The use and experience of responsible gambling tools

An explorative analysis of user behavior regarding a responsible gambling tool and the consequences of use

David Forsström

Abstract

Responsible gambling tools are an intervention that is designed to decrease gambling among individuals with an at-risk gambling behavior. Studies have indicated that responsible gambling tools can decrease gambling behavior, but little is known about how this intervention is used by gamblers. The aim of the present thesis was to explore different facets of the use, experience and functions of these tools. **Study I** used descriptive statistics and latent class analysis (LCA) combined with multinomial regression to explore the use of the responsible gambling tool Playscan among 9528 gamblers (regular and at-risk gamblers). The participants had volunteered to use the tool. The functions of the tool had a high rate of initial use but a low rate of repeated use. The LCA identified five user classes. Two of the classes (self-testers and multifunctional users) were defined as high users of the tool and had a higher risk of developing gambling problems according to multinomial regression. The multifunctional users were characterized by an extensive use of all the functions while the other high usage class had an extensive use of the self-test. The three other classes were as follows: those who did not use the tool, those who visited the tool but did not engage in any of the functions, and those who only used the tool's advice on how to decrease their gambling. Participants' reasons for use and non-use of the tool were attributed to their degree of need of the tool and its functions. The tool's most widely used function was the self-test that investigated the level of negative consequences faced by a user due to his or her gambling. **Study II** was a qualitative study investigating participants' views, experiences and their reasons for using the tool. The study was conducted by interviewing 20 volunteer users of the tool. These semi-structured interviews were analyzed by thematic analysis. The results showed that the users had a positive attitude towards the tool and understood its purpose. The self-test was the most widely used function in this sample as well. However, the participants' positive attitude toward the tool did not effectively encourage them to use it; they displayed low use of the tool's functions. This paradox was explained by lack of feedback and the fact that some participants did not understand that they had registered to use the tool. Providing more feedback and tailoring the feedback to individual users were seen as ways of bridging the paradox. Study II also found that participants used the gambling website (which Playscan was linked to) in an analogue way, preparing their bets before placing them online. This limited the time they spent on the site and inhibited their use of Playscan. **Study III** was motivated by the extensive use of the self-test among users in Study I and Study II. The aim of Study III was to investigate the psychometric properties of the self-test (known as GamTest) to better understand how it could be used with Playscan in the most efficient way. Two thousand two hundred and thirty four respondents answered the questionnaire, along with instruments measuring depression, anxiety and another instrument measuring problems due to gambling. Factor analysis, parallel analysis, Cronbach's alpha, and correlations were used to establish the tool's psychometric properties. The results yielded a three-factor model, excellent reliability, and high correlation with the Problem Gambling Severity Index (PGSI), endorsing the validity of the self-test. The results also indicated that the questionnaire could be effectively shortened. Overall, the studies show that the tool has an initial high use, low repeated use and that the self-test is the most used feature. In addition, the self-test had good psychometric properties.

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"In gambling the many must lose in order that the few may win."

George Bernard Shaw

To Ylva Wide, my fiancée.
To our son Theo.
To my parents, Anders and
Astrid Forsström.
To my brother, Daniel
Forsström.
To all my friends!

Abstract

Responsible gambling tools are an intervention that is designed to decrease gambling among individuals with an at-risk gambling behavior. Studies have indicated that responsible gambling tools can decrease gambling behavior, but little is known about how this intervention is used by gamblers. The aim of the present thesis was to explore different facets of the use, experience and functions of these tools. Study I used descriptive statistics and latent class analysis (LCA) combined with multinomial regression to explore the use of the responsible gambling tool Playscan among 9528 gamblers (regular and at-risk gamblers). The participants had volunteered to use the tool. The functions of the tool had a high rate of initial use but a low rate of repeated use. The LCA identified five user classes. Two of the classes (self-testers and multi-function users) were defined as high users of the tool and had a higher risk of developing gambling problems according to multinomial regression. The multi-function users were characterized by an extensive use of all the functions while the other high usage class had an extensive use of the self-test. The three other classes were as follows: those who did not use the tool, those who visited the tool but did not engage in any of the functions, and those who only used the tool's advice on how to decrease their gambling. Participants' reasons for use and non-use of the tool were attributed to their degree of need of the tool and its functions. The tool's most widely used function was the self-test that investigated the level of negative consequences faced by a user due to his or her gambling. Study II was a qualitative study investigating participants' views, experiences and their reasons for using the tool. The study was conducted by interviewing 20 volunteer users of the tool. These semi-structured interviews were analyzed by thematic analysis. The results showed that the users had a positive attitude towards the tool and understood its purpose. The self-test was the most widely used function in this sample as well. However, the participants' positive attitude toward the tool did not effectively encourage them to use it; they displayed low use of the tool's functions. This paradox was explained by lack of feedback and the fact that some participants did not understand that they had registered to use the tool. Providing more feedback and tailoring the feedback to individual users were seen as ways of bridg-

ing the paradox. Study II also found that participants used the gambling website (which Playscan was linked to) in an analogue way, preparing their bets before placing them online. This limited the time they spent on the site and inhibited their use of Playscan. Study III was motivated by the extensive use of the self-test among users in Study I and Study II. The aim of Study III was to investigate the psychometric properties of the self-test (known as GamTest) to better understand how it could be used with Playscan in the most efficient way. Two thousand two hundred and thirty four respondents answered the questionnaire, along with instruments measuring depression, anxiety and another instrument measuring problems due to gambling. Factor analysis, parallel analysis, Cronbach's alpha, and correlations were used to establish the tool's psychometric properties. The results yielded a three-factor model, excellent reliability, and high correlation with the Problem Gambling Severity Index (PGSI), endorsing the validity of the self-test. The results also indicated that the questionnaire could be effectively shortened. Overall, the studies show that the tool has an initial high use, low repeated use and that the self-test is the most used feature. In addition, the self-test had good psychometric properties.

Sammanfattning

Spelansvarsverktyg är en intervention som designats för att minska spel om pengar bland individer som har ett överdrivet spelande. Tidigare studier har visat att spelansvarsverktyg kan minska överdrivet spelande, men det finns ingen forskning gällande hur dessa verktyg används av spelare. Syftet med föreliggande avhandling var att undersöka olika aspekter av användningen av spelansvarsverktyget Playscan. **Studie I** använde deskriptiv statistik och latent klassanalys i kombination med multinominal regression för att undersöka användningen av Playscan bland 9528 spelare (både spelare med och utan risk att utveckla ett problematiskt spelande) som hade anslutit sig till verktyget på frivillig basis. Funktionerna (riskbedömning, svara på ett självtest, återkoppling och råd för att minska spelande) som verktyget innehåller användes av majoriteten av användarna en gång, men upprepat användande av funktionerna var sällsynt. Klassanalysen identifierade fem olika användarklasser. Två av klasserna definierades som höga användare (självtestare och flerfunktionsanvändare) av verktyget och hade en högre risk att utveckla spelproblem. De tre andra klasserna präglades av en annan typ av användarmönster. De klasserna utgjordes av användare som inte använde verktyget alls, användare som bara besökte verktyget samt en sista klass som bestod av personer som enbart använde funktionen som gällde att få råd för att minska sitt spelande. En tänkbar orsak till låg och hög användning av verktyget hade att göra med att spelare som hade en hög användning av verktyget hade högre risk för att utveckla spelproblem och därför hade ett stort behov av att minska sitt spelande. Ett självtest som undersöker graden av negativa konsekvenser på grund av spelande var den mest använda funktionen i verktyget. **Studie II** var en kvalitativ studie som undersökte användande och motiv för att använda verktyget genom att intervjua 20 frivilliga användare av verktyget. De semi-strukturerade

intervjuerna analyserades med hjälp av tematisk analys. Resultaten visade att användarna hade en positiv inställning till verktyget och förstod verktygets syfte. Självtestet var även i denna studie den mest använda funktionen. Den positiva inställningen till verktyget ökade dock inte användningen av det. Denna paradox förklarades av att deltagarna fick för lite direkt feedback från verktyget och att vissa användare inte förstod att de hade registrerat sig som användare av verktyget. Mer och individanpassad feedback sågs av intervjupersonerna som ett sätt att överbrygga paradoxen. Även det faktum att deltagarna använde Svenska spels sajt på ett analogt sätt genom att förbereda vilka matcher de skulle satsa samt vilka Lotto-rader de skulle spela på gjorde att de bara var inloggade på sajten en kort stund, vilket begränsade användandet av Playscan. **Studie III** genomfördes utifrån det utbredda användandet av självtestet bland användarna i studie I och II. Syftet med studie III var att undersöka de psykometriska egenskaperna hos självtestet för att bättre förstå hur det kan användas i spelansvarsverktyget på det mest effektiva sättet. Totalt 2234 personer besvarade en nätbaserad enkät som innehöll frågeformulär som täckte områdena spel om pengar, ångest och depression. Faktoranalys, parallell analys, Cronbach's alpha och korrelationer användes för att fastställa instrumentets psykometriska egenskaper. Resultaten visade att en trefaktormodell gav den bästa matchningen med data, att instrumentets reliabilitet var hög och att korrelationen mellan självtestet och ett annat instrument som undersöker spelande var högt. Resultaten tyder på att självtestet har goda psykometriska egenskaper. Sammanfattningsvis visade studierna i avhandlingen att verktyget hade ett initialt högt användande och lågt upprepat användande. Det låga användandet berodde delvis på brist på feedback. Vidare så visades att självskattningsformulär i verktyget hade goda psykometriska egenskaper.

Nyckelord: spelansvarsverktyg, användning, brist på feedback, självtest, psykometriska egenskaper, latent klass analys, tematisk analys, explorativ faktoranalys.

List of publications

I.   Forsström, D., Hesser, H., & Carlbring, P. (2016). Usage of a Responsible Gambling Tool: A Descriptive Analysis and Latent Class Analysis of User Behavior. *Journal of Gambling Studies*, 32(3), 889-904. DOI: 10.1007/s10899-015-9590-6.

II.   Forsström, D., Jansson-Fröjmark, M., Hesser, H., & Carlbring, P. (2017). Experiences of Playscan: Interviews with users of a responsible gambling tool. *Internet Interventions*, 8, 53-62. DOI: 10.1016/j.invent.2017.03.003.

III.   Forsström, D., Lindner, P., Jansson-Fröjmark, M., Hesser, H., & Carlbring, P. (2017). GamTest: Psychometric evaluation in the general population. Manuscript submitted for publication.

Abbreviations

AIC	Akaike's Information Criterion
AUC	Area Under the Curve
BIC	Bayesian Information Criterion
CBT	Cognitive Behavioral Therapy
DSM	Diagnostic and Statistical Manual of Mental Disorders
EGM	Electronic Gambling Machines
GAD-7	Generalized Anxiety Disorder Assessment
LCA	Latent Class Analysis
MI	Motivational Interviewing
PGSI	Problem Gambling Severity Index
PHQ-9	Patient Health Questionnaire-9
RG	Responsible Gambling
ROC	Receiver Operating Characteristics
SEK	Swedish kronor
SLA	Supervised learning algorithms
SSBIC	Sample-size adjusted Bayesian Information Criterion
SWELOGS	Swedish longitudinal gambling study

Contents

Introduction

Gambling has been a feature in many cultures throughout history. It has served as a pastime for people seeking excitement and, of course, the possibility of winning money or other rewards. Though the ways that humans gamble have changed—from games like Tabula (the Roman version of checkers) to today's online sports betting and the emergence of betting on e-games—one thing has not changed: the possibility of losing money while gambling. Most gamblers are willing to take this risk in order to experience excitement, pass time, or play in a social setting. However, for some individuals, gambling is associated with risk. This risk comes with negative impact on their physical and psychological well-being. A gambler's family and friends may also be negatively affected. In some cases, individuals need professional help to limit their gambling, but only a few seek it. Low rates of treatment seeking are linked to experiences of stigma and shame among gamblers. In addition, some gamblers have the capability to self-recover. Regardless, recovery comes with a high personal cost for the individual and people that are close. In the light low incidence of treatment seeking and high costs of recovery, preventive strategies to help individuals limit their gambling are essential. Strategies to this effect have been in place for decades in various arenas of gambling, but with the advent of online gambling, the possibilities for creating effective preventive measures have become much greater. Responsible gambling (RG) tools is one potentially effective preventive strategy. These tools track and investigate whether a gambler's behavior is associated with risk in an online setting. They also provide feedback and advice to gamblers. Studies investigating this type of intervention are scarce. When work on this thesis began in 2013, only one study regarding this type of tool, by Griffiths, Wood, and Parke (2009), had been published. The present thesis therefore intends to explore the usage of and application of RG tools from a quantitative and qualitative perspective. Internet interventions with a prevention focus are generally not utilized to a high degree, but no studies have been carried out in what way RG tools are used. A quote that is misattributed (ironically enough) to Mark Twain holds a key to the studies in the thesis: "It ain't what you don't know that gets you into trouble. It's what you know for sure that just ain't so". The included

studies will investigate if utilization of RG tools follows the same pattern of use as other Internet-based interventions in order to acquire knowledge about an area, which previously only was subject to speculation. I hope that the knowledge gained will aid in the development of RG tools so that they will prevent harm and help gamblers to limit their gambling.

Bjurholmsplan 23, Stockholm, September 2017.

Background

Definition of and the development of gambling

Gambling can be defined as the activity or practice of playing a game of chance for money or other stakes (Wykes & Berwick, 1964). Skill is also associated with gambling, but chance is however the main component that determines the outcome. Gambling has been and still is a common feature in most civilizations (Wykes & Berwick, 1964), which indicates its importance as a practice and pastime. Ancient Greek literature, for example, contains accounts of gambling (McMillen & McMillen, 1996). Through history, various types of gambling activities (e.g., Poker, dice games, etc.) have been conceived, but the essential features of gambling have not changed. The individual who gambles always risks the wagered money and is, in most cases, likely to lose it.

