gambling Disorder seeking treatment in routine care. More specifically, by exploring possible clinically relevant differences between subgroups of treatment seekers, and by determining the effectiveness of internet-based CBT for these individuals.

Paper I: The purpose of this study was to translate and validate the Gamblers' beliefs questionnaire (GBQ), a measure of cognitive distortions related to gambling, in a Swedish population.

Paper II: This study aimed to explore possible clinically relevant differences between treatment seeking gamblers with mild, moderate, and severe GD.

Paper III: In this study, the aim was to explore possible gender differences in a population of treatment seekers with GD.

Paper IV: The purpose of this study was to in a randomized controlled trial, assess the effectiveness of a guided internet-delivered CBT treatment for GD when compared to a control treatment.

3 PARTICIPANTS AND METHODS

A plethora of study designs, measurements and statistical methods were employed in the four studies making up this thesis. The methods from the different studies are presented together where possible. When a method is only relevant to a single study, this is annotated in the relevant subheading. A more in-depth description of the methodology of each study can be found in each of the separate papers.

3.1 PARTICIPANTS

As the focus of this thesis was on individuals with GD seeking treatment, the majority of studies (**Paper II – IV**) recruited participants from a clinical population, with the exception of **Paper I**, in where the participants were recruited from broader settings.

All participants in **Papers II – IV** were recruited at the “Clinic for Gambling Addiction and Screen Health”, a clinic specializing in treating GD and problems related to gaming, at the Sahlgrenska University Hospital, located in Gothenburg in the Västra Götaland region in Sweden. For **Papers II and III**, everyone coming to a first assessment visit to the clinic after being referred or self-referred there due to gambling problems were asked to participate in the studies. Everyone that agreed to participate and fulfilled the criteria for GD according to a diagnostic interview, was included in the studies. This resulted in a total of n=163 participants being analyzed in **Paper II** and n=204 in **Paper III**.

As **Paper IV** was a treatment study, more elaborate inclusion and exclusion criteria had to be set here to ensure the integrity of the study. In order to be included, participants had to a) be between 18-75 years old, b) fulfill criteria for GD according to a diagnostic interview, c) have access to the internet and a device with which to use it, and d) be able to read and write Swedish fluently. In addition, they were excluded if they e) had psychiatric or somatic conditions that contraindicated or severely hindered treatment participation, f) had an increased risk of suicide, g) were in another ongoing psychological treatment for GD, h) had started medication for a psychiatric condition during the last

three weeks, and i) were planning to start another treatment for GD during the course of the treatment period of the study. Everyone was asked about participation at the first assessment visit at the clinic if they did not obviously fulfill exclusion criteria. A total of n=71 participants were recruited and randomized to treatment.

For **Paper I** another recruitment approach was used. In order to ensure that a wide spectrum of participants was included, not only those with GD, participants was recruited from the general population at universities, workplaces and sports associations. However, as we wanted to compare a subgroup of participants with gambling problems to non-problem gamblers, a decision was made to also recruit participants from a self-help group for problem gamblers and a community health service treating gambling problems to make sure a sufficient number of participants experiencing problems was included. Participation in **Paper I** was anonymous and a total of n=402 elected to participate and provided complete enough data as to be able to analyze.

3.2 TREATMENT CLINIC

As mentioned, the majority of studies were based in the “Clinic for Gambling Addiction and Screen Health” at the Sahlgrenska University Hospital. This clinic opened its doors in May 2019, and has since then treated patients from 18 years or older with GD. From October 2020 treatment is also offered to individuals with gaming problems, and here the clinic welcomes patients 16 years or older. The clinic’s uptake area is the region of Västra Götaland in Sweden, which has a population of 1.7+ million inhabitants, and a total of 200 new patients with gambling problems are referred or self-referred to the clinic each year. The main treatment offered for GD after the initial assessment is CBT, either in group or individual format (internet treatment was only offered as part of **Paper IV**). Patients also get check-ups via telephone 3 and 6 months after the end of treatment. In addition to this, patients are also offered health related counseling by a nurse and family related counseling by social workers. As the region of Västra Götaland is geographically big, it is common for treatment to be offered online via video call in addition to regular physical visits at the clinic.

3.3 SUBJECTIVE MEASURES

In all four **Papers (I – IV)** a host of subjective measures were used, most commonly self-rated questionnaires. In addition, a number of clinical interviews were used, which although in some cases involve a clinician rating, also always are based on the subjective statements of the participant. The measures used in **Paper IV** were derived from the Banff consensus (Walker et al., 2006), which is a consensus document developed as to what outcomes should be assessed when evaluating treatment of GD. The recommended outcomes are divided into three categories; 1) gambling behaviors (money lost to gambling, time spent gambling/occupied with gambling), 2) gambling related problems (financial, relationships, employment, legal and mental health), and 3) processes of change (variables related to the theoretically assumed process by which the treatment works). Although this overarching framework is given, no specific measurement instruments are recommended (Walker et al., 2006), and so different measures of gambling behaviors and symptoms, mental health problems, and quality of life were chosen based on an amalgamation of their psychometric properties, validation/common use in a Swedish context, and length/item-burden.

Gambling related cognitive distortions was deemed to be an interesting construct to measure as a possible process of change. However, no such instruments validated or widely used in a Swedish context were found, and this prompted the translation and subsequent validation of the GBQ in **Paper I**. The instruments chosen for **Paper IV** were also used as assessment tools for the first visit in the clinic, allowing comparisons of these parameters at first assessment with the baseline in **Paper IV**, and also comparison of participant groups from **Paper II** and **III** with those in **Paper IV**. In addition, a few other instruments were added to the first assessment as a measure of constructs deemed of interest in the clinic, which could then be used in **Paper II** and **III**. No objective outcome measures were used, as no possible objective outcomes were found to be of interest for the research questions posed. A full list of subjective measures used, including a short description and references can be found in Table 2. More in depth descriptions can be found in each of the papers. An overview of the recruitment of participants, the studies relation to the routine care provided at the clinic, and when subjective measures were taken are illustrated in Figures 1 and 2.

Table 2. A complete list of measurement instruments used in **Papers I-IV**.

Measure	Description	Paper
<i>Clinical interviews:</i>		
Structured Clinical Interview for Gambling Disorder (SCI-GD)	The SCI-GD is a semi-structured interview that was developed as a tool for diagnosing GD according to the DSM criteria (Grant et al., 2004). It was recently validated in a Swedish context (Molander, Månsson, et al., 2023).	II - IV
Mini- International Neuropsychiatric Interview (M.I.N.I.)	M.I.N.I is a structured diagnostic screening interview composed of yes/no questions covering a large number of DSM diagnoses e. g. various mood and anxiety disorders, substance use disorders, and more (Sheehan et al., 1998).	II - IV
Practical questions about participation	An interview developed especially for Paper IV covering exclusion criteria not accounted for in other measurement instruments, such as access to internet or current status of other treatments.	IV
Anamnestic interview	An anamnestic interview mainly developed to be used at first assessments at the “Clinic for Gambling Addiction and Screen Health”. It includes, among others, questions about dominant gambling type and reasons for gambling.	II - III
<i>Self-report</i>		
<i>Questionnaires</i>		
<i>(gambling related):</i>		
The NORC Diagnostic Screen for Gambling Problems (NODS)	The NODS is a measure of gambling related problems used to assess level of gambling problems during a specified timeframe (lifetime, past year, or last 30 days) (Wickwire et al., 2008). It was also adapted to a 14-day version for Paper IV .	I - IV
Time-Line Follow Back adapted to gambling (G-TLFB)	G-TLFB is a diary used to register amount money bet, and gambling frequency (Hodgins & Makarchuk, 2003).	IV
Problem Gambling Severity Index (PGSI)	This 9-item instrument was created to assess gambling severity in population samples, and classifies gamblers as: non-problem, low-risk, moderate risk, and problem gambler (Ferris & Wynne, 2001).	I
Gamblers’ beliefs questionnaire (GBQ)	The GBQ is used to assess cognitive distortions in gambling (Steenbergh et al., 2002). The 20-item Swedish translation validated in Paper I is used throughout all studies in this thesis (Mide et al., 2022).	I - IV