Throughout most of its existence, gambling has been carried out in the same way. Bets are placed either at the physical location where the event being gambled upon is taking place (e.g., race tracks or sports arenas) or at locations designated for placing bets (e.g., betting shops). There are also specialized gambling venues, such as casinos, that allow patrons to access electronic gambling machines (EGMs) and other games (e.g., Blackjack, Poker and Roulette). However, since 1995, the way that gambling activities are carried out has undergone a major change; in that year, it became possible to gamble over the Internet. The number of gambling websites has since grown exponentially as has the number of individuals gambling online (Williams, Wood, & Parke, 2012). Also, the use of block chain (open source peer-to-peer network) and cryptocurrency (e.g. Bitcoin) are pushing the boundaries for how gambling is carried out over the Internet (S. M. Gainsbury & Blaszczynski, 2017) and indicating the advent of yet a revolutionizing development in gambling. The next evolution of gambling might be in the areas of gamification and E-sports. Components of gamification are already present in gambling. E-sport betting is now a rapidly growing market for betting. One study found that the boundaries be-

tween gambling and gaming are still in effect among consumers, but the boundaries are blurring (Teichert, Gainsbury, & Mühlbach, 2017).

It is debated whether certain types of gambling activities are associated with higher risk of developing problems than others. One study found that Poker and Live-action betting was associated with high risk (Brosowski, Meyer, & Hayer, 2012). Also disputed is whether online gambling is associated with a higher risk of developing problems than land-based gambling. It has been found that gamblers using multiple modes of gambling (both online and land-based) had higher scores than gamblers who solely engaged in either land-based or online gambling on the Problem Gambling Severity Index (PGSI). (Blaszczynski, Russell, Gainsbury, & Hing, 2016). The PGSI is a self-report questionnaire that measures negative consequences of gambling. Nordmyr, Forsman, Wahlbeck, Björkqvist, and Österman (2014) found a link between problem gambling and gambling online. Edgren, Castrén, Alho, and Salonen (2017) found increased risk for problem gambling among Finnish women that gambled online. Also, Canale, Griffiths, Vieno, Siciliano, and Molinaro (2016) found that rates of problem gambling was five times higher for online gamblers than land-based gamblers in an Italian sample. In addition, Internet gamblers are more vulnerable to manipulation than their offline counterparts (Redondo, 2015).

What further complicates the situation is that gambling online can encompass gambling on different types of devices making the results from studies investigating online gambling difficult to interpret. Gainsbury, Liu, Russell, and Teichert (2016) investigated online gambling on different devices. They found that gamblers that chose to use mobile devices and supplementary devices had higher rates of gambling problems than those gamblers that only gambled on their computer. This suggests that sub-groups analyses need to be carried out when investigating online gamblers. It also suggests that the online features that are meant to reduce gambling needs to be tailored. This line of argument is supported by Gainsbury, Russell, Blaszczynski, and Hing (2015). The study found two different types of gamblers in an online sample indicating a variation in the online gambling population. However, not all studies endorse the relationship between online gambling and higher rates of problems. Philander and MacKay (2014) found that past year online gambling was linked to a decrease in problem gambling severity. Conflicting results can be a consequence of the different ways that individuals gamble online, which seem to influence the potential harmfulness of Internet gambling.

Not only type, frequency of gambling activity and mode of gambling are risk factors for developing a problematic gambling. A meta-analysis (Dowling et al., 2017) containing 15 studies found 15 factors associated with higher risk. These factors were alcohol use frequency, antisocial behaviors, depression, male gender, cannabis use, illicit drug use, impulsivity, number of gambling activities, problem gambling severity, sensation seeking, tobacco use, violence, uncontrolled temperament, peer antisocial behaviors, and poor academic performance. This result further complicates research findings concerning Internet gambling and type of gambling activity since many factors can be present at the same time for an individual that gamble. This makes it harder to understand cause and effect relationships in the development gambling problems.

Problem gambling: Risk, harm, and consequences

For some individuals, gambling develops from a source of excitement and enjoyment into an activity that can be labeled as maladaptive and associated with problems, which result in negative consequences. These include both psychological and physical consequences. Pathological gambling has been a diagnosis since the Diagnostic and Statistical Manual of Mental Disorders III (DSM-III) was published in 1980 (American Psychiatric Association, 1980). However, problem gambling has probably existed as a condition long before the introduction in the DSM. It was, at first, classified as an impulse control disorder. Pathological gambling remained a diagnosis within the section covering impulse control disorders in the Diagnostic and Statistical Manual of Mental Disorders IV (DSM-IV) and the Diagnostic and Statistical Manual of Mental Disorders IV Text Revision (DSM-IV TR). Many of the studies that have used the diagnosis have used the definition provided in the DSM-IV, which was published in 1994 (fourth ed.; DSM-IV; American Psychiatric Association, 1994). By this definition, which is also present in the updated version published in 2000, a patient is diagnosable as a pathological gambler if he/she meets five out of ten of the following criteria: he or she is preoccupied with gambling; increases the amount of money spent on gambling to achieve the desired excitement level; is unable to control, cut back on, and/or stop gambling; gets irritable and restless when trying to stop or cut down on gambling; gambles to flee from problems or to relieve low moods (e.g., feelings of helplessness, guilt, anxiety, and depression); "chases" his or her losses, attempting to win back money lost the previous day; is untruthful about his/her gambling involvement towards

family members and/or the therapist; has committed illegal acts to provide economic means with which to gamble; has lost a significant relationship, job, or educational opportunity due to gambling; and needs others to pay for necessities that money spent gambling should have covered (American Psychiatric Association, 2000).

As mentioned, a majority of studies have used this definition and criteria to establish the presence of the disorder in outcome studies. Some examples are Jiménez-Murcia et al. (2016), Boughton, Jindani, and Turner (2016), Campos, Rosenthal, Chen, Moghaddam, and Fong (2016), N. Harris and Mazmanian (2016) and Petry, Rash, and Alessi (2016). In 2013, the Diagnostic and Statistical Manual of Mental Disorders 5 (DSM-5) was published (fifth ed.; DSM–5; American Psychiatric Association, 2013), changing the placement and the criteria used for diagnosis. The diagnosis was recategorized from "Impulse-control disorders not elsewhere classified" to "Substance-related and addictive disorders". The name of the diagnosis was changed from "Pathological gambling" to "Gambling disorder". Also, one criterion used in the DSM-IV and DSM-IV TR (the patient has committed illegal acts, such as forgery, fraud, theft, or embezzlement, to finance gambling) was dropped. Finally, in the new edition, a patient only needed to meet four out of nine criteria in order to receive the diagnosis.

Studies have investigated the effect of the changes in the number of criteria that need to be fulfilled and the elimination of the illegal acts criteria. Petry, Blanco, Jin, and Grant (2014) found that eliminating the illegal acts criteria did not affect the validity of diagnosis but that lowering the threshold from five to four criteria resulted in a small increase of the rate of the diagnosis. Also, Petry, Blanco, Stinchfield, and Volberg (2013) and Stinchfield et al. (2016) concluded that the illegal acts criteria was not necessary from a statistical standpoint and that using four criteria instead of five resulted in a better classification of disordered gambling. However, the illegal acts criteria might have practical use in a clinical setting.

Aside from the definitions in the DSM-III, DSM-IV, DSM-IV TR and DSM-5, there are other definitions of problem gambling and gambling associated with risk that also entail negative consequences for the individual and that introduce a classification of different levels of gambling. One such definition is found in the comprehensive review by Williams, Volberg, and Stevens (2012) on page 8:

Problem gambling is defined as having difficulties limiting money and/or time spent on gambling which leads to adverse consequences for the gambler, others, or for the community. It includes 'pathological gambling' (equivalent to severe problem gambling) that is characterized by severe difficulties in controlling gambling behaviour leading to serious adverse consequences.

Using that as a definition, Williams, Volberg, et al. (2012) reviewed the available prevalence studies between 1975 to 2012 (the definition above also encompasses pathological gambling according to the DSM-criteria). The highest standardized prevalence rate was found in Hong Kong in 2001 (7.6%) and the lowest rate was found in the Netherlands in 2004 (0.5%).

Another definition of risk has been used in prevalence studies carried out in Sweden. Two prevalence studies have been carried out in Sweden as part of the Swedish longitudinal gambling study (SWELOGS) carried out by The Public Health Agency of Sweden. As mentioned, SWELOGS employed different criteria for gambling associated with risk and problem gambling. The PGSI was used to define risk. The questionnaire is based on the DSM-IV-criteria. The questionnaire contains nine questions and has a maximum score of 27 points. Elevated risk was defined as a score of 3-7 and problem gambling was defined as score of eight and above. The prevalence levels for elevated risk were 1.9% in 2008/2009 and 1.3% in 2016. The rates of problem gambling were 0.3% in 2008/2009 and 0.4% in 2016.

The previous risk assessments explained were based on self-report or on expert assessments based on the DSM-IV-criteria. The RG tool Playscan, which is the focus of this thesis, employs a different conception of risk. It employs the term "risk of developing an excessive gambling pattern." This assessment is based on gambling behavior in the form of transaction data, such as time and money spent on gambling. Also including different behavior markers for excessive gambling, such as "night owling" (gambling late at night) and "chasing losses" (trying to win money to offset previous losses), were also used to determine risk. The risk assessment also includes the results from a 16-item questionnaire focused on negative consequences of gambling. A higher score on the questionnaire indicates a higher level of risk. The assessment, thus, is a combination of an individual's gambling data and the results of the questionnaire.

Whether an individual fulfills the criteria for pathological gambling/gambling disorder or has a gambling pattern associated with the

risk of developing excessive gambling, the individual will, in most cases, experience negative consequences/harm in the long and short term. The most obvious negative consequence of excessive gambling is the loss of money, but the loss of time can also be a major negative consequence. Negative psychological (e.g. anxiety and depression) and physiological consequences (e.g. high blood pressure and stress) are also common (Lorenz & Yaffee, 1988). However, individuals with pathological gambling/gambling disorder and at-risk gamblers are not the only ones who experience negative consequences. Two studies have shown that low-level gambling is also associated with harm: Canale, Vieno, and Griffiths (2016), who investigated harm among adult gamblers, and Raisamo, Halme, Murto, and Lintonen (2013), who investigated harm among adolescents.

One other aspect of gambling is that the gambler is not the only one who experiences negative consequences. A review including 30 studies have shown that significant others (e.g. family member or partner) also experience adverse effects due to gambling of a relative (Kourgiantakis, Saint-Jacques, & Tremblay, 2013). Another finding is that individuals close to the gambler (not relatives, e.g. close friends) also suffer from negative consequences (Svensson, Romild, & Shepherdson, 2013). Thus, helping an individual with problems due to gambling is perhaps at the same time providing help and relief for significant others and individuals close to the gambler. In a qualitative study by Downs and Woolrych (2010) the results indicated that the impact of problem gambling is large for the gambler and family and friends. Besides overall debt, deceit and secrecy that the gambler engaged in were the aspects that created problems in their relationships.

Harm or negative consequences of gambling are present for individuals at a pathological level, for individuals that engage in gambling associated with risk, and for leisure low-level gamblers. These three levels of gambling exist on a continuum, and it is hard to draw distinct lines between them. What is clear is that gamblers at different levels of gambling have different needs in terms of preventing and limiting the harm from gambling activities. Different preventive and harm-minimization strategies have been developed to meet the needs of these groups (mainly for at-risk and problem populations). However, for the most excessive gamblers treatment is a viable option.

Efficacy of treatments and treatment seeking

Psychological treatments have proven to be a moderately effective countermeasure against pathological gambling/gambling disorder. Meta-analyses have been published that support this claim for long-term treatments. The treatment that is validated Cognitive Behavioral Therapy (CBT). Meta-analyses have also found evidence for the effectiveness of short-term interventions, such as motivational interviewing (MI). Pallesen, Mitsem, Kvale, Johnsen, and Molde (2005) and Gooding and Tarrier (2009) showed in their meta-analyses that CBT-based interventions produced moderate effects on the group level. However, there was an overlap between the two meta-analyses when it came to the included studies. Fourteen out of the 22 studies in Pallesen et al. (2005) were also included in Gooding and Tarrier (2009). Over half of the studies included treatment and control group (Gooding & Tarrier, 2009). The studies included both individual and groups treatments. Most of the studies included were randomized control trials in the study by Gooding and Tarrier (2009). Yakovenko, Quigley, Hemmelgarn, Hodgins, and Ronksley (2015) found that MI interventions produced large effects sizes. Only six studies were included in that analysis, but it provides tentative evidence for short-term interventions for pathological gambling/gambling disorder. A meta-analysis of pharmacological treatments for problematic gambling (Bartley & Bloch, 2013) showed that opiate antagonists had a small effect and that other pharmacologically based treatments had no significant effect. Based on the results of the meta-analyses, psychologically based interventions should be recommended as the treatment of choice for pathological gambling/gambling disorder. Yakovenko and Hodgins (2016) followed up the meta-analysis with a review including studies from 2012 to 2015. The recent CBT treatment studies included supported the notion that CBT is an effective treatment. Regarding brief interventions, MI is still an effective treatment. However, one important aspect that has been discussed both in the review and in the meta-analysis is the methodological weaknesses in a majority of the included studies. However, critique against methodological aspects of studies investigating the effects of treating excessive gambling is also present in a review by the Swedish Board of Health and Welfare that reached conclusions contrary to those of the meta-analyses. The review concluded that the support for short-term treatments like MI and long-term treatments like CBT are weak. The review also concluded that the treatments do not have long term follow up and it is therefore hard to draw any conclusions regarding their effectiveness ("Spel om pengar – Behandling med psykologiska metoder eller läkemedel vid

beroende eller problemspelande," 2016). Also, a review of the12-step program used at Gambler Anonymous found that results were inconsistent across studies (Schuler et al., 2016).

Although there are moderately effective psychological treatments available for pathological/disordered gambling, the level of treatment seeking is low. The studies available have reported different levels of treatment seeking, but it generally spans from approximately 5% to 12% (Slutske, 2006; Suurvali, Hodgins, Toneatto, & Cunningham, 2008). Reasons for low treatment seeking have been researched. Barriers for not seeking treatment are, among others, the wish to handle the problem oneself; shame/embarrassment/stigma; unwillingness to admit the problem exists; and issues with treatment itself (Suurvali, Cordingley, Hodgins, & Cunningham, 2009).

One hypothetical reason for low treatment seeking, which has not been discussed at length in the field of gambling, could be that safeguards intended to reduce excessive spending of time and money in gambling venues and at online gambling sites are not good enough. A consequence of this inadequacy could be that excessive gamblers feel disappointed when the safeguards are not effective and they subsequently come to believe that neither treatment nor preventive strategies will work for them.

In any case, the low treatment seeking among excessive gamblers warrants effective land-based and online safeguards to decrease or stop individuals from spending excessive amounts of money and time on gambling. Many initiatives have been carried out by researchers trying to decrease spending on gambling without supplying formal and regular psychological treatment.

Prevention and responsible gambling features

The aim of prevention in gambling is to keep people who already gamble, and people in general that are non-gamblers, from developing problems. Prevention strategies can target different populations, including individuals with no known risk factors, individuals with one or several risk factors, and problem gamblers (Williams, West, & Simpson, 2012).

In the review by Williams, West, et al. (2012), different preventive strategies were assessed and ranked based on their ability to prevent

the onset of problem gambling rather than for their ability to reduce harm from gambling. However, as part of a larger line of argument, prevention of the onset of problem gambling was seen, by the authors, as a way of preventing harm. The review concludes that a multitude of initiatives is available to prevent problem gambling. The plethora of initiatives are, in part, due to differences in the type of jurisdictional approach between different states (e.g. in Australia and in Canada) and countries. The review also concludes that the most widespread and most used preventive strategies are the least effective and that some of the more effective features are employed in an ineffective manner. Another conclusion of the review is that most of the features (both general and specific) only produce a moderate effect (childhood interventions, awareness campaigns, overall restrictions on the availability of gambling, restrictions of the concurrent use of alcohol and tobacco) or a weak effect (on-site information, statistical instructions, school-based interventions programs, casino self-exclusion, modification of EGM parameters such as pop up messages when gambling, problem gambling training for employees at gambling venues, restrictions on advertising). Some of the features did not have sufficient empirical support to determine their effects (school-based preventions programs, limitation of the number of gambling formats, restriction of gambling to gambling venues, limitation of the operating hours of gambling venues, restriction of access to gambling venues, restriction of access to money, and increases in the cost of gambling).

As a part of the general prevention, RG features make up one facet of the preventive strategies available to help gamblers limit their gambling behavior and, thus, minimize harm. Most of these features are presented in conjunction with actual gambling situations and can therefore be expected to have a more direct impact than other preventive efforts, such as public awareness campaigns. RG features consist of different types of harm-minimization efforts aimed at limiting excessive gambling. One definition of RG is that it comprises policies and practices to reduce the potential harmfulness of gambling (Blaszczynski, Ladouceur, & Shaffer, 2004). Harmfulness can, in this instance, consist of some of the negative consequences presented above, such as loss of time and money. RG features span different types of interventions, such as the following: self-tests to assess the level of gambling problems; limit setting in respect to deposited amounts or bets over a predetermined period; warning systems that alert users when they have played for a long period of time or spent a certain amount; self-exclusion in different settings (both online and in casinos); updates of current and past expenditures on gambling; and information regarding gambling problems (Blaszczynski et al., 2011).

Responsible gambling features compared to features used by gambling sites

Even though there are a multitude of different features (some of them presented in the previous paragraph) to prevent excessive gambling and minimize harm, both land-based and online gambling sites provide gambling services that can be addictive. Gambling sites provide access to different forms of gambling activities. These activities all have strong reinforcing capacities to encourage individuals to continue gambling. Also, the use of promotional e-mails and bonuses when joining are among the means used by gambling companies for customer recruitment and retention. For example, Jolley, Lee, Mizerski, and Sadeque (2013) found that the use of e-mail reminders increased customer retention. Also, a review of gambling sites and payout rates during a demo period showed that 39% of the sites used inflated rates, which indicates the use of specific strategies to snare customers and prospective gamblers on the site (Sévigny, Cloutier, Pelletier, & Ladouceur, 2005). Another study showed that inflated or 'profit' demonstration modes resulted in higher bets on EGMs among participants (Frahn, Delfabbro, & King, 2015).

The available RG features online and on gambling sites must contend with potent reinforcers (which are present during gambling activities) to change gambling patterns and attitudes towards gambling. While gambling companies can use elements such as gamification and bonuses, RG features must resort to using feedback and information to change behavior. There is also little research to what extent these RG features are used. For example, in one study, only 1.2% of users made use of the RG feature limit setting function available on a gambling site (Nelson et al., 2008). However, low use might not necessarily be a problem. An opposing argument when it comes to the low rates of utilization of RG features could be that not all users make use of these features. However, the work of Canale, Vieno, et al. (2016) and Raisamo et al. (2013), presented above, linked low gambling frequency and potential harm among gamblers; providing an argument for promoting the use of RG features for all users at gambling sites as well. Over time, changes in gambling patterns can result in increased risk for individuals. This makes continuous use of RG features an important screening possibility for gamblers who wish to change their gambling patterns.

Users' view of responsible gambling features

There is little research on how users perceive and view both online and land-based RG features. This also includes attitudes towards and experience of RG features. The need for further research is crucial since the reasons for using RG features probably depends on, among other factors, gambling activity, level of gambling and general attitudes towards RG features. Sally Gainsbury, Parke, and Suhonen (2013) investigated attitudes towards RG features by using a survey in a sample of 10838 respondents and found that they had a positive attitude towards RG features. The same result in terms of positive attitude was found in a review on pre-commitment (Ladouceur, Blaszczynski, & Lalande, 2012). Gamblers that visited a gambling venue with mainly EGMs had a positive attitude towards implemented card based features that included RG (Nisbet, 2005). Also, users were surveyed about their use of and attitude towards the RG feature Playscan. The users joined Playscan because they were curious about the tool and its features. The results from Griffiths et al. (2009) indicates that the users had a positive attitude towards the tool. However, one other important aspect of these results is that having a positive attitude does not ensure use of RG features. This should be kept in mind when discussing the use of all RG features.

Another important aspect is that many gambling sites did not have responsible gambling features or information on their sites in the beginning of 2000. A study by Smeaton and Griffiths (2004) investigated the use of RG features and information available on 30 gambling sites and found that a majority of the sites lacked basic RG features and information. Bonello and Griffiths (2017) replicated parts of that study but investigated 50 gambling sites. The gambling sites had improved regarding the use of RG features and information, but some features were still missing on several sites and information about RG were also lacking. This might be a partial explanation for the lack of studies on views and attitudes about online RG features. The population available that has used RG features might not have been big enough in the past to carry out studies on the use of RG features. This idea is supported by the results from a study examining the awareness of RG features in Ontario. Under 40% of the sample of 2500 were aware of RG initiatives (Hing, Sproston, Tran, & Russell, 2017). Also, even though a sample of Australian gamblers endorsed behaviors related to RG practices, knowledge of RG was not enough to prevent them from experiencing gambling related harm (Turner, Wiebe, Falkowski-Ham, Kelly, & Skinner, 2005).

Review of recent research on responsible gambling

Since the review by Williams, West, et al. (2012), additional research and reviews have been made investigating the effects of RG features. Some of the available features target individuals who gamble excessively, while others focus on gambling companies looking to prevent customers from developing an excessive gambling pattern. Four reviews were published in 2016 and early 2017. Ladouceur, Shaffer, Blaszczynski, and Shaffer (2017) and A. Harris and Griffiths (2016) were selected as the primary sources for the review of recent research on responsible gambling. This was done to limit the amount of text dedicated to this section of the thesis. The decision to use these two reviews was based on a comprehensive search of all the authors of the four reviews to find the authors that had published the most articles in the field of gambling (this criterion was established by the author of the thesis). The authors of the other two reviews had published very few articles within the field of gambling and were deemed not suitable to be included in the thesis. The four reviews are Drawson, Tanner, Mushquash, Mushquash, and Mazmanian (2017) and Tanner, Drawson, Mushquash, Mushquash, and Mazmanian (2017) and (A. Harris & Griffiths, 2016), and Ladouceur et al. (2017).

Ladouceur et al. (2017) reviewed RG features in general while A. Harris and Griffiths (2016) reviewed features in EGMs and online gambling. The two reviews make a similar division between different types of RG features. Their tentative division was used to present the results of the reviews and other important studies (specific land-based RG features in the reviews are not presented since the studies included in the dissertation focus on online gambling). However, it is difficult to make clear cut divisions regarding some of the research on different features.

Electronic gambling machines

Due to its highly addictive qualities, EGMs is a research area within RG, which is not a RG feature (e.g. self-exclusion or limit setting) but a gambling activity. The research on EGMs covers different types of RG initiatives, such as limit setting when starting to gamble and pop up messages during a gambling session. Therefore, research on EGMs is hard to summarize coherently. The field comprises several smaller areas of investigation based upon how a given RG feature attempts to get gamblers to spend less time and/or money on gambling. Overall, the results regardless of the intervention are mixed, with the effective-

ness of some features having been supported empirically. A review, which included 17 studies, explored the effect of limit setting in terms of time and money spent when gambling on EGMs. Some of the studies supported the notion that such features can limit gambling behavior while others did not demonstrate such effects. One of the conclusions was that more studies are needed (Ladouceur et al., 2012). A similar conclusion was drawn by A. Harris and Griffiths (2016), who reviewed different types of messaging in EGMs.

Also, the research on EGMs highlights the difficulty to draw clear-cut lines between different fields of research within the RG spectrum. For example, in one study in the review by A. Harris and Griffiths (2016), gamblers were asked to set time and money limits in a virtual casino focused on EGMs. The participants who set a time limit before starting to gamble spent less time than the control group who did not have a limit. However, should the intervention be categorized as an RG feature in an online casino or as a modification of an EGM is a question that this study raises.

Self-exclusion

Self-exclusion is a feature that is used both in land-based and online contexts. It means that the gambler makes an agreement with the gambling venue or site to be excluded during a given period of time. This means that the gambler cannot enter the venue or the site at any time during the exclusion period. The exclusion period can differ between days to several months depending on the site or venue. Gainsbury (2014) performed a review of 14 studies that investigated self-exclusion programs. Thirteen of the studies had a land-based focus, and one study focused on an online gambling site. The gamblers who used the option to self-exclude spent less time and money on gambling, gambled less frequently, and experienced improved mental health. However, though this feature is effective, it is underutilized by patrons of gambling venues and/or websites. Another problem with this type of feature is that gamblers can visit another gambling venue or website if they feel the urge to gamble. Also, the intervention does not necessarily change motives or behavior with regard to gambling. It simply limits the gamblers' ability to continue the harmful behavior at a given location or website. Also, Haeusler (2016) investigated different types of payment behavior compared to gambling data to identify self-excluders. The study found that payment behavior was not a better predictor than gambling data when it comes to predicting self-

exclusion. Also, one study suggested that self-excluders are a hetero-geneous group. Some participants self-excluded within one day of joining the site while some participants were serial self-excluders and repeated the behavior to self-exclude several times (Dragicevic, Percy, Kudic, & Parke, 2015). This indicates that self-exclusion also needs to be tailored to fit different types of sub-groups of gamblers.

Pre-commitment and limit setting

Online pre-commitment and limit setting (these two features entails limit the amount of money and/or time an individual can spend on gambling) have yielded mixed results. Studies, included in the review by Ladouceur, Shaffer, Blaszczynski, and Shaffer (2016), have found that these two features can produce small effects on gambling behav-ior. However, the five studies included provide inconsistent results. Across studies it is pointed out that, these two types of features are underutilized because few users voluntarily sign up to use them. If more users engage in this RG feature future studies might be able to provide results that are more conclusive.

Internet-based interventions without behavior tracking

It is possible to make a division between two types of Internet-based gambling prevention programs (not including regular Internet-based treatment). One type encompasses features that use gambling data to assess risk or other aspects of gambling. The other type of feature does not use gambling data to determine risk, but are based on gam-blers actively identifying themselves as displaying a pattern of exces-sive gambling. This paragraph will focus on the feature including self-rated excessive gambling. The following studies presented were not included in the review by A. Harris and Griffiths (2016) or Ladouceur et al. (2016). Several features/interventions with different foci have been developed and researched. Cooper (2004) investigated the effect of an Internet-based program that used peer support to aid problem gamblers while attending Gamblers Anonymous (a 12-step program to stop gambling). Fifty gamblers were included in the study, and 70% of them reported experiencing a positive impact on their gambling be-havior after the program. Easy access to the program was an important factor for its use. Another study by Wood and Wood (2009) also fo-cused on peer support and found that gamblers felt less alone with their problems when using the program. GamAid, a service that sup-plied advice and guidance and served as a signposting service where

gamblers could chat and receive information to help reduce their gambling, was investigated by Wood and Griffiths (2007). A majority of the study's 413 participants found GamAid and the service that it provided to be satisfactory. GamAid was viewed as helpful in choosing strategies to reduce gambling and in finding ways to receive help. Rodda, Lubman, Cheetham, Dowling, and Jackson (2015) carried out a qualitative investigation of a web-based, single-session counselling. One result found was that the participants in the study sought counselling when experiencing a crisis. The effect of the intervention was evaluated by Rodda, Lubman, Jackson, and Dowling (2017) who found that the intervention had an immediate effect on decreasing gambling behavior. However, follow-up studies are needed to determine the interventions' long-term effects.

The studies presented in this section used relatively small samples, making it difficult to make inferences about online-based interventions to decrease gambling. The studies support the tentative conclusion that online interventions decrease excessive gambling. However, the studies do not indicate what feature or function of the interventions produces the effect.

Different types of risk assessments

Several studies have used gambling data to explore risk levels among online gamblers. Risk can be defined from different perspectives depending on the study's focus. The main goal has been to identify markers or procedures that can be used to accurately classify gamblers. Behavior tracking and sustainability markers (intervals of intense activity and rapid drops in betting) have been successfully used to identify individuals at risk (Adami et al., 2013). Philander (2013) analyzed gambling data by using nine different supervised learning algorithms (SLA). Algorithms based on neural networks (a form of machine learning that learns from provided exercises to analyze new data) proved to be the best approach to estimate problem gambling. However, many of the SLAs performed well. Braverman and Shaffer (2012) performed a cluster analysis on 530 gamblers that had closed their accounts. They identified several sub-groups characterized by intensity of gambling, frequency of gambling, and variability of bet sizes. The sub-group who gambled most frequently had a higher risk of gambling problems when closing their online gambling accounts than did the other identified groups. Dragicevic, Tsogas, and Kudic (2011) explored gambling patterns and risk. The study found that

high-intensity gambling and frequent gambling during the first month after signing up for an account on an online gambling site were potential risk behaviors for problem gambling.

Two studies have investigated the use of complaint emails from users of a gambling site for identifying excessive gamblers. Employees at a gambling company analyzed these e-mails. The employees managed to successfully identify future excessive gamblers (Haefeli, Lischer, & Schwarz, 2011). Software was used to analyze the same set of complaint e-mails in a second study. The most effective way to detect future excessive gamblers was to use a combination of employee and software ratings (Haefeli, Lischer, & Haeusler, 2014). These studies present an interesting alternative to using gambling data to identify gamblers at risk. The benefit of this method is that it might be easier to communicate with users about their e-mails than by referring to patterns in aggregated data. In conclusion, more research is needed to determine what type of data will provide the most accurate risk assessments and what behavior that predict self-exclusion.