The Gambling Pathways Questionnaire (GPQ)	This 48-item questionnaire is used to identify which pathway to gambling problems is most likely for an individual. In the GPQ, pathway 3 takes precedence over pathway 2 if conditions are met for both, and only if neither of these are met a classification of pathway 1 is made (Nower & Blaszczynski, 2017).	III
<i>Self-report</i>		
<i>Questionnaires</i>		
<i>(comorbidity):</i>		
Patient Health Questionnaire (PHQ-9)	The PHQ-9 uses 9 items to measure and classify the severity of depressive symptoms during the past two weeks (Kroenke et al., 2001).	II - IV
Generalised Anxiety Disorder Assessment (GAD-7)	This instrument consists of 7 items used to assess symptoms of generalized anxiety during the past two weeks (Spitzer et al., 2006).	II - IV
Alcohol Use Disorders Identification Test (AUDIT)	The AUDIT is a 10-item measure of alcohol related problems concerning consumption, dependence, and negative consequences (Bergman & Källmen, 2002).	II - III
Drug Use Disorders Identification Test (DUDIT)	DUDIT is an 11-item questionnaire used to identify problematic use of illicit drugs by assessing consumption, dependence, and negative consequences of drug use (Berman et al., 2005).	II - III
The World Health Organisation Adult ADHD Self-Report Scale (ASRS-V1.1)	This 18-item DSM-based instrument is used to screen for possible symptoms of ADHD (Kessler et al., 2005).	II - III
<i>Self-report</i>		
<i>Questionnaires</i>		
<i>(various):</i>		
Brunnsviken Brief Quality of life scale (BBQ)	The BBQ assesses individuals subjective Quality of Life by asking them to rate the quality, as well as the subjective importance of six different aspects of life, using a total of 12 items (Lindner et al., 2016).	II - IV
Difficulties in Emotion Regulation Scale (DERS-16)	DERS-16 is a brief 16-item version of the original questionnaire. It is used to measure difficulties with emotion regulation (Bjureberg et al., 2016).	II - III

Revised short version of the Working Alliance Inventory (WAI-SR)	A 12-item brief version of the Working Alliance Inventory, measuring the therapeutic alliance between therapist and patient in psychotherapy (Hatcher & Gillaspy, 2006).	IV
Treatment Credibility Scale (TCS)	An adaptation of the Credibility Scale (Borkovec & Nau, 1972) used to assess patients perceived credibility and expectations on a given treatment.	IV
Negative Effects Questionnaire short form (NEQ)	The NEQ was designed to measure potential negative effects occurring during psychotherapy. The 20-item short form was used in Paper IV (Rozenal et al., 2019).	IV
Demographics questionnaires	Three different demographics questionnaires were developed specifically for the studies in this thesis. The three questionnaires varied in the number of demographic variables measured, depending on what was needed for each particular study.	I - IV

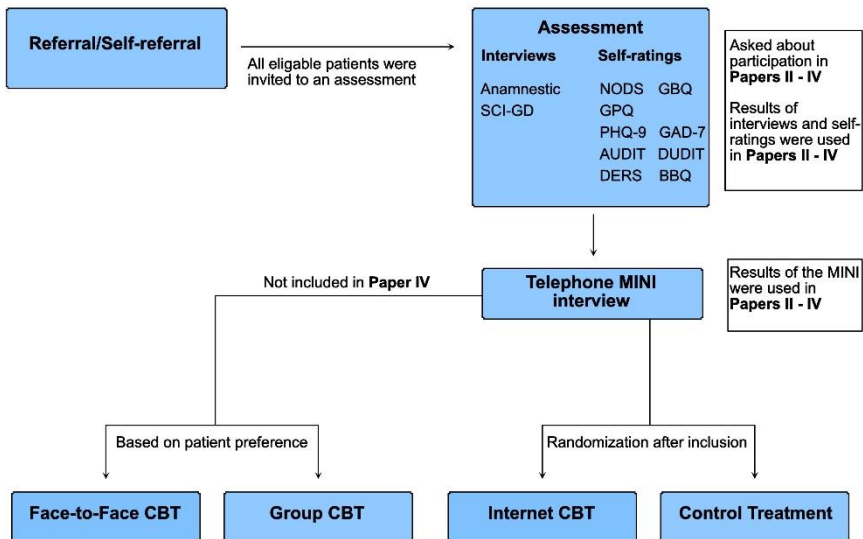


Figure 1. Study flow at the clinic for Gambling Addiction and Screen Health.

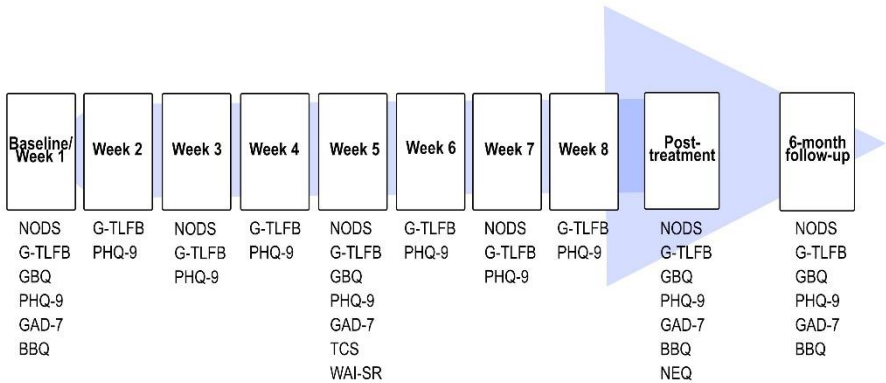


Figure 2. All measurement points, and self-rating scales administered in Paper IV.

3.4 TRANSLATION AND VALIDATION (PAPER I)

In the literature, many different processes are used in the translation of psychometric instruments. Although none of these has the empirical backing to be seen as a gold-standard, there is evidence that multi-step procedures in general result in better translations (Acquadro et al., 2008).

One commonly employed method, which was also used in **Paper I**, is back-translation in which a/several native speakers of the target language translate the instrument back into the original language in order to see if it has retained its meaning (Acquadro et al., 2008).

An instrument also needs to be reliable and valid, otherwise it can be called into question if it is really measuring what is intended. Reliability reflects the amount of random error in an instrument, the more reliable an instrument is the less random variation in responses. There are several ways to assess reliability. One way is internal consistency, in where the items in a scale are compared by correlation with one another to assess whether they belong together. Another way is to assess the temporal stability, using test-retest reliability. By having participants answer the instrument twice, with a several weeks pause in between, and correlating the results the amount of random

variation can be assessed. Ideally, the same participant should answer as similarly as possible on both occasions (Viswanathan, 2005).

If an instrument has several proposed subscales, a Confirmatory Factor Analysis (CFA) can be used to see if data from responses fit with the proposed subscales (Viswanathan, 2005). In **Paper I**, internal consistency was assessed, and CFA was used to assess if the two-factor model of the original instrument could be replicated. A test-retest procedure was however not used, as this was not possible due to the anonymous nature of the study.

Validity reflects whether the instrument measures what it is intended to measure, and there are several types of validity. Content- and face validity pertains to subjective judgement of item content and the measure as a whole, and convergent- and discriminative validity to the instrument's relation to measurements of other constructs. Known-groups validity is the instruments' ability to discriminate between groups that are previously known to measure differently regarding the construct in question (Viswanathan, 2005). Content validity is normally assessed when an instrument is created, and therefore other types of validity had to be explored when validating the GBQ in **Paper I**, and thus convergent- and known-groups validity were explored. In addition to the above, item scaling (Chiu et al., 2014) was also explored as a way of assessing individual items relation to the subscales.

3.5 DESIGNING A RANDOMIZED CONTROLLED TRIAL (**PAPER IV**)

Randomized Controlled Trials (RCT) are well-suited to study the effectiveness of treatment interventions (Harrer et al., 2023) and is considered one of the highest levels of evidence (Guyatt et al., 2011). However, it is important that RCTs are designed and reported correctly, and this is not always the case either in general, or specifically in the mental health field (Harrer et al., 2023). To ensure rigorous design and reporting in **Paper IV**, the so-called CONSORT-guidelines were used (Schulz et al., 2011). These stipulate what should be reported when describing an RCT, including details about study design. These guidelines come with an easy-to-use checklist, that can be used not only when reporting the RCT, but also as a blueprint to methodological issues that need to be considered when designing a study, such as: predefining outcome

measures, proper randomization and allocation procedures, blinding, and determination of sample size (Schulz et al., 2011).

In **Paper IV**, steps were taken to ensure that the author was not involved in the randomization and allocation procedures. To minimize the risk of any tampering, different persons were responsible for randomization and allocation procedures, and concealment was used, all to ensure the integrity of the design. The study was single-blinded. However, blinding is a challenge in psychotherapy research as participants often can guess if they are receiving a “placebo” or the bona-fide treatment. Using a double-blind design is not possible at all as therapists hardly can be blinded to what treatment they are administering (Harrer et al., 2023).

Sample size was determined beforehand, although this was challenging as few relevant studies were published when **Paper IV** was designed, and with the knowledge produced since then other assumptions about sample size likely would have been made. Outcome measures were not only predefined, but also preregistered together with the intended sample size, inclusion criteria and a statistical analysis plan. This is another important way to ensure the integrity of an RCT as it ensures that parameters are not tinkered with to produce a result in line with the researchers’ expectations (i.e. it is not possible to change the intended primary outcome measure or try different analyses until one yields the wished for results) (Harrer et al., 2023).

One challenge pertaining to the design of a randomized controlled trial is that of the control group. In contrast to pharmacological studies where a pill placebo is normally used as control, in trials of psychological treatments many different variants can be seen across studies. It is not uncommon to use a waitlist control, which however is problematic as the treatment is then not compared to a plausible alternative. A far better type of control is another type of treatment, or “care as usual”, which is something that the individual is more likely to receive should they not be included in a study receiving an experimental treatment (Harrer et al., 2023). In **Paper IV**, we opted to compare the experimental treatment to another treatment. However, even though face-to-face CBT is the most promising treatment for GD it can still not be considered a gold-standard treatment, for instance due to the lack of knowledge about long-term effects. We thus opted to instead design a new treatment with a similar format as the experimental treatment, but with no CBT content, in the hope to prove superiority of internet-delivered CBT as a treatment for GD.

3.6 TREATMENTS AND THERAPISTS (**PAPER IV**)

The experimental treatment in **Paper IV** was an internet-delivered CBT treatment. It was not developed by the authors. Instead, it was chosen due to it being used in previous research with promising results, although comparison had so far only been made against a waitlist control (Carlbring & Smit, 2008). The treatment follows a standard format of internet-delivered CBT, where modules including different types of content such as psychoeducation and various exercises are administered on a weekly basis. As the treatment consists of 8 modules, the total treatment length is 8 weeks. The modules contain typically common interventions used in CBT for GD such as cognitive restructuring, alternative activities, and identifying triggers (Petry et al., 2017). In addition, it also includes a substantial amount of motivational work and partly involves significant others in the treatment, which are less common approaches in internet-delivered treatments for GD (Bücker et al., 2019; Casey et al., 2017; Merkouris et al., 2017). Another exception is that therapist guidance is offered by way of weekly telephone calls of 15 minutes/week, while the most common way to offer guidance in internet-treatment is via written messages or e-mails.

The control treatment was designed by the authors of **Paper IV**, with the intention of producing a treatment as similar in format as the experimental treatment as possible. This resulted in a treatment that was also internet-delivered, consisting of 8 modules over 8 weeks, and with 15 minutes of telephone support/week. To ensure the treatments were not too similar in content, no CBT elements were contained in the control treatment. Instead, it was based on principles of MI. This meant that participants got access to self-reflective question intended to increase the motivation to gamble less, limited psychoeducation about gambling and GD that they could partake in voluntarily, and telephone support in the form of MI-styled conversations. The control treatment was named Internet-delivered Motivational Interviewing (IMI).

Besides the first author, all therapists during the course of the study were employed at the “Clinic for Gambling Addiction and Screen Health”. All therapists treated participants in both the experimental treatment and the control treatment. In order to ensure that everyone was competent in MI everyone received MI training and had a conversation with an actor independently coded and assessed before they could start treating patients in the control condition.

3.7 STATISTICAL ANALYSIS

A large number of statistical methods were employed in the studies that make up this thesis, and these are listed in Table 3. All analysis plans were developed together with a statistician, and for **Paper IV** the statistical analysis plan was published in advance. The methods employed are described in more detail in each of the studies, but a few overarching considerations are detailed below.

Table 3. All statistical tests and methods used in *Papers I - IV*.

Statistical test/method	Paper
Analysis of covariance (ANCOVA)	II - III
Confirmatory factor analysis	I
Cronbach coefficient alpha	I, IV
Fisher's exact test	II - IV
Fisher's $r - z$ transformation	I
Independent t-test	III - IV
Jonckheere-Terpstra test for trend	II
Mann-Whitney U test	I - IV
Mantel-Haenszel test for trend	II
Pearson Chi-Square test	III - IV
Pearson's product moment correlation	I, IV
Repeated measures ANCOVA	IV
Repeated measures Analysis of Variance (ANOVA)	IV
Repeated measures general linear model	IV
Shapiro-Wilks test	I, III
Spearman's rank-order correlation	I
Tukey-Kramer test	II

In **Papers I – III**, the amount of missing data was low, and so in most cases complete case analysis was used with no methods employed to handle missing data. In **Paper IV** however, data was collected repeatedly over time which created the possibility of participants being lost to follow-up, introducing a larger problem of missing data. As **Paper IV** utilized a repeated measures design, repeated measures ANOVA/ANCOVA were employed, and Maximum Likelihood Estimation could be used to address the problem of missing data under an assumption of data being Missing at Random (MAR).

None of the studies employed any corrections for multiple analyses (e.g., Bonferroni correction). This is perhaps most evident in **Papers II – III** where many analyses were made. This choice was made due to both studies being of an exploratory nature, meaning that no specific outcomes were predicted.

4 RESULTS

4.1 PAPER I – VALIDATION OF A SWEDISH TRANSLATION OF THE GAMBLERS' BELIEFS QUESTIONNAIRE

4.1.1 Background and aim

Cognitive distortions related to gambling are a possible factor in the development and maintenance of GD, and thus likely an important target in treatment. In order to study these distortions, validated instruments specifically designed to measure them are needed. A large number of such instruments have been developed internationally, but to our knowledge none of them have been validated in Sweden.

The aim of this study was to translate the 20-item Gamblers' beliefs questionnaire, a widely used instrument with good psychometric properties, into Swedish and subsequently validate it in a Swedish population.

4.1.2 Methods

The GBQ is a 20-item questionnaire consisting of two subscales: Illusion of control, and Luck/Perseverance. It was translated to Swedish using back-translation methodology. Participants recruited from the general public (at universities, sports associations, and workplaces) and from populations with experiences of gambling problems (at a self-help group for problem gamblers, and a community health service for problem gamblers) were asked to anonymously answer a questionnaire packet consisting of the Swedish GBQ, the NODS lifetime, the PGSI and a simple demographics questionnaire. A total of $n=402$ elected to participate and filled in the questionnaires in a way that they could be used for analysis. Internal consistency was assessed by calculating Cronbach's coefficient alpha. Validity was examined by correlating results from the GBQ with the NODS and PGSI, exploring convergent validity, and by examining possible differences in GBQ results between problem- and non-problem gamblers to assess know-groups validity. A confirmatory factor-analysis was performed to test the validity of the

original two-factor model, and scaling success was calculated for the two subscales.

4.1.3 Results

Of the 402 participants (47.9% women), 44 (11.2%) were identified as problem gamblers, defined as having a score ≥ 3 on the PGSI. The problem gambler group had significantly higher scores on both the NODS lifetime and the PGSI, both clear indications of severe gambling problems.