The responsible gambling tool Playscan

Playscan was launched in 2007 at the Svenska Spel gambling site. Playscan was at first a subsidiary to Svenska Spel, but later became a part of Svenska Spel. Playscan was marketed as a commercial product until 2015. In 2010, La Française des Jeux added Playscan. A year later, Miljonlotteriet added Playscan as well. In 2014, Norsk Tipping started to use Playscan. Currently, the fourth version of the tool is online.

Membership in Playscan is voluntary in Sweden for members of Svenska Spel's gambling site and mandatory in Norway for members of Norsk Tipping's (the state-owned Norwegian gambling company) website. These two sites combined have approximately 500 000 users. Playscan is also still available for users of the Miljonlotteriet (a Swedish charity lottery) and La Francaise des Jeux.

The tool is a free service available for the members of the sites and is usually accessed via the gambling site. The aim of the tool is to prevent individuals at the gambling site from developing patterns of excessive gambling in terms of time and money spent. The theoretical base for Playscan is the Stages of change model (Prochaska, DiCle-

mente, & Norcross, 1993) and MI (Miller & Rollnick, 2002). The core idea of these two theories/techniques is that individuals are at different stages to carry out a behavioral change. When it comes to MI, the goal is to make the individual aware of the negative consequences of a behavior without being judgmental. The idea is make the individual consider a behavioral change and elicit the motivation to carry out the change. The Stages of change-model is based on the idea that an individual takes several steps to complete a behavior change and that he/she can be at different stages of being ready to carry out the change in behavior. Playscan tries to draw on an individual's capacity to become more ready for behavior change through feedback and advice. The theoretical foundation of the tool has not been evaluated in respect to the tool's usage and effects. There are also no studies on theories of change regarding limiting gambling behavior in an online setting. However, one review explored mechanisms of change due to MI and substance abuse. The review found that client experience of discrepancy between how an individual currently behaves and how he/she wants to (related to better outcomes), client change talk/intention (related to better outcomes) and therapist MI-inconsistent behavior (related to worse outcomes) were important for change (Apodaca & Longabaugh, 2009). The fact that experience of discrepancy was related to better outcomes might indicate that getting on feedback on gambling behavior might increase the feeling of discrepancy among users of the tool and thus promote decreased gambling behavior.

An excessive gambling pattern associated with risk, according to Playscan, is defined as an escalation of time and/or money spent on gambling over time. The time and/or money spent by the individual in question are compared to that spent by an average user. The aim of the tool is to detect and support gamblers who gamble at a variety of risk levels.

The three features of Playscan that are supposed to facilitate behavior change include providing a risk assessment, communicating the risk of excessive gambling, and supplying advice/strategies on how to decrease excessive gambling behavior.

The risk assessment is based on a three-level system; users are rated as being at no risk (green light), moderate risk (yellow light), or high risk (red light) of developing an excessive gambling pattern (in the current

version of the tool the risk assessment is now presented as a sliding scale from green to red and not as three separate levels). As mentioned, the assessment's focus is to determine the level of risk. The assessment is based on two components. The user's gambling history is the first component. Different aspects of the user's gambling history are incorporated into the analysis. Variables such as spending (in terms of time and money), frequency, and duration, as well as the user's choice of gambling activities (e.g., Poker) constitute the basis for the analysis. Also, incorporated in the analysis are markers associated with excessive gambling behavior, such as "chasing losses" (trying to win back money lost the day after a losing streak) and "night owling" (gambling late at night). The second component of the assessment is the GamTest, a self-report questionnaire focused on the negative consequences of gambling. GamTest contains sixteen items. Fifteen of the items focus on negative consequences caused by the user's gambling during the past three months. One item specifically asks about problems caused by gambling during the past three months. The GamTest is intended to cover the following areas: time spent on gambling, money spent on gambling, economic consequences (more long term), social consequences, and emotional consequences. The five dimensions were supported in Jonsson, Munck, Volberg, and Carlbring (2017). The answers have a range from 0 to 10, with 10 indicating the most severe problems. The answers range from "Do not agree at all" to "Fully agree". The results from the analysis of the users' gambling data and from the GamTest can result in a yellow or red risk rating. A high rating on one of the two components of the analysis is enough for an individual to receive a yellow or red rating. An estimation of risk is carried out on a weekly basis. Users who have not changed their risk levels do not receive any new communications from the tool. However, if the risk level has changed, the user will receive a message in his or her Playscan-inbox. It is important to note that changes in risk are not directly communicated to the user; the user must log on to Playscan to receive updated risk information.

Advice on how to prevent excessive gambling is available to users and is presented in conjunction with feedback based on the risk assessment. Reading the advice selected is using the advice function in the tool. Users receive a variety of advices about strategies on how to decrease excessive gambling behavior, including the following: "Do you need a break from gambling?", "Oversee your weekly budget," "Keep track of your deposits," and "Learn about problem gambling from a

support hotline." This function of the tool is most clearly based on Stages of change model (Prochaska, DiClemente, & Norcross, 1993) and MI (Miller & Rollnick, 2002). The texts accompanying the advice are based on MI-techniques and the stages of change model.

Users' utilization of the different advices is presented in Table 1 below (unpublished Playscan data analyzed by the author). In the table, advice 1-5 is how many that used repeated advice. The number represents how many advices that were used by the participants at least. The rows are represented by the different advices. The most widely used advice was "Taking a break from gambling." The least used advice was "Learn about problem gambling from a support hotline." The population for this data was the same as the population in Study I (N = 9528). The finding that users chose the advice that entails self-exclusion is interesting since a part of the gamblers use several advices. The participants in Study I might be similar to the two different categories (users that self-excluded within a day and serial self-excluders) in Dragicevic et al. (2015). Some of the participants that chose the advice to take a break might have done so with the aim to quit gambling while others repeatedly need to take a break from gambling.

One feature, which was removed from the tool during the period of the project, allowed users to set time and money limits. The limits were set to cover spending during a month's time, and separate limits were set for time and money. If a user exceeded the set time or money limit, the risk level for developing a problematic gambling pattern went from green to yellow. It did not matter by how much the limit was exceeded. Only approximately 30% of users set a time or money limit, and there was a considerable overlap between those who set a time limit and those who set a money limit. The mean money limit was 454 (SD = 684) in Swedish kronor (SEK), and the mean time limit was 4.7 hours (SD = 6.6) (unpublished Playscan data prepared by the author). This feature was removed from the tool because it was not frequently used. Also, it was not a good predictor of risk because it did not measure the extent to which limits were exceeded. The population used was the same population as in Study I.

Besides removal of the time and money limits, the tool underwent several changes. Changes to a tool that is being evaluated is one of the drawbacks of conducting research on a system owned by a third party.

However, the changes were not substantial. The biggest changes include the following: the advice about receiving help from a telephone hotline was removed because it was not often used; the risk assessment went from a three-step scale (green, yellow, and red) to a sliding scale (the colors are still in use but instead of three steps there is a continuous change in color when the risks change) and, as mentioned the possibility of limit setting was removed.

Table 1

Advice read by the users

	First advice		Second advice		Third advice		Fourth advice		Fifth advice	
	n	%	n	%	n	%	n	%	n	%
Do you need a break from gambling?	3355	80.8	409	32.8	156	36.6	75	35.6	38	31.2
Oversee your weekly budget	612	14.7	580	46.6	170	39.8	88	41.7	56	45.9
Keep track of your deposits	184	4.5	256	20.6	101	23.6	48	22.7	28	22.9
Learn about problem gambling from a support hotline	3	0	1	0	-	-	-	-	-	-
Total amount of advice users	4154	100	1246	100	427	100	211	100	122	100
Amount of non-advice users	5374	-	8282	-	9101	-	9317	-	9406	-

Research on responsible gambling tools

RG tools are more comprehensive than most other RG features because of the ability to combine different features, such as risk assessment, continuous feedback, limit setting, different types of advice and self-exclusion opportunities). This implies that these types of tools might have a greater impact on decreasing gambling behavior. However, they demand continuous efforts from users to have the desired effect. For example, if gamblers self-exclude or use limit setting as a strategy, no other action is required on their part. However, an RG tool demands continuous effort from the gambler since feedback is presented to him/her on a regular basis. There is also no end for use of RG tools; as long as the user continues to gamble, he or she may need to use the tool. This is a major advantage of using an RG tool; the tool and its assessments are available for the user at all times. The drawback is that there is no limit for how long a tool can and should be used.

Also, one important benefit of these types of tools is that they are accessible at gambling sites, thus making them available while individuals are involved in potentially dangerous behaviors. This constitutes a difference between these tools and other interventions (e.g., smoking cessation) because the potentially negative behavior is linked to and in close range of a beneficial feature. This is not the case with smoking or drinking prevention online, where there is a gap between negative behavior and means of prevention.

Two RG tools, Mentor (study sample was 1015 RG tool users with 15 216 as matched controls) and Playscan (study of 779 RG tool users with 1558 matched controls), were evaluated to see if they managed to decrease spending among users. The variables compared were money deposited, money bet, and total time spent on gambling (Auer & Griffiths, 2015; Wood & Wohl, 2015). The studies investigated gambling patterns over three different ranges of time. Wood and Wohl (2015) studied users' levels of gambling after six months of using the tool and also changes after one week of use, and Auer and Griffiths (2015) studied users' levels of gambling after two weeks of using the tool. Auer and Griffiths (2015) found a small effect on time and money spent on gambling compared to the control group. Wood and Wohl (2015) found that green players that received feedback reduced the

amount they deposited one and 24 weeks after enrolment. Yellow gamblers that received feedback also reduced the money deposited after 24 weeks. Also, yellow players reduced their wagering 24 weeks after enrolment. Change in gambling behavior occurred for some risk groups and overall the effect was small. A tentative conclusion that the RG tools decrease gambling behavior is complicated by the fact that some matched controls also decreased their gambling. This suggest that there might have others reason for the decrease among all the gamblers.

Studies of the effect of RG tools are an important addition to the research on the prevention of excessive gambling. These studies are a first step to understanding how RG tools can be used to limit online gambling behavior. However, what is missing in past studies' analyses is how the gamblers used Playscan to reduce their gambling. Also, the reduction in gambling reported in Wood and Wohl (2015) is rather small; research is needed on how the tools are utilized and on how they are used in relation to gambling. One hypothesis is that tool use will yield a dose-effect response, meaning that low rates of use of the tool will yield only a small effect on gambling behavior. However, it is not established that there is a positive dose-response effect in treatment of dependence in general. For example, Ballesteros, Duffy, Querejeta, Ariño, and González-Pinto (2004) found, in a meta-analysis, no clear evidence for a dose-response relationship in treating hazardous drinkers.

Two recent studies have investigated the use of feedback on spending in relation to gamblers view of how much they had lost in a RG tool setting. Wohl, Davis, and Hollingshead (2017) found that gamblers that had underestimated their losses decreased the money lost during follow-up. The same result was found in a study by (Auer & Griffiths, 2017).

Aside from the four studies mentioned above, research investigating RG tools is scarce. One other study has been carried out by Griffiths et al. (2009). Gamblers who used Svenska Spel's gambling site were surveyed about their gambling habits and about their use of Playscan. A total of 2348 respondents answered an online survey. Of these, 594 had started using Playscan on a voluntary basis. The survey investigated different facets of Playscan use. Curiosity was the participants' main reason for trying out the tool. Other reasons included their desire

to set time and money limits for gambling and to receive information about their gambling. Of the respondents who had used Playscan, 89% reported that they had not experienced any change in risk level after joining. One other important finding from the study was that most respondents found Playscan useful. One possible weakness of the study is if the questions asked had fixed answers on a Likert scale. This means that the respondents might have endorsed features of which they had no experience, making the results of the study less relevant. However, the study by Griffiths et al. (2009) was an important step towards establishing a research paradigm about RG tools.

As mentioned in the introduction, in 2009, the first study investigating features of Playscan was published. This study provided valuable insights into how users perceive and use RG tools. When Study I and Study II were being planned in 2013 and 2014, no other studies had been published. In 2015, the first study that investigated the effects of RG tools was published, and an additional study on the same topic was published in 2016. As previously noted, these studies supported the notion that RG tools can have an effect on reducing gambling behavior.

Other web-based e-health interventions and treatments

It seems to be a general trend in e-health that interventions aimed at prevention are underutilized and that rates of usage of web-based services are low. Wangberg, Bergmo, and Johnsen (2008) and Wanner, Martin-Diener, Bauer, Braun-Fahrländer, and Martin (2010) found that low usage and high attrition were present in interventions promoting diabetes care and smoking cessation. A regression model was used in a review by Kelders, Kok, Ossebaard, and Van Gemert-Pijnen (2012) that focused on adherence to interventions. The review included 101 articles covering 83 interventions within the fields of chronic disease (19 studies), lifestyle (16 studies), and mental health (48 studies). The review found that improved adherence was due to more frequent feedback.

However, not all services supplied via Internet have high attrition and low adherence. A review by Christensen, Griffiths, and Farrer (2009)

of Internet-based psychotherapy for depression and anxiety found that the adherence to complete online treatment was approximately 50 to 70% for depression treatments and 50% for generalized anxiety disorder. Rates of adherence to panic disorder interventions were reported as high as 80 to 100%. Trials for social phobia reported an adherence level of 70 to 90%. Also, in a meta-analysis by van Ballegooijen et al. (2014) the adherence rate for Internet–based CBT was investigated and the result was that participants completed 81% of their treatment. These studies provide tentative evidence for the delivery of Internet-based interventions with maintained adherence throughout the treatment. A question that is raised is how Internet-based treatments can have a high degree of adherence while Internet-based prevention does not have it to the same extent.

Aim of the thesis

The overall aim of the present thesis was to explore the usage, experiences and various functions of RG tools. Using quantitative and qualitative methods, the studies investigated overall usage and non-usage of the tool Playscan in order to uncover relevant insights to further develop and enhance RG tools from a user's and developer's perspective.

Study I

The aim of the first study was to conduct the first-ever investigation of the behavior of users of an RG tool. The study was explorative in nature, investigating use and if there were specific user classes in the sample. The study was based on secondary user data. In total, 9528 users were included in the study and user behavior was explored using descriptive analysis and latent class analysis (LCA).

Study II

The aim of the second study was to understand users' views of, experience of, and use of the tool from a qualitative perspective. Reasons for joining and using the tool as well as the users' experiences and views of different functions were also explored. Twenty users were interviewed, and the interviews were analyzed using a thematic approach.

Study III

Based on the extensive use of self-test among users of Playscan a psychometric evaluation of the questionnaire was deemed necessary. The aim of the third study was to conduct a psychometric evaluation of the self-test (GamTest) included in the tool since the two previous studies indicated the test's importance. The study explored the factor structure, reliability and validity of the GamTest.

Methods

Participants

Study I

Users, who signed up to Playscan between December 12, 2011 and October 30, 2013, were included in the study. A total of 10 252 users signed up during the inclusion period. Of these, 724 were excluded because they quit using the tool during the data collection period. In total, 9528 users were included. Of these, 9293 disclosed their sex and age. The majority of the participants were male, comprising 7823 users (84.2%); 1470 (15.8%) were female. The mean age for the entire sample was 41.8 years (SD = 15.4). The males had a lower mean age at 41.4 years (SD = 15.6), and the mean age for females was 44.0 years (SD = 14.4). The distribution in the excluded sample of users was 617 (87.6%) males and 87 (12.4%) females (only 704 users disclosed their sex). The age difference (that was present) among the included participants was also present in the dropout sample. The group level mean age was 49.3 (SD = 15.4). For males, the mean age was 48.8 (SD = 15.6), and the mean age of the women was 52.5 (SD = 13.3).

Study II

A total of 1673 potential participants received an email from Svenska Spel (the information in the email was written by the researchers responsible for the study) about participating in the study. Those targeted lived in the Stockholm area and had gambled on one or several occasions during the three months prior to when the email was sent. In all, 9.4% (157 respondents) wanted to participate. Of these, 24 were selected to participate. The basis for the selection was that the first 24 to sign up at a web page provided by the researchers would be contacted about participating in the study. However, the aim was to recruit eight participants from every risk level. When the quota was filled for one risk level no more volunteers from that level was included. Three of the selected users tested the interview guide via tele-

phone. One user did not attend the interview. In all, 20 users were interviewed. The sample consisted of 19 males and one female. The mean age for the sample was 42.2 years (SD = 12.7). The mean PGSI score was 2.7 (SD = 3.4). The users' mean monthly spending on gambling was 2027 Swedish kronor (SEK; SD = 4388). The mean monthly income for the group was 22 658 SEK (SD = 12 437). The mean time spent on gambling per month was 7.8 hours (SD = 8.2). Half of the sample engaged in sports betting, and the other half engaged in lotteries.

Study III

A total of 5000 respondents were e-mailed information and an invitation to answer an online questionnaire. The respondents were recruited by a Swedish based company (SKOP) specialized in recruiting participants and distributing online questionnaires. In all, 47.5% (2376 respondents) started to answer the questionnaire, and 2257 respondents completed it. The final sample consisted of 2234 individuals because 23 respondents were excluded due to taking over two days to answer the survey. The sample contained 1184 (52.9%) males and 1048 (47.0%) females. Two respondents (0.1%) chose the category "Other" with regard to sex. The mean age for the sample was 51.4 years (SD = 16.2). For males, the mean age was 52.4 (SD = 16.7), and for females, it was 50.3 years (SD = 15.5).

The mean income for the sample was 33 161 Swedish Kronor (SEK) (median = 30 000, SD = 25 149). For males, the mean income was 36 607 SEK (median = 32 000, SD = 27 016), and for females, it was 29 133 SEK (median = 28 350, SD = 22 090). The mean spending on gambling during the last 30 days was 275 SEK (SD = 997). For males, the mean spending was 356 SEK (SD = 1112), and for females, it was 183 SEK (SD = 840). Gambling on charity lotteries was the most common gambling activity in the sample, followed by regular state-organized lotteries and sports betting. Horseracing was the fourth most common activity.

Ethical considerations

The three studies included were approved by the Central Ethical Review Board in Stockholm (Dnr. 2014/545). However, some ethical implications of each study need to be discussed further.

In study I, no personal information about the participants was included except for age and sex. The data set was de-identified, making identification of the participants by the researchers impossible. The data used in the study was not considered to be sensitive since the focus was on secondary data related to the use of the tool. The risk assessment that was carried out by Playscan was used, and that was based only on gambling data. This risk assessment was also available to the users of the tool. The users agreed, when signing up to Playscan, that their data could be used for research purposes.

The second study was, as mentioned, an interview study about user's views and experiences of Playscan. The participants received extensive information about the study before joining. They first received information via an e-mail that was sent directly to them. Interested users who wanted to partake in the study could sign up at a webpage that was not a part of the site that they visited to gamble. The first users to sign up were contacted via telephone. During the phone call, they received additional information about the study. If, after receiving additional information, they wanted to be interviewed, a time for the interview was decided on. At the time of the interview, the participants gave their informed consent to participate. The participants (both those interviewed face-to-face and those interviewed over the telephone) received monetary compensation. The amount they received was approximately $55 (500 SEK). One ethical question that needs to be addressed is whether the participants chose to do the interview in order to use the monetary compensation to fund their gambling. This is probably not the case since they received the compensation several months after doing the interview and were informed of this before they agreed to do the interview. Also, according to the participants' individual PGSI-scores, the majority of the participants did not have a gambling pattern associated with risk (the participants answered the questionnaire before the interview). There were questions about the participants' gambling habits during the interview, but the interview focused on their views and experience of Playscan. The interview focused on preventing gambling and should have promoted a more responsible attitude towards their gambling and the interview situation should not have promoted more extensive gambling among the participants. One safeguard in place was to inform about a telephone hotline if the participants expressed having problems related to his/her gambling.

Study III used data from an online questionnaire. The respondents were recruited from the general public by a company specializing in online surveys. The researchers responsible for the study prepared the

information about the study. This information was e-mailed to prospective respondents. Included in the information was the contact information of the first author in case respondents had questions regarding the study. Interested individuals gave their consent to be a part of the study before starting to fill out the questionnaire. The survey included questions on gambling habits, negative consequences of gambling, and levels of low mood and worry. No information that could be used to identify the respondents was included in the data set.

Declaration of interest and information on funding

Measures

Study I

As mentioned, in Study I, different facets of user behavior were explored. The main variables were based on how the participants used the tool. The variables included the following: the number of separate times that participants logged in to Playscan; the number of times they started the self-test (GamTest); the number of times they completed the GamTest; the number of Playscan's advice they used; the number of messages that were sent from the tool; the number of messages that the participants read; the risk assessment performed by Playscan (only based on gambling data); and the participants' age and sex. The GamTest contained 16 items and could be answered as many times as the participants wanted. The actual results of the questionnaire were not included in the analysis; nor were the specific advice used by participants.

Study II

In study II, age and sex were used and the answers from the PGSI (Ferris & Wynne, 2001). The PGSI measures negative consequences of gambling and is a nine-item questionnaire. The minimum score is 0 points and the maximum score is 27 points. The range is from 0 (Never) to 3 (Almost always). Monthly income, monthly spending on gambling, and other demographic variables, were used to describe the sample. The gambling activities of the sample group were also used. The participants had to report their risk rating according to the Playscan tool. The risk level was used as a grouping variable. In addition to these variables, a semi-structured interview was conducted. The interview guide consisted of 13 questions (Appendix I). The information gathered during the interviews and used in the analysis was qualitative in nature.

Study III

Demographic variables (age and sex) were used to describe the sample. Questions regarding general gambling habits were also used. The questions were the same as those used in the SWELOGS-study (Romild, Volberg, & Abbott, 2014). Other variables used in Study III included the users' scores on the GamTest and the total score of PGSI (Ferris & Wynne, 2001). The total scores on the Generalised Anxiety Disorder Assessment (GAD-7) (Spitzer, Kroenke, Williams, & Löwe, 2006) and the Patient Health Questionnaire-9 (PHQ-9) (Kroenke, Spitzer, & Williams, 2001) were used as well. GAD-7 measures generalized anxiety. The questionnaire has seven items. The scale ranges from 0 (Not at all) to 3 (Nearly every day). The total score for the seven items is used as an indicator of level of anxiety. PHQ-9 measures level of depression and it is based on the DSM-IV criteria for depression. The total score is an indicator of level of depression. The scores range from 0 (Not at all) to 3 (Nearly every day). All of the questionnaires are based on self-reported symptoms and can be administered using pen and paper and online.

Analyses

Study I

As a first step, the use of the various functions (e.g., the logins) were analyzed using descriptive statistics. The number of times the participants used a certain function was the result of the descriptive analysis. The second and final step in the analytic procedure was multinomial regression in combination with the LCA. The LCA was chosen as a means to explore the possibility of identifying unobserved subpopulations, i.e., latent classes (Hagenaars & McCutcheon, 2002; McCutcheon, 1987). The number of visits, of advice used, and of self-tests started were included in the analysis. Before the analysis, the number of times a function was used was added up for each participant. If a participant had used a feature three or more times, this was considered "high usage" (for self-tests, there was no "high usage" category). If the function was used two times, this was labeled "moderate usage." "Low usage" occurred if the participant used the function once. The complete absence of use of a particular function was labeled "non-usage." Messages (both received and read) were not included in the second step (the LCA). This was because the tool sent messages about the participants' gambling habits, but also about updates and other information concerning the tool, via the message service. Thus, some of the messages sent did not contain information about gambling habits; it was not useful to include messages read in the analysis since most of the messages sent did not contain essential information concerning risk or gambling level. As such, the messages read were not seen as indicator of use. Several criteria were used to determine the optimal number of latent classes: Akaike's Information Criterion (AIC; Akaike (1974), the Bayesian Information Criterion (BIC; Schwarz (1978), the sample-size adjusted Bayesian Information Criterion (SSABIC; Sclove (1987), and a measure of entropy (Ramaswamy, Desarbo, Reibstein, & Robinson, 1993). BIC is viewed as a reliable indicator for model fit (K. Nylund, Bellmore, Nishina, & Graham, 2007) and lower BIC-values are seen to reflect a better fit (K. L. Nylund, Asparouhov, & Muthén, 2007; Pears, Kim, & Fisher, 2008).

Another important component for understanding model fit is entropy. Entropy values will be assessed on the basis of unity. Entropy indi-

cates how well the classes are separated in a given model. As advised by Croudace (2003), entropy values were assessed on the basis of unity, meaning that the closer the entropy value is to one, the better. The last step in choosing the best model fit was based on coherence, distinction, and meaningfulness of the different LCA-solutions determined by the researchers responsible for the study. Risk of developing an excessive gambling habit was used as a covariate in combination with the LCA to investigate whether different levels of risk/gambling could discriminate between different classes in the solution with the best fit. This analytic procedure is the same as multinomial regression, in which the probability of class membership is regressed on the covariate. The LCA and multinomial regression were fitted to the data simultaneously as proposed by Vaughn et al. (2011). IBM SPSS 22 was used for the descriptive statistics. The LCA and the multinomial regression were performed using Mplus 5.2 (Muthén & Muthén, 1998-2011).

Study II

The first author of Study II carried out the analysis of the interview material. Thematic analysis was used to analyze the interviews because it was seen as the best method to describe the views and experiences of the participants. Multiple previous studies within the field of gambling have used thematic analysis (Dunn, Delfabbro, & Harvey, 2012; Palomäki, Laakasuo, & Salmela, 2013; Patford, 2009). Also, a similar study to Study II that interviewed Swedish poker players used thematic analysis (Wood & Griffiths, 2008). The six phases introduced by Braun and Clarke (2006) were followed and constituted one part of the analytic procedure. The analytic procedure is best described as being inductive and focused on the semantic content of the participants' interviews. The six phases of the analysis were as follows: reading and re-reading the interviews (the interviews were read first according to risk level), coding interview content, finding themes, reviewing themes, developing and expanding the themes and, finally, writing up the themes and adding the quotes. The quotes were labelled with the risk level and a random number to identify which quote came from which participant. Internal homogeneity and external heterogeneity constituted the basis for the themes. This translates into the themes being coherent and separated from each other. A more detailed description of the analytic procedure is available in Braun and Clarke (2006). The themes were also categorized into two main themes based on the content of the sub-theme. A range in the answers given by the

participants was present in the sub-themes. The analytic procedure was therefore strengthened by the classification introduced by Hill et al. (2005). This was done in order to accurately describe the different views and experiences in a given sub-theme. The classification is based on how many of the participants have endorsed a particular view or experience. If the view or experience was seen as *general* (in our study, 19–20), all but one participant in the sample presented that view during the interview. If the views and experiences were *typical* (10–18), it meant that more than half of the sample endorsed it. A *variant* (4–9) meant that less than half of the participants had endorsed the view or experience. If two or three participants endorsed a view or experience, it was labelled as *rare* (2–3). From the method presented by Hill et al. (2005), only the classification procedure was used. The classification system proposed by Hill et al. (2005) was utilized in a similar way as Study II in Regev, Chasday, and Snir (2016) and Di Blasi, Tosto, Marfia, Cavani, and Giordano (2016).

Study III

Most of the respondents (n = 1842) in the overall sample of the 2234 had the lowest possible score of 15 on the on Playscan's GamTest, which meant that they answered "Do not agree at all" on every question that the GamTest contained. The analysis to determine internal structure (e.g., factor solution) was performed with the respondents who had a total score of over 15 on the GamTest (n = 413). The smaller sample was used because it is not possible to assess the internal structure of the instrument if the item variation is substantially floor-constrained. The factor structure of the GamTest was assessed using explorative principal axis factor analysis (common factor analysis) with oblimin rotation. This analytic procedure is recommended when data is skewed in a smaller sample (Fabrigar, Wegener, Mac-Callum, & Strahan, 1999). Parallel analysis (Hayton, Allen, & Scarpello, 2004) was employed to determine the number of factors that gave the best fit. Cronbach's alpha and inter-item Pearson correlation coefficients were used to assess the internal reliability of the instrument. Furthermore, measures in the field of gambling and mental health were used to validate the instrument. Correlations with the PGSI, the PHQ-9, and the GAD-7 were used to assess validity. The GamTest's ability to differentiate between respondents with and without gambling problems was investigated by comparing scores across groups using F-tests and Cohen's d effect sizes and by examining re-

ceiver operating characteristics (ROC) and calculating area under the curves (AUC). Gambling problems were scored by the respondents on a scale of 1 to 10 and binarized as either none (score = 1, n = 2154) or any (score > 1, n = 103). To achieve non-skewed AUCs with interpretable curvature, a ROC analyses using both the subsample who scored above the minimum possible score (n = 317/98) and the subsample who reported having spent money on gambling recently (n = 1243/90) was performed. Data processing and statistical analyses were conducted using the R statistical environment (3.2.3).