The Swedish translation of the GBQ was found to have good to excellent internal consistency for the full scale ($\alpha=.94$) and both sub-scales; Luck/Perseverance ($\alpha=.92$), Illusion of Control ($\alpha=.86$). The GBQ and its subscales also showed medium strong correlations with both the NODS and the PGSI, ranging from $r_s=0.35$ to $r_s=0.43$. Furthermore, there was a significant difference in GBQ full scale and subscales score between problem- and non-problem gamblers, with the problem gamblers consistently scoring higher.

The results from the confirmatory factor analysis were mixed, but overall did not indicate an acceptable fit of the two-factor model. Likewise, the scaling success was not acceptable with four items in each subscale not showing significantly higher correlations to their own subscale than to the other subscale.

4.1.4 Conclusions

In this study, the Swedish translation of the GBQ was shown to be internally consistent and support was found for the validity of the instrument by demonstrating convergence with instruments measuring gambling problems and by also demonstrating a hypothesized known-group difference in cognitive distortions between problem and non-problem gamblers. However, the two-factor structure of the instrument could not be confirmed, and several items had a similar correlation to both subscales. In conclusion, the Swedish translation of the GBQ is likely a reliable and valid instrument for measuring cognitive distortions related to gambling as a whole, but caution is warranted regarding use and interpretation of the two subscales. The instrument can be used for evaluating treatment effects clinically and in research, and also for planning which distortions to focus on in CBT treatment of GD.

4.2 **PAPER II – CLINICAL DIFFERENCES OF MILD, MODERATE, AND SEVERE GAMBLING DISORDER IN A SAMPLE OF TREATMENT SEEKING PATHOLOGICAL GAMBLERS IN SWEDEN**

4.2.1 Background and aim

Increasing severity of gambling problems are related to higher rates of comorbid mood-, anxiety-, substance use- and personality-disorders in community samples. In addition, antisocial behaviors and various health problems are also more common among the more severe gamblers. However, these associations have been found when examining a range of gamblers of different severities, from non-gamblers up to GD. A diagnosis of GD can be further specified by level of severity by counting the number of criteria fulfilled (mild, moderate, severe). However, not much is known about possible clinically relevant differences between GD severities. One earlier study showed that moderate and severe gamblers lost larger amounts of money to gambling, debuted in a gambling behavior earlier in life, had higher rates of state depression and anxiety, and a lower quality of life. The severity of GD has however not shown any predictive capacity on rate of relapse or drop-out during treatment.

The aim of this study was to further explore possible meaningful clinical differences between individuals with mild, moderate, and severe GD.

4.2.2 Methods

A total of n=165 participants were recruited during their first assessment at the “Clinic for Gambling Addiction and Screen Health”. After a diagnostic interview with SCI-GD, n=163 were diagnosed with GD and so retained for analysis in the study. Data were collected during the assessment interview using an anamnestic interview, together with a battery of self-report questionnaires assessing symptoms of depression and anxiety, quality of life, emotional dysregulation, problematic use of alcohol and drugs, and cognitive distortions related to gambling. The first assessment was then complimented

with a M.I.N.I. interview over the telephone for those that had no prior psychiatric care outside the clinic.

4.2.3 Results

A total of 163 participants (26.2% women) were diagnosed with mild (n=22), moderate (n=64), or severe (n=77) GD. Increasing severity of GD was found to be associated with increasing alcohol and drug problems and an earlier gambling debut. Participants with severe GD were several times more likely (Odds ratio 6.89 compared to moderate GD) to gamble to “escape”. The frequency of severe gamblers stating this reason was 80.5%. Severe GD was also associated with higher state depression and anxiety, and both moderate and severe GD was associated with higher rates of emotional dysregulation than the mild form. No difference was found between groups regarding gambling related cognitive distortions, and although an overall significant group difference was found for quality of life, no specific differences could be seen between severity levels. However, all three groups had quality of life scores on a clinical level.

4.2.4 Conclusions

This study found meaningful clinical differences between different severities of GD. Especially, those with severe GD were found to have more symptoms of depression and anxiety, as well as having higher levels of emotional dysregulation and being more likely to gamble to “escape”. Also, alcohol and drug problems were found to increase with GD severity. These group differences could mean that individuals of different GD severity need different considerations in their treatment when presenting at the clinic. However, as there so far are few studies exploring the clinical differences of GD severity, and the results have been somewhat contradictory more research is needed to land in a firm conclusion.

4.3 **PAPER III – CLINICAL DIFFERENCES BETWEEN MEN AND WOMEN IN A SWEDISH TREATMENT-SEEKING POPULATION WITH GAMBLING DISORDER**

4.3.1 Background and aim

Although results are somewhat mixed, earlier studies have shown that women seeking treatment for gambling problems develop a disorder and seek treatment a shorter period of time after problems debut compared to men. They are also older when they enter treatment, and present with more affective- and anxiety disorders, while men instead have more problems with alcohol and drugs. Women are also more likely to live without a partner and have been suggested to have a higher chance of presenting as “emotionally vulnerable gamblers” according to the pathways model. Finally, women tend to engage more with non-strategic forms of gambling, such as casino and bingo, than men do.

Although men generally tend to gamble more, and more often present with gambling problems, there are some indications that the prevalence of women with gambling problems are increasing in Sweden. The aim of this study was to update the knowledge about possible gender differences among treatment seekers with GD in Sweden, and assess if earlier findings would be replicated.

4.3.2 Methods

The method in this study was much the same as in **Paper II**, with some key differences. Participants were recruited and diagnosed in the same fashion as described above, undergoing the same interviews and self-rating questionnaires. Notable differences were that the study included a larger number of participants, with n=208 recruited of which n=204 fulfilled criteria for GD and were included in the analysis. In addition to the questionnaires and interviews in **Paper II**, this study also included the GPQ questionnaire, investigating participants pathways into gambling.

4.3.3 Results

Of the 204 participants analyzed, the women constituted a smaller part, 26.5%. Women and men did not differ regarding the severity of their gambling problems or their given reasons for gambling. They also did not differ regarding their level of gambling-related cognitive distortions, emotional dysregulation, or quality of life. There were however some significant differences. Women were older, and they were more often single parents. Women were more likely to engage with online casino games as their dominant form of gambling (94.4%), even though this type of gambling was common for men as well (66.2%). However, men also often gambled on online sports betting (24.0%) which none of the women in the sample did. Women also developed gambling problems later in life, progressed quicker into a problematic behavior (although with a small but still significant effect, $d=0.07$), and had a shorter duration of problems before seeking treatment. Women were also found to have higher scores on state depression and anxiety than men. On the other hand, men had more problems with illicit drug use. Finally, the women were also considerably more likely to be in the “emotionally vulnerable” pathway (34.5%), with an odds ratio of 6.2 compared to men (16.1%). It should be noted however that the most common pathway in both groups was the behaviorally conditioned gamblers, women 44.8%, men 50.5%.

4.3.4 Conclusions

In conclusion, this study largely replicated the results of earlier studies comparing treatment-seeking men and women with GD. This is important knowledge, especially with the possible increase of women gamblers in the future. As there seems to be meaningful gender differences, it might be prudent to be aware of these in treatment planning as special consideration might have to be given regarding psychiatric comorbidity, drug use, or family situation.

4.4 **PAPER IV – INTERNET-DELIVERED THERAPIST-ASSISTED COGNITIVE BEHAVIORAL THERAPY FOR GAMBLING DISORDER: A RANDOMIZED CONTROLLED TRIAL**

4.4.1 Background and aim

As GD is a diagnosis that is associated with several negative consequences such as psychiatric comorbidity, economic problems, and difficulties in close relationships it is important to find good treatments that are able to reach a large part of the population. CBT is considered the most promising treatment, as it is the most well-studied and have shown overall positive results in the literature. However, only 21 % of problem gamblers seek some form of help worldwide. Internet-delivered treatment could possibly reach out to more gamblers, as this treatment format can be considered a low-threshold intervention. Internet-delivered CBT has been proven effective for a large number of different psychiatric disorders, and coupled with therapist guidance even as effective as face-to-face CBT when compared head to head. However, in the field of GD, no study has been able to display an effect on gambling symptoms for ICBT or other internet-delivered treatments when compared to an active control treatment in an RCT, although promising results have been shown in comparison with waitlist controls. The area is however under-researched, and many studies are feasibility or pilot trials. Also, only one earlier study has compared ICBT with therapist guidance which theoretically should be the most effective internet treatment for GD to a control treatment, and that was a low-powered feasibility study.