Results

Study I

The results from Study I contain two sections. The first section constitutes the results from the descriptive analysis, and the second section contains the results of the LCA and multinomial regression. As seen in Table 2, the various functions of the tool were used by the participants to a fairly high degree at least once. However, the repeated use of the functions was much lower. This difference in levels of use is apparent, with the level of use decreasing from the first to the second time, and from the second to the third time. The most widely used feature was the self-test (GamTest). It had the highest initial and highest repeated use. The second most widely used function was the advice function. A total of 43.6% used this function once. However, both functions declined rapidly with repeated use. The percentage of read messages is also very low even though Playscan sent several e-mails to a majority of the users. There were also high rates of visitors to the Playscan page initially, but the number of visitors decreases with about half of the population for every subsequent visit. The common denominator for use of Playscan is the decrease of repeated visits. Also noteworthy is the discrepancy between started and completed self-test. For the first self-test there is a 14.6% drop between started and finished self-tests.

The LCA resulted in several plausible categorizations of the participants. The solution that had the best fit, according to the criterion mentioned earlier, was the five-class solution. The five classes were distinct from each other and made conceptual sense. The AIC, BIC and SSABIC steadily decreased from the 3-class to the 5-class solution and the entropy value for the five-class solution was 0.846. The classes were non-users, site visitors, advice users, self-testers, and multi-function users. The gender distribution and mean age were similar across all classes. The range of mean age was from 40.9 to 45.8 years. The standard deviation for mean age was also similar across classes. The percentage of women ranged from 11.8% to 17.4%. There was, however, a difference in how many individuals each class

contained. The non-users constituted 7.9%, the site visitors 47.7%, and the advice users 31.8% of the sample. The two smallest classes were the multi-function users (9.3%) and the self-testers (3.3%). It is possible to divide the five classes into two groups based on the use of the various functions. Self-testers and multi-function users (labeled as high users) display higher rates of use of the functions than non-users, site visitors, and advice users, who displayed low rates of usage of the functions and are labeled as low users of the tool. The more frequent users (self-testers and multi-function users) had a higher risk of developing an excessive gambling pattern than the low users, according to multinomial regression.

Table 2
Usage of the different features in Playscan (N = 9528)

	Visits		Self-test (started)		Self-test (completed)		Advices used		Messages sent		Messages read	
	n	%	n	%	n	%	n	%	n	%	n	%
No usage	1320	13.9	1906	20.0	3297	34.6	5374	56.4	864	9.1	6195	65.0
At least one time	8208	86.1	7622	80.0	6231	65.4	4154	43.6	8664	90.9	3333	35.0
At least two times	4188	44.0	1679	17.6	1220	12.8	1246	13.1	7658	80.4	2189	23.0
At least three times	2144	22.5	476	5.0	341	3.6	427	4.5	5516	57.9	1598	16.8
At least four times	1160	12.2	173	1.8	131	1.4	211	2.2	3730	39.1	1072	11.3
At least five times or more	696	7.3	79	0.8	58	0.6	122	1.3	2959	31.1	722	7.6

Study II

The qualitative analysis yielded two main themes with subsequent sub-themes. The overarching experience and structuring principle for the first main theme was the use of the Svenska Spel gambling site and use of Playscan. The focus was how the participants had used the site and the tool (the main themes and subthemes are presented in Table 3). The name of the first main theme was "Usage of Playscan and the gambling site". The following sub-themes were included under this main theme: Interaction with the tool, Participants' view on their lack of repeated use, Usage of Svenska Spel's gambling site, and Responsible gambling features on the gambling site. The other main theme was focused on participants' view and experience of Playscan. This theme was labelled "Experiences of Playscan" and included the following sub-themes: Reasons behind joining and ways that the users had joined the responsible gambling tool; Understanding the purpose of the tool; Views on Playscan's ability to change gambling behavior; Perceived tone of the information issued by Playscan; Users' view and experience of the reliability of the risk assessment; Changes in gambling behavior after joining the responsible gambling tool; Changes in attitude after joining the responsible gambling tool; and Suggestions regarding improving the tool.

Table 3

The main themes and associated sub-themes

Usage of Playscan and the gambling site	Experiences of Playscan
Interaction with the tool	Reasons behind joining and ways that the users joined the responsible gambling tool
Participants' view on their lack of repeated use	Understanding the purpose of the tool
Usage of Svenska spel's gambling site	Views on Playscan's ability to change gambling behavior
Responsible gambling features at the gambling site	The perceived tone of the information issued by Playscan
	The users' view and experience of the reliability of the risk assessment
	Changes in gambling behavior after joining the responsible gambling tool
	Changes in attitude after joining the responsible gambling tool
	Suggestions regarding improving the tool

The first sub-theme (Interaction with the tool) covered how the participants had interacted with the tool. Almost all of the participants had used the tool in some way, and a majority had completed the GamTest. The participants answered the questions on the GamTest because they wanted information about their gambling and risk level. A minority of the participants had used the GamTest several times. Some users had used the advice function. A few of the participants had limited experience of the tool since they did not know that they were members of Playscan. The second sub-theme (Participants' views on their lack of repeated use) focused on why the participants did not use the tool's features repeatedly. The main reason for this was the lack of feedback and the fact that some users did not know that

they were members of the tool. The third theme (Usage of Svenska Spel's gambling site) focused on why and how the participants used the gambling site. They used the site because it was convenient and easy to use; however, they did not remain on the site for long. They prepared their lottery numbers or matches to bet on before logging in to the site, which meant that they did not spend a long time on the site and did not use many of its available functions. The fourth theme (Responsible gambling features on the gambling site) explored the participants' view of the site's RG features. The participants viewed Playscan and the other features (e.g. a banner containing information about a gambling hotline) on the gambling site as a part of the site. The participants were also confused over the purpose of all of the features and thought they were the same feature. The participants did not have enough knowledge to separate the features from each other.

The first sub-theme in the main theme "Experiences of Playscan" (Reasons behind joining and ways that users joined the responsible gambling tool) covered why users joined the tool. Their main reason for joining was curiosity. This curiosity had multiple aspects. Some of the users joined because they wanted a risk assessment, and others joined when exploring the gambling site. A small part of the sample did not know how they had joined the tool. The second theme (Understanding the purpose of the tool) concerns how the users understood the tool's purpose. The sample was split when it came to understanding the purpose of the tool. More than half of the sample saw the tool as something that was going to help gamblers recover from excessive gambling while a minority of the sample did not have a clear grasp of the tool's purpose. However, almost all of the participants thought that Playscan could change an individual's gambling behavior (Views on Playscan's ability to change gambling behavior). Most of the participants found the tone of the written information to be neutral, straightforward, and trite (Perceived tone of the information issued by Playscan). These participants' view of the information's tone did not influence their use of the tool. However, some users viewed the tone positively and others viewed it as harsh and accusing. This influenced the use of the tool in a positive manner for the first group of users and the latter group in a negative way. A majority of users perceived the risk assessment as reliable and fair (Users' views and experiences of the reliability of the risk assessment). A small portion of the sample viewed the assessment as non-reliable and reacted strongly to it. They saw themselves as experts on their own gambling habits. The majority of the sample did not experience any change in attitude or gambling behavior after using the tool (Changes in gambling behavior after joining the responsible gambling tool and Changes in attitude after joining

the responsible gambling tool). A small portion of the sample changed their attitude or gambling behavior after joining but viewed the contribution of Playscan to this change as small. Changes in life circumstances were seen as the largest factor in changes in gambling behavior and attitudes. As for the last theme (Suggestions regarding improving the tool), almost all of the participants mentioned more direct feedback as a way of promoting the use of the tool. The feedback could be delivered via SMS, mail, or as pop-up messages when users log in to the gambling site. This theme was the most commented upon of all the themes in the study. Also, none of the participants commented on that receiving feedback in a more direct way would interfere with their gambling experience.

Study III

As seen in Table 4, based on the respondents who scored above the minimum of 15 points, the common factor analysis and parallel analysis suggested a three-factor solution. The proportions of explained variance were .38 (Financial and emotional consequences of gambling), .18 (Time spent on gambling), and .14 (Interactions with others in relation to gambling) for factors 1–3, with reliable factor loadings of nearly .50 for all items (see Table 4 for more information). Cronbach's alpha for the entire questionnaire was .96 for the whole sample and .95 in the subsample, with scores above 15 points; which indicates excellent internal reliability. For the factors, Cronbach's alpha was slightly lower for the whole sample. For the first factor, "Financial and emotional consequences of gambling", the Cronbach's alpha was .95. "Time spent on gambling" had a level of .91, and "Interactions with others in relation to gambling" had a level of .87. Inter-item correlations were in the range of .87 to .22. In the whole sample, the GamTest scores had a high positive correlation with the PGSI ($r = .82$, $p < .001$). The GamTest score also had a positive correlation with money recently spent on gambling ($r = .37$, $p < .001$). For the subsample that scored above the minimum of 15 points, the GamTest correlated with the PGSI ($r = .83$, $p < .001$) and money spent recently on gambling ($r = .30$, $p < .001$). All of the participants had a positive correlation between the GamTest and the PHQ-9 ($r = .32$, $p < .001$) and GAD-7 scores ($r = .28$, $p < .001$). Also, the correlations between GamTest and the PHQ-9 ($r = .57$, $p < .001$) and GAD-7 ($r = .49$, $p < .001$) for the respondents who scored over 15 points on the GamTest were markedly higher. Among participants who scored above the minimum on the GamTest ($n = 413$), there was a significant between-

group difference in the scores between the respondents that reported any self-rated gambling problems as measured with the GamTest and those who reported none ($F[1,411] = 244.8$, $p < 0.01$, Cohen's d = 1.81 [95% CI: 1.34–2.13]). The AUC was calculated 0.92 (95% CI: 0.89–0.94) in the subsample that scored above the minimum possible and 0.95 (95% CI: 0.92–0.98) in the subsample that reported having recently spent money on gambling.

Table 4. Standardized component loadings for the three-component solution (subsample)

	Item number	Financial and emotional consequences of gambling	Time spent on gambling	Interactions with others in relation to gambling
			Loadings	
Sometimes my gambling has left me short of money	12	0.93	-0.02	0.03
I sometimes gamble with money that really should have been used for something else	7	0.91	-0.03	-0.03
Sometimes I feel bad when I think about my gambling	14	0.89	0.05	0.06
Sometimes I feel bad when I think of how much I have lost gambling	11	0.88	-0.01	-0.02
I feel restless if I do not have the opportunity to gamble	13	0.70	0.17	0.01
I do not want to tell other people about how much time and money I spend on my gambling	9	0.62	-0.12	0.01
Sometimes I gamble more money than I intend	5	0.48	0.41	0.00
My gambling sometimes makes me irritated	15	0.54	0.24	0.18
I sometimes try to gamble back money that I have lost	6	0.39	0.37	0.12
Sometimes I forget the time when I'm gambling	2	-0.01	0.94	0.01
Sometimes I gamble for longer than I intend	1	0.09	0.78	0.10
I devote time to my gambling when I really should be doing something else	4	0.35	0.47	0.03
People close to me think that I gamble too much	10	0.07	-0.08	0.94
Other people say that I spend too much time gambling	3	-0.12	0.19	0.81
I sometimes borrow money to enable me to gamble	8	0.39	-0.05	0.48
SS loading		5.75	2.74	2.17
Proportion		0.38	0.18	0.14

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Discussion

The three studies included present different facets of the use, the experiences and the functioning of the features of the RG tool Playscan. Even though different types of data collection and data analysis have been used, the results converge. The first two studies created the background and principal reasons for Study III because they demonstrated the importance of the GamTest in the use of the tool. In itself, the importance of the GamTest is a major finding from Study I and Study II. The need to investigate the psychometric properties of the GamTest became apparent. However, several other important findings also warrant further discussion.

Implications of Study I and Study II

The results of Study I and Study II have many implications for the use of the tool and for the research on the effect of RG tools. The five different classes of users that resulted from the LCA were characterized by different behavior patterns and the classes used the tool in different ways. These findings imply that the effect of the tool might differ between the different user classes.

One class, which constituted 758 users (7.9%), did not use any of the functions included in the tool despite the fact that they signed up voluntarily. Two of the classes (site visitors and advice users) were characterized by low use of the tool and its functions. The site visitors visited the tool but did not engage in any of the functions. This was the largest user group (47.7%). The advice users only visited the tool and used the advice available. This was the second largest class consisting of 32.8% of the sample. Two classes (self-testers and multi-function users) used the functions to a greater extent than the other classes. They constituted 12.6% of the sample. The different user classes had varying risk levels. The groups with high rates of use had higher risk levels than those characterized by low rates of use. The different profiles of the classes seem to indicate that different needs govern the actions of the participants in each class. The non-users are difficult to understand and to discuss since they did not use the tool. A

possible reason to why this group did not use the tool might be found if this result is related to a result from Study II. In Study II, a portion of the participants answered that they were unaware that they were members of the tool. If the non-users in Study I also did not have this knowledge, this would explain their non-use. Other reasons for non-use are also possible. For example, they might have signed up for the tool by mistake while using the site. The site visitors seem to have taken their participation one step further and logged in to the tool. One can assume that curiosity was the motive behind visiting and joining the tool. Curiosity as a reason for joining and, to some extent, using the tool was found by Griffiths et al. (2009) and in Study II as well. There were, however, different types of curiosity among the participants in Study II. Most of the participants wanted information about their risk level or wanted to see what membership in Playscan entailed. A similar line of argument is that some users joined the tool while "window shopping." The concept, mentioned in Donkin and Glozier (2012), refers to instances when users want to explore a system or a service without having any intent of using it. In the case of Playscan, the site-visitors might have simply wanted to see what membership actually entailed. Another plausible hypothesis for the low use among the site visitors is that they had already collected the information they needed. This is in line with "perceived need" (Andersen, 1995). This means that the user of a system (originally conceived for health care services) only utilizes the services that he or she needs. If the users already had the information they needed to carry out a behavior change, or if they made the judgement that they did not want a behavior change after receiving the information from Playscan, they may not have been motivated to use the tool again. According to this, if the user continues to gamble in the same way after receiving a green risk rating, they might not see a need to use the tool again.