The aim of this study was to assess the effectiveness of ICBT with therapist guidance for GD in a treatment seeking sample, compared to an active control treatment.

4.4.2 Methods

In a parallel group single-blinded RCT, n=71 participants were randomized to either 8 weeks of ICBT with 15 minutes of telephone support from a psychologist each week, or a control condition consisting of 8 weeks of IMI with 15 minutes each week of MI over the telephone with an MI trained psychologist. Due to a participant revoking consent, and another experiencing

a software bug $n=69$ were possible to analyze, and of these $n=66$ started treatment. Self-report questionnaires were administered at a first assessment before treatment start, at baseline (treatment start), repeatedly during treatment, post-treatment and at 6-month follow up. The questionnaires assessed gambling symptoms as a primary outcome, and amount gambled/week, time spent gambling/week, symptoms of depression- and anxiety, gambling-related cognitive distortions, and quality of life as secondary outcomes. In addition, potential negative effects of the treatment were assessed at post-treatment and treatment credibility and therapist-patient alliance was assessed mid-treatment. A main analysis on the full analysis sample ($n=60$) was performed, with a sensitivity analysis performed on the intention-to-treat sample ($n=69$). Maximum likelihood estimation was used to account for missing data under an assumption of MAR.

4.4.3 Results

No significant differences were found between the two treatments either post-treatment or during follow-up on any outcome. Post-treatment gambling symptoms, as well as symptoms of depression and anxiety, were below clinical cut-offs in both the ICBT and IMI condition. Both treatments were scored equally credible and therapist alliance was equally high in both groups. Treatment retention was high with 80% vs 67% staying in treatment until the last module in the ICBT group and the IMI group respectively. There was no significant difference of the mean number of modules started between groups. An exploratory analysis where all participants were pooled showed a significant reduction of gambling symptoms ($d=0.52$), depression ($d=0.89$), anxiety ($d=0.69$), cognitive distortions ($d=0.84$), and quality of life ($d=0.60$) during treatment. However, there was a slight but significant deterioration for gambling symptoms ($d=0.42$), depressive symptoms ($d=0.59$) and anxiety symptoms ($d=0.30$) between post-treatment and 6-month follow-up. Furthermore, the largest change in gambling behaviors occurred between assessment and the start of treatment.

4.4.4 Conclusions

There was no difference between the two treatments evaluated in this study. However, exploratory analyses suggest that both treatments might have been effective. Although this cannot be fully confirmed due to the lack of a waitlist

control, the fact that both groups had non-clinical gambling symptoms post-treatment suggests an effect of the treatments. Importantly, the largest symptom change was found to occur between assessment and the start of treatment, suggesting that change had already started well before treatment was administered. This suggests that some parts of the procedure, such as the assessment or monitoring might be responsible for a large part of the change observed. The change seen before treatment start, together with the fact that both treatments seemed to work equally well even though the IMI treatment had considerably less content, might indicate that low-threshold and low-intensity interventions could be helpful for at least a subgroup of treatment seekers with GD that willingly choose to participate in internet treatment.

5 DISCUSSION

The overarching aim of this thesis was to contribute to better routine care of individuals with GD by advancing the understanding of clinically relevant differences among GD subgroups (**Papers II and III**) and by exploring a new type of treatment in routine care: internet-delivered CBT (**Paper IV**). In addition, a need for an instrument measuring cognitive distortions related to gambling was identified when designing **Papers II – IV**, and thus **Paper I** was conceived to translate and validate such an instrument, the GBQ.

5.1 SUMMARY OF STUDY RESULTS

In **Paper I**, the GBQ was translated, and evidence pointed to the full scale being valid for use in a Swedish context. However, the two subscales suggested in the development of the GBQ could not be confirmed.

Paper II found relevant clinical differences between the different severity levels of GD. Mainly, individuals with severe GD had more symptoms of anxiety and depression, had more problems with emotional dysregulation, and were more likely to gamble to “escape”. Increasing severity was also associated with more alcohol- and drug- problems. The group with severe GD was found to constitute almost half of all treatment seekers with GD.

Paper III likewise found that there were differences between men and women with GD, where women tended to be older, developed a disorder later in life, had more symptoms of anxiety and depression, and engaged more in online casino gambling. Furthermore, it suggested that women more often were categorized as “emotionally vulnerable” gamblers. Men, on the other hand had more problems with illicit drugs.

Paper IV found no difference between therapist guided ICBT and an internet-delivered control treatment based on MI. It found that participants in both treatment groups improved over time and had no clinical symptoms post-treatment. It also found that the largest change in gambling symptoms occurred before treatment start, between the first assessment and baseline.

5.2 INSTRUMENT VALIDATION (**PAPER I**)

In **Paper I**, the GBQ, a questionnaire used to assess gambling-related cognitive distortions was successfully translated and validated in a Swedish context. When developing a questionnaire, it is important to assess both its reliability, and validity. A reliable instrument minimizes the amount of random measurement error. A valid instrument measures the construct it was developed to assess (Viswanathan, 2005).

Similarly, when translating a questionnaire, it is important to validate the translated questionnaire (Tsang et al., 2017). This is to ensure that the translated questionnaire retains the reliability and validity in its new form and cultural context. It is thus noteworthy, that in the field of GD, few instruments have been validated for use in a Swedish context. The NODS, which is used in **Papers I – IV** has undergone reliability and validity testing in a student bachelor thesis (Fager, 2007) and the SCI-GD used in **Papers II – IV** was recently validated in Sweden as well (Molander, Månsson, et al., 2023). In addition, both the Gambling Disorder Identification Test (GDIT), a measure of GD severity (Molander, Wennberg, et al., 2023) and the Jonsson-Abbott scale (JAS), used to predict risk of developing gambling problems (Jonsson et al., 2017) were developed in Sweden. This is indeed a welcome development during the last few years.

However, several commonly used or potentially useful instruments, although translated, have not been fully validated in a Swedish context. The PGSI has been translated and used in Swedish population studies (Abbott et al., 2018; Public Health Agency of Sweden, 2019) and its factor structure and internal consistency has been evaluated in a Swedish study (Molander & Wennberg, 2022) but the translated instrument has not undergone a full validation procedure. Other examples are the GPQ (Nower & Blaszczynski, 2017), the Gambling Symptom Assessment Scale (G-SAS) (Kim et al., 2009), and the Gambling Urge Scale (GUS) (Raylu & Oei, 2004). This is of course unfortunate, as being able to validly and reliably measure target variables are of central importance in all research. Even though some instruments are widely used and there is reason to believe they are valid based on experience, one cannot be certain until it has been properly ascertained.

Regarding instruments specifically measuring gambling-related cognitive distortions, none has previously been validated in a Swedish context. The JAS scale contains two questions about distortions but is not used specifically to

measure this. There is however another Swedish developed instrument specifically assessing gambling-related cognitive distortions, called “Tankar om spel”. This was developed for use in a report (Jonsson et al., 2003) and has subsequently been used in at least one other study (Källmen et al., 2008). However, it does not seem to have undergone any validation procedure, and internal consistency has been lacking for two of three subscales and only acceptable for the full scale (Källmen et al., 2008). Therefore, the work done in **Paper I**, where a commonly used psychometrically sound measure specifically measuring gambling-related cognitive distortions was translated and validated in a Swedish context, is an important step in ensuring reliable and valid measurement in the field of GD in Sweden.