The need for low risk and low spending gamblers to use the tool might not be apparent at first sight. However, if use of the tool is put in a larger scope alongside the results of the studies by Canale, Vieno, et al. (2016) and Raisamo et al. (2013) which indicate that harm is associated with even low rates of gambling continuous use of the tool might be warranted for low risk and low spending gamblers as well. This implies that there might be a need for RG tools to cater to this type of user class and perhaps especially to non-users and site visitors. Repeated visits might be beneficial for users with low risk because they might not realize that they are increasing their spending on gambling. One additional reason for repeated visits is that users underestimate their losses, according to Auer and Griffiths (2016b). If users

monitor their spending via the risk assessment, they will have a better understanding of their spending and prevent excessive gambling.

Feedback, which the participants in Study II suggest, may be a way to increase use in general. Low usage of Internet-based interventions has been found in other areas of e-health as well. The study by Wangberg et al. (2008) is one example of findings of low rates of use and adherence to Internet-based interventions. Besides window-shopping, researchers have investigated explanations for the low rates of use of these types of services. Eysenbach (2005) used the term the "law of attrition" to refer to the limited use of Internet-based interventions ("limited" here meaning a low rate of use and a low degree of repeated visits). This type of user pattern is applicable for the three classes characterized by low use and for some of the participants in Study II. The steep decrease in use of the tool's functions (the descriptive results from Study I) provides tentative evidence for the claim that the problem with attrition holds true for interventions targeted at gambling as well.

The advice users, who constitute almost 32% of the sample, can be seen as "low users." The risk level of these users is the same as that of the non-users and site visitors. The interesting aspect of their use is that, when they visit the tool, they only do one specific thing: they read advice on how to change their gambling habits. Since the most extensively used advice is to take a break from gambling, it is plausible that these gamblers think that they are spending too much time and money on gambling. This is interesting since they have not taken the GamTest or, at least, have not received the results of the test. If they have a low risk rating, why do they believe that they needed a break from gambling? One hypothesis is that they have performed some sort of personal assessment and, on the basis of that, realized that they needed help to decrease their gambling. This contradicts, in part, the results of Auer and Griffiths (2016b) regarding the discrepancy between self-rated and actual loss. In the study, gamblers underestimated their loss compared to actual gambling data. One hypothesis regarding this class is that they have realized that they are increasing the money and/or time that they spend on gambling. This might lead them to use advice before their risk ratings change, and it might be why they chose the tool's advice to "Take a break from gambling." Another explanation could be that the gamblers chose to take several advice because they are "serial-self-excluders" as the gamblers in the study by Dragicevic et al. (2015).

Also, low rates of tool use can perhaps partly be explained by the results of Study II. The participants had a good overall view of the tool and its features but did not use it to a great extent, even though they volunteered to use it. In Study II, this is labeled the "user paradox"; though the participants understand the purpose of the tool, are curious about its features, and think that it has the ability to change gambling behavior, they do not use it. One reason for this might be that the participants did not feel the need to change their gambling habits. This is in line with the argument made earlier based on "perceived need" (Andersen, 1995). Also, the participants commented on not receiving any feedback from the tool, which limited use. Another reason for participants not using the tool could be, as mentioned above, that some of them did not know that they had joined the tool.

Approximately 13% of the tool's users can be classified as "high users," in comparison to the classes previously discussed. Those two classes make up almost 1200 participants. Self-testers make up 3.3% of the sample. This class is characterized by repeated use of the GamTest and a higher risk level than the previously discussed classes. One hypothesis behind the user pattern in this class is that they use the tool and the GamTest to get regular feedback on their gambling and subsequent risk levels. According to the LCA, some of them also used the tool's advice on how to change their gambling behavior. One interesting aspect of their use is that they did not visit the tool many times, which indicates that they are active when using it. This class might have been trying to receive updates on their risk level since they are either yellow- or red-level gamblers. They might have been searching for the limit at which their risk level changes and been seeking to understand their risk level's relation to their gambling pattern. One hypothesis can be that the users are trying to get updates on their risk level during a gambling session and are answering the self-test during a period of intense gambling.

As mentioned, the other high usage class was the multi-function users. They constitute 9.3% of the sample. These users visit the tool frequently, use its advice, and take the GamTest (although their use of the self-test is lower than that of the self-testers). Their use of the tool can be understood as monitoring and trying to change their gambling behavior via advice. These users have either a yellow or red risk level. This indicates, as with the self-testers, that the users in this class have a need to change their gambling behavior. The different user profiles of the two classes that use the tool to a great extent could reflect those classes' different "needs." The self-testers might be looking to moni-

tor their gambling and risk level while the multi-function users are trying to change their gambling behavior.

The mean age and gender distribution were similar for each class. The largest difference in mean age between classes was approximately five years, and the biggest difference in gender distribution was 5.6%. These relatively small differences probably did not influence the way that the users gambled and used the tool. The small differences also indicate that there were not any systematic differences concerning age and gender between the classes. Use of the tool and risk level seems to be what separated the different classes.

An important result from Study II is that the participants joined out of curiosity about the tool and about what participation entailed. Some of the participants also joined because they wanted an assessment of their gambling behavior. The results are similar to the results found by Griffiths et al. (2009). According to the study, 47% of the participants who had used Playscan joined the tool out of curiosity. Furthermore, 12% joined out of concern that they gambled too much, and 11% wanted to gain insight into their gambling behavior. In any case, it seems that the tool was not capable of harnessing the initial curiosity of the participants in Study II. This conclusion is based on the low use of the tool for the participants in Study II.

Previous studies (Adami et al., 2013; Braverman & Shaffer, 2012; Dragicevic et al., 2011; Haeusler, 2016; Percy, França, Dragičević, & d'Avila Garcez, 2016; Philander, 2013) have successfully used gambling data to assess risk and predict self-exclusion. However, these studies use aggregated data and do not investigate how gamblers perceive their risk assessment. In Study II, users were asked how they perceived their risk assessment, and the majority considered the assessment to be reliable and fair. The participants in Study II endorsed the assessment's face validity. That users can relate to their risk assessment can be seen as a way to bridge the gap between actual loss and the self-rated loss found by Auer & Griffiths (2016). This also further substantiates the use of gambling data to assess risk and self-exclusion. The results need to be supported by further studies, but Study II provides a first step towards anchoring risk assessments among gamblers. However, the question that remains is what sort of data can best be used to determine risk and self-exclusion?

Besides having a positive view of the risk assessment, the majority of participants in Study II also viewed the communication that they received from the tool as being neutral or positive. Furthermore, the

participants thought the tool could change gambling behavior and attitudes towards gambling in a positive way. Gainsbury et al. (2013) and Ladouceur et al. (2012) found that users had a positive view of RG features. Additionally, the participants in Study II did not comment on any problems with the tool except for its lack of feedback. The study by Griffiths et al. (2009) had similar results, with 9 out 10 respondents finding the tool easy to use. Participants' positive views of these features should have promoted the use of the tool. Reasons for the low rates of use have already been discussed in relation to the results in Study I. The majority of the participants in Study II seem only to have visited the tool and answered a GamTest. Thus, it is not surprising that the participants did not report any changes in terms of gambling behavior and attitudes towards gambling. The changes in gambling behavior and attitudes were due to changes in life circumstances, such meeting a partner, starting school, or finding new hobbies.

The paradox between the positive attitude towards the tool and the low use was probably strengthened by the fact that the participants in the study only spent a small amount of time on the gambling site. One other reason for the low repeated use might be that the participants reported their own risk levels. The participants might have reported the wrong risk levels. If they reported a higher risk level than they actually had, they might not have felt a need to use the tool. Even if that was the case, the lack of feedback from the tool seemed to determine levels of use to a high degree.

Ways to resolve the paradox and increase use of the RG tool

The method, most commented on by participants in Study II (almost all of whom discussed this subject), for bridging the gap between users' positive view and feelings about the tool and their limited use of the tool was to improve the means of providing feedback regarding the risk assessment and also to increase the frequency of feedback. Previous studies have found that a lack of feedback hinders use of Internet-based interventions (Kuijpers, Groen, Aaronson, & van Harten, 2013; Nijland, van Gemert-Pijnen, Boer, Steehouder, & Seydel, 2008; Nijland, van Gemert-Pijnen, Kelders, Brandenburg, & Seydel, 2011). This implies that more feedback might increase adherence.

Suggestions presented by the participants included sending pop-up messages when users log in to the gambling site and sending users e-mails and/or text messages. The participants' suggestion about feedback is supported by research within the field of gambling and related

areas (Auer & Griffiths, 2016a; Kelders et al., 2012; Martens, Arterberry, Takamatsu, Masters, & Dude, 2015; Neighbors et al., 2015). The use of feedback is also supported by studies in the RG tool paradigm (Auer & Griffiths, 2017; Wohl et al., 2017). Another study showed that e-mails to gamblers have been found to increase retention by member sites (Jolley et al., 2013). Another benefit that receiving feedback could have is that it might contribute to the users' experience of being a part of the tool. The meaning of "being a part of the tool" is to know that Playscan is a feature that can help the gambler to limit negative gambling behavior. The experience of being a part of the tool was not present among the interviewed participants.

A plausible way, that the users in past studies that investigated internet interventions, have bridged similar gaps is if they had a "perceived need" (Andersen, 1995) to use the tool. Such a need seemed to be present in Study I, where high-risk users consulted the tool more than users with low risk. Since reasons for use were not investigated, it is difficult to ascertain why certain participants used the tool more. Furthermore, there is a contradiction between the results from Study I and the results from Study II. In Study II, the high-risk users did not use the tool more than the low risk users. The high-risk users in Study II might not have felt the need to use the tool. It might be the case that the red- and yellow-level users in Study II were not representative of users with this risk rating and, thus, that another sample might use the tool to a greater extent.

One other important result that should be discussed is the way that the participants in Study II used the gambling site and, subsequently, Playscan. Their behavior can be described as analogue, meaning that they behaved in the same way when gambling online as they did when gambling in a land-based venue. They decided what numbers or matches to bet on beforehand. The effect of this is that the participants do not stay on the site for a long time. This will limit Playscan's opportunity to influence users' gambling behavior through feedback since the users never become aware of whether they have an increased risk. One can suspect that the analogue way of using the gambling site is also present in some of the classes in Study I. The mean age for the non-users and site visitors is similar to the mean for participants in Study II. High mean age and the fact that many of the gamblers in Study II had gambled for a long period of time indicate that they might be prone to use the tool in a limited manner. Though the tool has a postbox indicating if there is a message from Playscan, this might not be sufficient to attract the attention of gamblers who only want to place their bets and leave as soon as possible. Again, the use

of tailored individual feedback sent directly to the user (by SMS or e-mail) might mitigate analogue use somewhat.

Usage and effects of responsible gambling tools

The results from Study I and Study II show that, despite a high level of initial use, the tool was not repeatedly used to a great extent. This is surprising since the users volunteered to become members of the tool. The qualitative results also indicate that the users had a variety of aims in volunteering to participate. The "user paradox" was seen as an essential part of the experience among the participants in the qualitative study. The fact that the users had a positive view of the tool but did not use it and that most of the users in Study I were not repeated users is interesting in the light of studies by Auer and Griffiths (2016a) and Wood and Wohl (2015). One hypothesis that arises when combining these results is that fairly low use of the tool produces small effects in terms of decreasing money spent on gambling. This line of reasoning, however, is based on the notion that the use of the tool among the gamblers included in the studies by Auer and Griffiths (2016a) and Wood and Wohl (2015) is similar to those in Study I and Study II. However, this might not be the case. Another assumption that can be plausibly made from the results of these four studies is that the effect of the tool varies between different user classes. Another interesting question along this line of reasoning is whether increasing use of and feedback from the tool would increase the effect. The result of this enhancement might be a larger effect and a drop in spending on gambling for the users of the tool. The dose and response effect might be an important part of RG tools and also RG features in general. Also, combining data on use and effect might provide insight regarding what type of intervention would be most suitable for different levels of risk. It might be that the high-risk gamblers with a high rate of use of the tool will need a different strategy than low risk users who used the tool less extensively. Another interesting avenue of investigation is whether improving the tool's functions increases rates of use. Participants in Study II endorsed this. The aim of these types of strategies would be to create a more comprehensive and tailored intervention. The logical next step for research on RG tools is to take a process-oriented approach. It would be interesting to explore the link between usage and effect between different user classes.

The results from Study I and Study II provide tentative evidence for the underutilization of the tool. One line of reasoning, that is possible,

is that leaving the use of RG tools and other types of RG measures to the gambler might not be solution to the problem concerning excessive and harmful online gambling. A debate in gambling research is if the individual should be solely responsible for his/hers gambling. The Reno model promoted in several scientific publications support this perspective even though the responsibility of gambling companies are discussed (Blaszczynski et al., 2011; Blaszczynski, Ladouceur, & Nower, 2008; Blaszczynski et al., 2004; Collins et al., 2015). The Reno model have been criticized by Hancock and Smith (2017) and their critique have been addressed (Abbott, 2017; Orford, 2017; Young & Markham, 2017). Hancock and Smith (2017) mean that informed choice that the Reno model promotes is not viable RG strategy. The results from Study I and Study II support the critique put forward by Hancock and Smith (2017) and perhaps rethinking informed choice is an important step when conceptualizing RG strategies. This makes the result of Study I and Study II, in a sense, political and they might have an impact on the future of RG. This line of reasoning is made more important by the fact that gambling companies have many different practices at their disposal to reinforce gambling behavior. Maybe RG features that are online based are not sufficiently developed and refined to compete with gambling sites.

Use of the GamTest and its impact on user behavior

The most used function in Study I was the GamTest, which almost all of the users started to answer at least once. This was also the function that was used repeatedly and the most times. The GamTest was also an important part in the analysis of the latent classes. However, though 80.0% of the respondents started to take the GamTest, only 65.4% completed it the first time. The results from Study II show that the GamTest was the most used feature in that study as well. Almost all of the participants had taken the test at least once. The GamTest seemed to function as a gateway for joining and using the tool (this is mentioned by some of the participants). Based on the results from Study I and Study II, a further exploration of the psychometric properties of the GamTest was considered warranted. There was a need to understand more about the GamTest so that the questionnaire could function more effectively for the users of Playscan.