There are several possible uses for the GBQ. It can be used as in **Paper IV**, to evaluate the effect of treatment on cognitive distortions, or as in **Papers II – III** to compare cognitive distortions between different groups. As cognitive distortions are predictive of gambling problems, the GBQ could also be used as a predictor of future gambling problems or perhaps even of risk of relapse. Finally, it is a tool that can be used in the clinic to better understand a client’s irrational cognitions and address them during treatment.

5.3 RELEVANCE OF GAMBLING DISORDER SEVERITY LEVELS (**PAPER II**)

Paper II identified relevant clinical differences, mainly between individuals with severe GD compared to those with mild and moderate GD. Only one other similar study has been made, in which clinically relevant differences such as money lost, symptoms of anxiety and depression, and nicotine consumption instead differed between those with a mild disorder compared to those with moderate and severe disorder (Grant et al., 2017). The results so far have thus been somewhat conflicting. Furthermore, it has been argued that the severity criteria in the DSM-5 are not meaningful, as clear differences between all three groups have not been found (Grant et al., 2017) and as GD severity level could not predict relapse or drop-out during treatment (Mestre-Bach et al., 2019). This is certainly a possibility, seeing as the GD severity levels have been adapted from how other substance use disorders are classified in the DSM-5, without specific regards for different criteria possibly having different weights (Hasin et al., 2013). In addition, several studies have found that certain criteria (e.g. economical bailouts, preoccupation) are more indicative of severe

pathology (Chamberlain et al., 2017; Slecicka et al., 2015; Toce-Gerstein et al., 2003) or are more useful to distinguish between social and problem gamblers (Temcheff et al., 2016). However, although some symptoms might have more weight, counting criteria could still be a useful approximation of severity, although a bit imprecise. A simple symptom count is also easier to use for busy clinicians, rather than consulting an algorithm based on symptom weights.

As both **Paper II** and another previous study (Grant et al., 2017) has found clinically relevant differences, although somewhat conflicting, between severity levels, their ability to meaningfully distinguish individuals with GD certainly merits more investigation. Especially, as the DSM-5 severity levels are already used in research as an outcome measure of disorder severity (e.g., (Solé-Morata et al., 2023; Wullinger et al., 2023)). At this juncture, their usefulness cannot be fully ascertained, but also not fully dismissed.

5.4 INDIVIDUAL TAILORING OF TREATMENT (**PAPERS II – III**)

Both **Paper II** and **III** focused on investigating possible group differences among different subgroups with GD. **Paper III**, focusing on gender, largely replicated results of similar studies from a number of different countries. **Paper II**, assessed possible differences between mild, moderate, and severe GD. Although as described above the results in **Paper II** were somewhat in conflict with previous research, this study points to possible clinically relevant differences between GD severity levels.

One reason to learn more about the characteristics of particular subgroups with GD is the possibility of tailoring treatment to the individual characteristics of the patient. There has been an increased attention in recent years in the tailoring of psychotherapeutic interventions to patients. This is an important venue of research as evidence based treatments are not effective for about half of individuals seeking treatment (Zilcha-Mano et al., 2022).

Lately, novel approaches of predicting who will benefit from treatment, or certain therapeutic components, are becoming more common. In a meta-analysis of 24 studies using machine learning approaches to predict who would benefit from CBT, a mean prediction accuracy of 74% was found (Vieira et

al., 2022). This is promising as it indicates the possibility of matching treatments to patient characteristics.

Machine learning approaches have also been used to predict if certain therapeutic skills or treatment modes work better for patients with certain characteristics. By way of example, one study (Webb et al., 2022) found that Dialectic Behavior Therapy skills were associated with positive affect among patients with non-suicidal self-injury and sleeping disturbance, while Behavior Therapy skills were associated with positive affect among patients with higher emotional lability, anxiety disorder comorbidity, lower psychomotor agitation/retardation, and lower feelings of worthlessness/guilt. Another study (Brujniks et al., 2022) found that twice-weekly sessions of CBT and Interpersonal Therapy were generally more effective than weekly sessions, but by using a data-driven machine learning approach, it was possible to predict which individuals would benefit significantly more from twice-weekly sessions. This hints at the possibility of not only matching treatments to individuals, but also matching treatment components and treatment modes based on individual characteristics, thus tailoring treatment to the individual.

In the field of substance use, one early and well known try to match treatment with patient characteristics was Project Match. Here, participants with alcohol dependence were randomized to either CBT, Motivational Enhancement Therapy, or 12-step Facilitation Therapy. Although all treatments were found effective, few interactions were found between treatments and patient characteristics (ProjectMATCH, 1997). Since then, however, new approaches have been developed, and there have at least been some promising results in predicting who will benefit from CBT treatment among patients with alcohol- and nicotine dependence (Vieira et al., 2022).

Regarding GD, similar approaches have so far not been tested, and indeed GD is often under-researched compared to other addictive- or psychiatric disorders. However, in order to hypothesize which patient characteristics, therapeutic skills, and treatment modes might be relevant in future attempts to tailor treatment it is important to understand how different groups of GD patients might differ from one another. **Paper II** and **III** highlight several interesting patient characteristics that might be relevant when tailoring treatment. One way of categorizing individuals with GD is through their pathway to gambling (Nower et al., 2022). As seen in **Paper III**, gambling pathways seem to differ markedly between genders, and even though not examined in **Paper II**, the fact that gamblers with severe GD had more

problems with emotional dysregulation, were more likely to gamble to “escape”, and were more anxious and depressed, indicates that the “emotionally vulnerable” gambler subtype might be more common among severe gamblers. In addition, women were found to more often be single parents, and increasing GD severity was associated with more alcohol and drug problems. Drug problems was also more common among men.

These characteristics indicate several ways treatment of GD might be tailored to the individual. It might be prudent to add social support to single parents, or additional treatment for alcohol- and/or substance abuse to those with a more severe disorder. Another promising approach could be to add emotion regulation skills training to GD treatment for those identified as “emotionally vulnerable gamblers”, or even to anyone scoring high on a measure of emotion dysregulation like the DERS-16. This is particularly interesting, as emotional dysregulation has been theorized as playing an important role in the development and maintenance of GD (Rogier & Velotti, 2018; Velotti et al., 2021) and enhancing GD treatment with emotion regulation skills training has already proved a feasible approach in a pilot trial (Månsson et al., 2022).

5.5 LOW-THRESHOLD AND LOW-INTENSITY TREATMENTS FOR GD (**PAPER IV**)

As previously described in the introduction to this thesis, treatment seeking in GD is relatively uncommon. The easy access low-threshold character of internet-delivered treatments make them an attractive option to reach out to a larger proportion of the GD population. Other brief treatments, such as personalized normalized feedback, or single session treatments might also be a way to reach those for which starting a full-fledged psychotherapy seems a daunting aspect.

The fact that internet treatments for GD repeatedly, both in **Paper IV** and the literature as a whole, has failed to show an effect on GD symptoms when compared to active controls is cause for concern. However, this might be due to the controls having similarly positive effects. Indeed, in **Paper IV**, both groups had nearly no symptoms post-treatment. Also, in a few studies including both an active control and a waitlist, both active conditions have performed better than the waitlist (Casey et al., 2017; Jonas et al., 2020) although there is also an example where the active conditions were no better

than the waitlist (Luquiens et al., 2016). Considering this, and the fact that most of the change on GD symptoms for participants in **Paper IV** came before treatment started, it is possible that even interventions of very low intensity, such as monitoring, feedback and support (Casey et al., 2017), e-mail counselling (Jonas et al., 2020), an assessment procedure (**Paper IV**), or even just simply logging ones gambling expenditures (Wall et al., 2023) might be enough to exact positive change.

It should be noted that participants in studies of internet treatments might not always be representative of a general population (Statens beredning för medicinsk och social utvärdering (SBU), 2021). Indeed, fewer participants in **Paper IV** had severe GD than in **Papers II** and **III**, even though they were all recruited at the same clinic. This is probably due to self-selection bias, where those with less severe problems are more likely to choose internet treatment. In light of this, even though low-intensity treatments both over the internet and otherwise might be promising as a low-threshold/low-cost alternative, it is unknown if they would be equally effective for all individuals with GD. It is also largely unknown if the effects of such interventions last in the long run, due to the lack of long-term follow up (Eriksen et al., 2023; Peter et al., 2019; Quilty et al., 2019).

5.6 GENERAL DISCUSSION

This thesis has discussed the possibility of tailoring treatment to the individual, and the potential promise of low-intensity treatments. This alludes to the possibility of a more individualized approach to the treatment of GD. One way of utilizing treatments of different intensity would be a stepped care approach.

Stepped care is a concept, where treatments of different intensity are arranged along a continuum, with the goal of offering a sufficiently intense and advanced treatment to each individual's needs, while still preserving limited resources. In addition, the different treatments should be integrated into a coherent system, so that it is possible for an individual to "step up" or "step down" as needed (Berger et al., 2022; Mughal et al., 2023). For GD, a stepped care model could be advantageous for several reasons: 1) low-intensity/low-threshold interventions might be more palatable for individuals with GD that currently chose not to seek treatment, 2), access to low-intensity treatment could increase treatment availability, which is important, as the lack of treatment availability has been cited as a barrier for treatment-seeking

in GD (Gainsbury et al., 2014; Khayyat-Abuaita et al., 2015), 3) if as postulated earlier, low-intensity treatments work well for a subgroup with GD, a stepped care approach could be cost-effective, 4) integrating low-intensity/low-threshold interventions in a stepped care approach would make it possible for those that do not benefit from a low-threshold intervention to “step up”, that is, easily access a more intensive treatment. For such an approach to work, the different treatment options not only need to be integrated. It is also crucial that validated instruments are used to assess clinical variables relevant for the matching of treatment, and to continually measure progress (Mughal et al., 2023). This data-based approach informs when and for who treatment should be stepped up or down. An example of how a stepped care approach could be arranged in GD, is illustrated in Figure 3. As it currently stands however, a lot more research is needed to understand for whom a certain level of treatment is optimal, and how best to tailor treatment interventions.

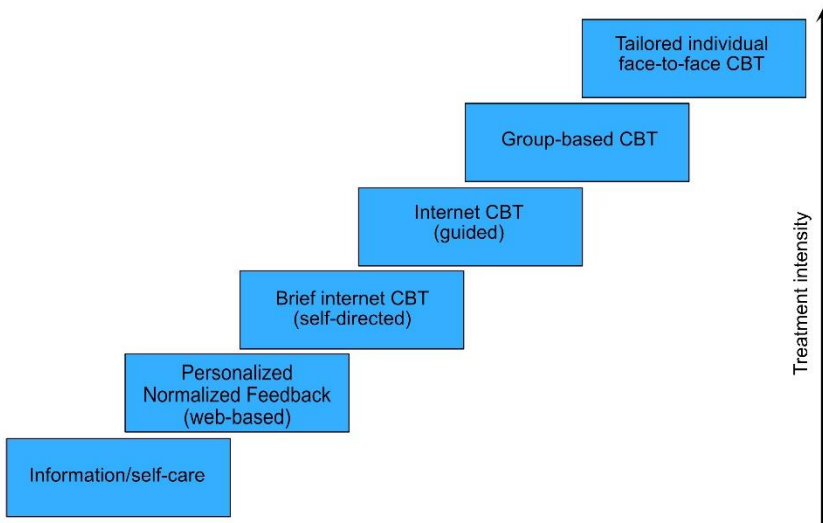


Figure 3. A stepped care model for Gambling Disorder.

5.7 LIMITATIONS

The choice of methods is discussed at length in the methods section of this thesis. However, although the methods employed were carefully selected, the

papers making up this thesis still have a number of limitations. The main limitations are presented below, with more detailed descriptions in each paper.

In **Paper I**, some choices were made for the study to fit the resources available, that presents some limitations in the design. These were 1) to keep the study anonymous, and 2) the sampling method employed. The fact that the study was conducted anonymously, made it impossible to reinvoke participants to do a test-retest, and thus the reliability over time for the Swedish GBQ is still unknown. In addition, although the sampling method ensured sufficient participants with gambling problems for the statistical analysis without needing a very large number of participants, it is not a true representation of the general population, and this affects the generalizability of the study.

A limitation present in both **Papers I** and **III** is the use of non-validated instruments. The lack of validated instruments prompted the validation of the GBQ in **Paper I**. However, the PGSI, and the GPQ, although translated, has not been validated in a Swedish context and this needs to be considered when interpreting the results. The lack of validated instruments is a general limitation in GD research in Sweden.

Papers II and **III** were mainly exploratory efforts. An exploratory study is not designed to confirm a specific hypothesis, instead their purpose is to describe and gain new insights in areas where there is a lack of prior knowledge (Swedberg, 2020). Due to this approach, **Papers II** and **III** were looking into a large number of variables with no set primary outcome measure. This meant many statistical tests were performed, and with no primary outcome singled out and no corrections of significance values performed there is a high risk of type I error. However, for an exploratory study this can be adequate – although it means findings should be confirmed in future more hypothesis-driven studies. Another drawback of this design was the lack of a power calculation. As there was no primary outcome variable, or estimation of effect size, the studies were instead ended once a number of participants deemed sufficient for a reasonable subgroup analysis was reached.

When conducting a hypothesis-driven experimental study as in **Paper IV** conducting a power analysis is crucial. This is because it minimizes the risk of type II errors, while still keeping the sample size as low as possible to conserve resources. It is especially important in studies with human participants, as including participants in an underpowered study where the chances are high that no effect will be found is ethically problematic (Haile, 2023).

Even so, the power calculation was also the main limitation in **Paper IV**, as it was based on faulty assumptions. At the time when the study was planned, few studies comparing ICBT for GD to an active control had been made, and so assumptions were made on the information available at the time. This meant that the hypothesized effect was assumed larger than what would have been deemed probable with today's knowledge, leading to the study being underpowered. However, it can be argued that the difference in gambling symptoms between groups post-treatment was so small that any difference detected by a better powered study would likely not have been clinically relevant.

Another limitation of **Paper IV** was that there is no treatment for GD that can really be considered a gold-standard, that is, a treatment widely accepted to be the best available for a certain disease (National Institute for Health and Care Excellence, 2023). As previously described, the most studied treatment with the best results for GD is CBT, but its long-term effects are still largely unknown. If face-to-face CBT (or another treatment) would have been considered a gold-standard, it could have been used as the active control condition in a non-inferiority design. As this was not the case, a treatment similar in form was designed from the ground up, introducing a level of uncertainty as to the effect of this control treatment.

Paper IV also has some limits to its generalizability. If an internally valid result can be generalized outside the sample investigated in a study is a matter of interpretation (Kukull & Ganguli, 2012). In the case of **Paper IV**, the results could possibly be generalized to non-treatment seekers with GD. However, the fact that many potential participants declined participation introduced a self-selection bias where participants had less severe gambling symptoms than the treatment seeking population as a whole. This limits the generalizability of the results to individuals with a more severe pathology.

5.8 ETHICAL CONSIDERATIONS

All studies making up this thesis include human participants. For such studies, extensive ethical considerations have to be made to minimize potential harm, and to ensure that the benefit of the research outweighs any potential risks. Participation needs to be totally voluntary in nature, and research participants

need to have gotten appropriate information about the procedure, and any risks and benefits it entails, in order to give an informed consent to participate.

Participation in all studies were voluntary in nature. For **Papers II – IV**, informed consent was given by participants by way of receiving written information, being able to ask questions about the study, and then filling out a written consent form. This information included the study objectives, information about potential harm or risk in taking part of the studies, and the fact that their personal data would be handled confidentially. Participants were also informed that they whenever they wished could leave the study, even if given prior consent, without giving any reason or suffering any consequences. For **Paper I**, participants received oral or written information (depending on recruitment setting). This again included the same type of information as described above. To ensure voluntary participation in this study, all answers were collected anonymously, and it was possible to turn in blank questionnaires as a way of not participating. This procedure was clearly explained to the participants.