Implications of the evaluation of GamTest

The common factor analysis (principal factor analysis) and the parallel analysis supported a three-factor solution, and the factors were labeled accordingly: "Financial and emotional consequences of gambling" (consisting of nine items and explaining 38% of the variance), "Time spent on gambling" (consisting of three questions, which contained questions about different aspects of time and gambling and explained 18% of the variance), and "Interactions with others in relation to gambling" (also consisting of three questions, and explaining 14% of the variance). The factor solution explained 70% of the variance in the data from the 413 respondents who scored over 15 points (the lowest score possible). Selecting a three-factor solution was also conceptually sound when reviewing the questions that belonged to each factor. The two factors "Time spent on gambling" and "Interactions with others in relation to gambling" are made up of three questions each, and the questions are coherent within each factor. The factor that contained the majority of the questions and explained the largest part of the variance, "Financial and emotional consequences of gambling," is made up of questions related to spending on gambling and the emotional consequences of gambling. Since the questionnaire is partly based on the PGSI, this factor and the questions the factor contains are similar. There are, however, some differences between the PSGI and this factor. The PGSI includes one item that focuses on time spent and one item that focuses on gambling in relation to others apart from the questions that are similar to the GamTest.

The questionnaire was constructed and intended to cover five separate dimensions. One published study has confirmed these five dimensions (time spent on gambling, money spent on gambling, economic consequences (more long term), social consequences, and emotional consequences) using data from a gambling population (Jonsson et al., 2017). The results from Study III contradict these results. The factor analysis and the parallel analysis support a three-factor solution. Two of the factors in Study III are similar to those found in the work of Jonsson et al. (2017). The overlapping factors between Study II and Jonsson et al. (2017) were time spent on gambling and social consequences, which overlapped with time spent on gambling and interactions with others in relation to gambling from Study III. The main difference is that a single large factor explains most of the variance in the sample in Study III, which is equivalent to money spent on gambling, economic consequences (more long term) and emotional consequences in Jonsson et al. (2017). The different outcomes in Study III

and in the study of Jonsson et al. (2017) have several possible explanations, the most plausible of which is the fact that the two studies had different populations. Study III used a population that was supposed to be similar to the general Swedish population while Jonsson et al. (2017) used a population comprised of gamblers. Another explanation could be that the age range and gender distribution is different in the two samples and that influences the outcome of the analysis.

As mentioned, Cronbach's alpha was .96 in the whole sample and .95 in the subsample scoring above 15 points. According to Streiner (2003), this indicates that the instrument has excellent internal reliability. However, Streiner (2003) also argues that, if a questionnaire has such a high Cronbach's alpha, several items on the questionnaire might be redundant. Therefore, reducing the number of questions that the questionnaire contains is the most suitable solution from both a psychometric and a practical perspective. Items that have low factor loading or items that load on different factors are suitable for removal. The factor from which it is most suitable to remove questions is the largest factor. From a practical perspective, this might lead to more participants completing and starting new tests. There is another possible means of increasing the use of the GamTest. The first time a user takes the test, they have to complete the entire test. If the user takes the GamTest repeatedly, shortened versions of the test can be administered using questions that the user endorsed when he or she previously took the GamTest. There was a high correlation between the GamTest and PGSI. This result is similar to that of Jonsson et al. (2017). These results confirm the validity of the GamTest as well as its ability to estimate levels of harmful consequences due to gambling.

Previous studies have supported the discriminative ability of the PGSI when it comes to classifying harmful consequences of gambling. The main difference between the GamTest and PGSI is the number of items included. The GamTest has 15 items while the PGSI has nine. The GamTest has two additional factors that provide information about the consequences of gambling. Depending on what type of information is needed, the GamTest can be adapted. If information is needed about the time one has spent gambling or how one's gambling is affecting interactions with others, the GamTest, taken in its entirety, can provide more information than the PGSI.

There was a difference between the correlations in the total sample and the sub-sample of 413 that scored over 15 points on the GamTest. Correlations were higher for the sub-sample of 413 that endorsed more negative consequences due to gambling. The correlations of anx-

iety and depression were higher for that sub-sample. This is in line with research showing a high degree of co-morbidity between excessive gambling and anxiety and depression. One study by Lorains, Cowlishaw, and Thomas (2011) found that rates of co-morbidity were 37.9% for mood disorders and 37.4% for anxiety disorders. Also, respondents who had a high level of spending on gambling proved to have higher scores on the GamTest, further strengthening the validity of the test.

The high correlation with the PGSI suggests that high scores on the GamTest can identify individuals with a problematic gambling pattern that would probably endorse several criteria of gambling disorder in DSM-5 and of pathological gambling in DSM-IV. This might also explain why the participants in Study II found the risk assessment reliable and fair. If the participants answered the GamTest and scored high, this would have influenced the risk rating. On the basis of this result, it seems like the questions that the GamTest contains are understandable from a gambler's perspective.

Limitations

The limitations in this body of work are diverse due to the different methodologies used in the three studies. However, there are some similarities across the studies.

General limitations for Study I and Study II

One important limitation is that the tool underwent changes during the project. Though these changes were minor, they might have affected the use, views, and experiences of the tool. Some of the tool's functions were removed during the project. It is possible that this influenced the results. The participants in Study I and Study II might have had different possibilities in terms of accessing the functions of the tool. The layout of the page that contains the tool has also undergone changes. Thus, it is not possible to ascertain how the changes have influenced user behavior. The important point about this limitation is that continuous evaluation is needed to understand changes in user behavior. Study I and Study II can function as benchmarks for other studies that investigate the use of RG tools. However, one hypothesis is that the changes made have not influenced user patterns much. The basis for this is the fact that 56.0% of the users only logged in once (see the results from Table 1 in Study I). This means that any changes

to the tool or to the interface would not have affected a majority of the users' opinions of the tool.

Another general limitation is the time that users spent as members of the tool. It is possible that the users in Study I and Study II who were members of the tool for a long time used it more extensively than users who were members for a shorter period of time. This is a plausible hypothesis, but due to lack of information, it cannot be confirmed or discarded. Not knowing how long the users in Study I were members of the tool and when they used the functions is, therefore, a limitation in the study. However, most of the users in Study II were users of the tool for over six months but had a fairly low rate of use. Further research regarding the link between time and use of RG tools needs to be carried out to adequately estimate the severity of this limitation.

Limitations of Study I

The risk assessment, which was solely based on gambling data, was based on data five weeks prior to the users' voluntarily joining Playscan. It is possible that a longer interval than five weeks would have produced a different risk rating. However, it can be assumed that the risk rating for users was stable or was moving towards a higher level before they joined the tool. More research into how a risk rating varies over time needs to be carried out to understand the full extent of this limitation.

Another limitation concerns the execution of the LCA and multinomial regression. There are two concerns that need to be discussed. The first involves the way that the categorization of use by the researchers was made. The results from the descriptive analysis were the basis for classification. The categorization might have affected the results of the LCA. It is possible that another team would have made a different classification. The other concern that needs to be addressed is the risk assessment used in multinomial regression. The assessment was performed by the tool and was solely based on users' gambling history. If the analysis had been based on another type of risk assessment or employed a different algorithm to calculate risk based on the same data, the distribution of risk between the three groups might have been different. This limitation would not have affected individuals that either spend small or large amount of money on gambling. It is more probable that gamblers who are at the limit between green and yellow and yellow and red are affected. However, these individuals would probably make up a small part of the entire sample.

The fact that the users in the Study I volunteered to use the tool is another limitation. There is no knowledge regarding what made the gamblers join the tool and whether this had any influence on the outcome of the study. However, 47% of the participants reported that they joined Playscan out of curiosity (Griffiths et al., 2009). An assumption is that this curiosity could have influenced their willingness the use the tool. Use of the tool might be lower if the tool was mandatory to use for members of a gambling site. The fact that the population that did not join Playscan is unknown is an additional limitation. It is important that users in Study I is compared with all of the users of Svenska Spel's gambling site. This could provide insight into who joins an RG tool. Without having this information, it is hard to generalize how the use of Playscan would be for the entire sample that uses the gambling site.

Another piece of information that was not available was whether the users gambled at sites other than at Svenska Spel's gambling site. If the users gambled at other sites, the risk assessment would be obsolete due the fact that spending on gambling at other sites is not a part of the risk assessment model. However, Griffiths et al. (2009) reported that about half of the sample did not gamble at other sites. This means that the risk assessment made in Playscan is accurate for at least some of the members of the tool.

Limitations of Study 2

The recruitment e-mail was sent to registered users of the tool in the Stockholm area. Also, all of the participants volunteered to take part in the study. This recruitment procedure might have introduced a bias that could have affected what types of answers were given by the participants. The procedure, which entailed interviewing the first participants that signed up and giving users 500 SEK for their participation, might have added to this bias. Perhaps users who had time to be interviewed, were early adopters of Playscan, or checked their e-mail more frequently could have read about the offer to participate and signed up at the webpage faster. This might mean that users with different gambling habits and experiences of the tool did not have the opportunity to be interviewed. This particular limitation makes it harder to generalize the findings to the entire Playscan population (always a limitation in a qualitative study). An important argument concerning the ability to generalize the findings is that a benchmark for thematic analysis, according to Braun and Clarke (2013) is six to ten participants. Having interviewed 20 participants should, thus, cover the majority of user experiences. Adding to this, the e-mails were sent to 1673 users.

These users were selected at random. The way that the selection of the participants was made should have limited the bias in their answers to a high degree.

Another limitation that concerns the participants and selection process is that only active users of Playscan were interviewed. It is possible that users who have left the gambling site and Playscan left because they had received help from the tool to gamble less and carried out a behavioral change.

The participants were also asked to recall events from previous years during the interview. Due to recall bias, their answers might not have been accurate. They may have under- or overestimated their gambling or their use of the tool. If the participants did not remember or did not know how to answer a question, they might have answered in a way that they thought that the interviewer wanted to hear, thus acting in accordance with social desirability.

One other limitation is that the first author of Study II completed the thematic analysis of the interviews on his own. If the other authors had been included in the analysis, this might have produced a more reliable end result. Adding more perspectives in the different stages of the thematic analysis would have been beneficial. Also, a statement containing information about all the authors and especially the first author might have been useful in order to open up a discussion on the question about reflexivity, which is present in qualitative research.

Limitations of Study 3

One major limitation is that only population data collected in a non-gambling setting was available. The questionnaire is available and is responded to at gambling sites or when using EGMs. The sample also produced floor-constrained data (handled appropriately in the affected analyses). This might further limit the extent to which our findings can be compared to data collected in gambling settings.

Cronbach's alpha was the reliability measure used in Study III. This constituted another limitation of the study. A test-retest reliability score for the instrument would provide an additional reliability measure that could make the instrument more applicable in clinical settings. A test-retest reliability score can be used to determine change on an individual level using the reliable change index (Jacobson & Truax, 1991). An additional reliability assessment could be used to track

changes in spending, with increases or decreases in scores measuring changes in a more robust way.

Future research

Future research efforts should focus on the connection between use and effect of the functions that RG tools contain. If low rates of use provide a small effect, perhaps increasing rates of use will increase the effect that the tools can have. This relationship between use and effect needs to be researched. Also, there is a need to determine the maximum degree of effect that this type of tool can have on gambling behavior. Another important area of inquiry is if there is a point in time when it is not beneficial to use the tool any more. To date, no research project has found a point in time when use of the tool has been deemed not beneficial to decrease gambling behavior. In theory, use of the tool can go on as long as the individual gambles. In that case, when the gambler will have the most use of the RG tool is important to investigate as well. These areas can be researched by using moderator analysis or sub-group analysis.

Research efforts should also focus on when the gamblers use Playscan in relation to their gambling. Users might use the tool straight after losing money or they might use it days or weeks after losing money. Knowing when then tool is used could help to steer feedback so it will have the most impact on gamblers.

Another important question is if there are any adverse effects from using these types RG tools. Perhaps green users start to gamble more when they receive a low risk rating is one issue that would be interesting to explore. Perhaps using Playscan influences problem gamblers not to seek treatment even though they are in need of it.

Research efforts that explore the link between different ways of improving the tool, such as more and/or targeted feedback or different types of messages, should be investigated. These types of improvements should be linked to the use of the tool and its function and what type of effect that it has on user behavior.

The theoretical foundations of Playscan are MI and the Stages of change model. The tool and its effect should be related to these two

models of change to understand what these two models contribute in terms of decreasing gambling behavior.

Future research also needs to focus on the GamTest and its psychometric properties in different populations. Efforts should be made to test shortened versions of the GamTest to see if the rate of completion increases when it is used as a part of an RG tool. In addition, using item response theory to explore the tool's different psychometric properties could produce vital information about the instrument and, subsequently, the way in which it should be implemented in RG tools.

Another area of research where RG tool can be employed is different types of computer games. The tool could be linked to games in a similar manner that is it linked to gambling sites at present. A version focused on computer games could measure time spent on gaming, perform risk assessments and also provide advice and different types of strategies to diminish gaming. The tool could also enforce breaks during long gaming sessions. This new context could examine if RG tools can promote behavior change in a different setting.

Conclusion

The present thesis provides evidence for high rates of initial use and low rates of repeated use of RG tools. Different levels of use were associated with different levels of risk of developing a pattern of excessive gambling (high rates of use meant high levels of risk). In addition, users of the tool seem to have a positive view of this type of tool, but such a view does not guarantee use. Online prevention in the field of gambling seem to follow the same user pattern as other areas of online prevention (low use and low adherence). Answering a questionnaire in order to receive information about gambling habits seems to be the most appealing and widely used feature of the tool. Based on that result, the questionnaire to assess negative consequences of gambling (the GamTest) in Playscan underwent psychometric testing as a part of the thesis. The questionnaire had good psychometric properties, but on the basis of the analysis, the questionnaire could be shortened to promote further use. The fact that there is a low rate of use and different user classes needs to be taken into account when assessing the efficacy of RG tools and other RG features that are designed to limit gambling behavior and reduce harm.

Appendix I: Interview guide

Questions on gambling:
When did you begin gambling?
What game(s) did you begin with?
Why did you begin to gamble?
When did you begin gambling with Svenska Spel's on-line service?
What game(s) do you use on Svenska Spel's on-line service?

Questions on Playscan:
When did you join Playscan?
Why did you join Playscan?
How have you used Playscan?

Opinion of Playscan as a service:
How do you understand the purpose of Playscan?
What is your opinion of the reliability of Playscan?
What is your opinion of the tone used in communications from Playscan?

Questions on gambling after joining Playscan:
Has your gambling changed in any way since joining Playscan?
Has your attitude towards your gambling changed in any way since joining Playscan?

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