All data were handled confidentially and stored in a secure way. For **Papers II – IV** a coding procedure was employed to anonymize the data. For **Paper I**, all data was collected totally anonymously and no data (or collection of datapoints) making a participant identifiable was collected. Also, the data collection procedure in **Paper I** was handled in a way that it would be impossible for the study leader to match data to study participants.

Participants in all studies were also informed about how results would be communicated. Information was given that the study results would be published. Participants were given contact information to the study leaders, and so it was possible for them to directly take contact and ask about their results – and the results of the study as a whole. Due to the anonymous nature of **Paper I**, it was not possible to communicate individual results back to participants of this study.

Some additional considerations and challenges applying to individual studies are detailed below. In **Paper I**, the procedure in itself was not deemed harmful. Participants only interaction with the study was to fill out questionnaires for a few minutes. However, the anonymous nature of the study did not make it possible for study leaders to identify specific individuals with gambling problems, and thus direct them to treatment. It was only possible to give general information in this regard. In contrast, participants in **Papers II – IV**

were directly treated at the “Clinic for Gambling Addiction and Screen Health” and could be monitored and given proper care when needed. However, most participants in **Paper I** likely to score high on these measures were already in either the context of treatment (at a community health service), or a self-help group and thus had ready access to care and support.

For **Papers II** and **III**, the interviews and questionnaires participants underwent were in the standard battery at the “Clinic for Gambling Addiction and Screen Health”. As such, they did not undergo an extra procedure. Being included in the study meant only to allow the data from these measurements to be used in the studies, after giving an informed consent. Here, the participants (and indeed all patients at the clinic) needs were put first and foremost. When the GPQ measure was deemed non-clinically relevant and too time-consuming for patients at the clinic this was discontinued. Also, all participants did not undergo the M.I.N.I. interview. This was only performed when deemed clinically relevant. This meant that **Papers II** and **III** had less data available than they otherwise would have, but it also meant that no one had to undergo any additional procedures due to being included in the study.

The ethical aspects of **Paper IV** were the most challenging. Firstly, undergoing a psychological treatment can be aversive and can also come with other negative effects (Rozental et al., 2019), and some may even deteriorate during treatment (Rozental et al., 2017). It is thus important to continuously monitor participants during the course of a treatment study. In **Paper IV** all participants were monitored via self-report questionnaires, and they also had weekly telephone calls with a psychologist. This made it possible to detect any alarming deterioration and provide adequate support.

Secondly, participants either underwent an experimental treatment (ICBT) or a control treatment not previously tested. In addition, as the study was performed in the clinic, declining to participate meant that one instead was offered the regular treatment at the clinic – group or individual CBT. Even though they cannot be considered a gold-standard treatment, CBT is still the recommended treatment for GD in Sweden. To offset this ethical conundrum, a number of steps were taken. Each participant was interviewed by their psychologist at the end of treatment about the treatment results and the participants need for further treatment. Everyone that expressed the need for additional treatment, or were deemed in need by the psychologist, were offered this. As described above, participants also gave their informed consent. However, as the study was complicated in nature, all participants that had

signed the written consent were contacted before study start by a research assistant who again went through the study details and ensured the participants understood what they had agreed to.

Third, as participants were only in contact with the clinic via the internet and telephone, it was important to continuously assess potential deterioration and suicide risk. Participants with a heightened suicide risk were excluded, and depressive symptoms and suicidal thoughts were monitored each week by means of a self-report questionnaire. If a heightened risk was detected, participants were contacted, and a structured assessment was made. This also included participants that had given answers indicating a heightened risk during the follow-up assessments. Should a heightened risk be detected participants were to be directed to emergency care. However, although a few telephone assessments had to be made, no one was assessed as having a heightened risk during the course of the study.

Finally, the treatment took place online, which is where most gambling content is also found. This could theoretically mean that participants would be tempted to gamble when working with the treatment. However, as online gambling is already very accessible via smartphones and most people spend time on their phones everyday it is unlikely that the extra time spent online for participation in the treatment posed an increased risk for online gambling.

6 CONCLUSION

The aim of this thesis was to further the understanding of relevant clinical considerations and possible treatment options for individuals with GD seeking treatment. **Paper I** validated an instrument that can be used to better understand a particular patient's gambling-related cognitive distortions, and thus inform treatment planning. In addition, the GBQ can be used to assess treatment effect on cognitive distortions both in the clinic and in research. This is an important tool, as cognitive distortions are implicated in both the development and maintenance of GD.

Papers II and III illuminate how different subgroups among treatment seekers with GD differ from each other, information that can be used by clinicians to better understand their patients, as well as inform future attempts to tailor treatment of GD. They also highlight a few specific clinical characteristics that might warrant treatment adaptations. Specific targets for adaptations could be problems with drugs and alcohol, difficulties with emotion regulation in more severe GD, and being a single parent and having more psychiatric symptoms among women with GD.

Paper IV concluded in a Randomized Controlled Trial, that the effect of ICBT in a sample of treatment seekers with GD was not more effective than an active control. It also found that the participants as a whole reduced their gambling symptoms to subclinical levels and that most of the change in gambling symptoms happened between the first assessment at the clinic and treatment start. This indicates that there might be a case for low-intensity treatments, at least for a subgroup with GD that choose to partake in internet treatments.

Overall, this thesis has also discussed the need for more validated instruments in the field of GD in Sweden, the possibility of tailoring and matching treatments to individuals, and the overall promise of low-intensity interventions within a stepped care framework. In conclusion, this thesis has contributed knowledge that can be used in clinical treatment planning of GD. However, in order to realize the possibilities of tailoring, matching, and stepped care developed in the discussion, further research is needed.

7 FUTURE PERSPECTIVES

The results and further discussion of this thesis points to several important areas for future research. Important groundwork needs to be done, with further validation of instruments. It is encouraging that the primary diagnostic tool SCI-GD has been validated in a Swedish context (Molander, Månsson, et al., 2023), but it would be beneficial to also further validate symptom scales such as the G-SAS (Kim et al., 2009), and scales measuring more specific constructs in the GD field such as the GPQ (Nower & Blaszczynski, 2017) or the Gambling Urge Scale (GUS) (Raylu & Oei, 2004) in Sweden. This would lay a solid foundation for future research, as the use of non-validated instruments is a significant limitation.

Further research needs to be done regarding the DSM-5 severity levels. As it stands, it is still unclear if they are a good representation of disorder severity as so far results have been mixed. As the criteria are used to estimate severity in research studies, their usefulness in this regard needs to be further clarified. This could be achieved by studies similar to **Paper II**, but preferably with better power.

Internet-delivered treatments, whether it is full-fledged guided CBT, or low-intensity interventions like personalized normalized feedback delivered over the internet hold promise as a way of reaching out to a larger portion of the GD population. However, more research is needed in order to assess, 1) the effectiveness of such interventions, and 2) for whom they are effective. Especially, there is a need to study low-intensity interventions specifically, and not just as a control treatment as was done in **Paper IV**. For all internet treatments, it will be important with studies on the long-term effects – to investigate if early gains are maintained over time.

Another interesting venue of future research is the tailoring of treatment in GD. As this research so far is lacking, several research questions are of interest here such as: 1) which patients will respond to treatment, 2) which patients will respond to a specific treatment (like a low-intensity intervention), and 3) will some patients have better outcomes if they receive a certain intervention (like emotion regulation skills training). As previously described, novel methods like the use of machine learning could be used to study this. In order to facilitate this research, more studies in the vein of **Papers II** and **III** are needed,

where different subgroups with GD are compared to each other. This can then be used to generate hypotheses about relevant variables and treatment interventions for matching and tailoring. Prospective studies focusing on predictors of relapses could also be of use here, as they could possibly point to important targets for treatment.

Finally, as was previously discussed, in the future a stepped care approach could be developed and tested for GD. However, for this to stand on a solid foundation, a lot more research into low-threshold interventions and matching of treatment to individuals has to be made.

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