Harm reducing and preventative regulation

Implemented by authorities or gamblers

Jonny Engebø

Thesis for the degree of Philosophiae Doctor (PhD)
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Scientific environment

I have since 2017 been a PhD-candidate at the Department of Psychosocial Science, Faculty of Psychology, University of Bergen (UiB). The approved courses which are part of my PhD-education have been completed at the UiB, Faculty of Psychology, Oslo Metropolitan University, Faculty of Health Sciences and the Norwegian University of Science and Technology, Department of Public Health and Nursing. At UiB I have been member of the Graduate School of Clinical and Developmental Psychology, and the Addiction Research Group at the Faculty of Psychology. My two supervisors, professor Torbjørn Torsheim and professor Ståle Pallesen, are employed at the Department of Psychosocial Science, Faculty of Psychology, UiB, whereas the third supervisor, professor Helge Molde, is affiliated with Department of Clinical Psychology, Faculty of Psychology, UiB.

Parallel to my project, I have been employed full-time as an adviser at the Norwegian Gambling and Foundation Authority. My background from working with the Norwegian gambling market since 2001 and participation in several international organisations relevant for regulation of the gambling market spurred my interest and motivation to begin a PhD-project on the prevention of gambling problems.

From May 2014 until June 2023 I have been a board member of Gambling Regulators European Forum (GREF) and I am one of two co-chairs of its working group for responsible gambling. Since 2016, I have also been a board member of the European Association for Studies of Gambling (EASG). EASG is open to all actors in the field of gambling, e.g., researchers, clinicians, operators and regulators. EASG arranges large international conferences where e.g., results of research are shared. In 2019, I was invited to join a WHO expert group on prevention of gambling problems. So far there has been only one meeting (the Meeting on the Public Health Implications of Gambling and Gambling Disorder, in Istanbul December 2019) in this expert group. The group consists mostly of researchers, but there are also some civil servants who participate.

These international activities and networks are for me important sources to knowledge in the field of prevention of gambling problems.

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Preface

It is not a modern activity to stake something of value with a hope to win something worth more. For centuries, people have participated in different games. Some have won fortunes, but the vast majority has lost. Among those who lose there are some who are severely harmed, often in more ways than financially. It is less than fifty years since Gambling Disorder was recognized by World Health Organization as a psychiatric disorder. Different forms for gambling have gradually arisen in gambling markets. At the end of the 20th century, most of the gambling took place in various allocated physical environments. From the turn of the millennium and due to technological development, gambling opportunities online became gradually more available. Today, many people are able to gamble online, with computers, tablets, and mobile phones.

In Norway around two decades ago, gambling problems and harm came on the political agenda. A decision to ban harmful slot machines was taken in 2003. The machines were removed in 2007 and replaced with new terminals equipped with measures to reduce the risk of harmful gambling. All gambling on the new terminals had to be registered (linked to identifiable persons) which again made it possible to apply responsible gambling (RG)/ consumer protection (CP) measures. Some measures where set by the authorities (e.g., maximum loss limits). At the gambling terminal, the players could set their own limits (e.g., personal loss limits below maximum). Later, such measures to regulate gambling have been implemented in many games in the Norwegian market.

Regulatory requirements for RG /CP measures are implemented internationally, but the level of regulatory demands differs between countries. Internationally, gambling problems and harm caused from gambling have received increased attention. An important question is how to prevent harmful gambling.

This thesis is based on three studies which investigated who among the gamblers believe that RG /CP measures will help them to control their own gambling, and further what can predict the actual use of such measures. Finally, the effect of regulatory changes in the market by removing or introducing games was investigated.

Abstract in English

The majority of Norwegian adults participate in money games. Some will win, but more will lose. Some can be at risk or have already become problem gamblers. At-risk and problem gamblers may experience severe harm and are affected in different ways, e.g., financially, legally, health-wise, in relationships to family, friends and colleagues and in terms of work/educational performance and quality of life. Based on the literature, a careful estimate suggests that six other persons are affected for each problem gambler. Different measures are used to prevent gambling problems. In line with a public health approach, authorities can restrict the availability of games with higher risks for harmful gambling. In addition, the individual gambler can use other measures to control their own gambling, e.g., using a tool to set personal loss limits. Such measures are known as responsible gambling (RG) or consumer protection (CP) measures. This thesis consists of three studies which investigated different aspects of measures used by authorities or gamblers. All three studies were based on cross sectional data collected from representative samples of the Norwegian populations.

The aim of Study 1 was to investigate to what degree gamblers believe that different measures to reduce gambling problems or the negative consequences of gambling will help them to control their own gambling. The aim of Study 2 was to investigate if two major changes in the Norwegian gambling market would lead to changes in gambling behaviour. The first change entailed a ban of slot machines in 2007 with a subsequent replacement of new video lottery terminals (VLT). The second change consisted of the introduction of new regulated interactive online games in 2014 with the purpose to channelize gamblers from foreign websites without Norwegian licenses. The aim of Study 3 was to investigate the actual use of measures to regulate personally gambling behaviour among gamblers.

Study 1 used data collected in 2013 and 2015, and the gamblers were asked if they agreed or not that ten specific measures would help them controlling their own gambling. Between 35% and 42% neither agreed nor disagreed, but among those with an opinion, most agreed. A multiple regression analysis identified predictors for positive beliefs, e.g., female gender, young age, playing random games only, and being

a moderate risk or problem gambler. Positive beliefs in the measures may reflect that individuals have needs for more specific measures to prevent gambling problems. Negative views on the measures can stem from a wish to gamble without obstacles, and to take risks or trust in self-control. Study 2 used survey data collected from 2005 through 2018. Respondents were asked each year if they had participated in different games. Logistic regression analyses were used to predict participation in groups of games and if changes coincided with major market changes. With the first change a reduction in gambling on slot machines as well as a reduction in gambling participation overall were found. Results also showed small increases in female participation in games offered in land-based bingo premises and generally in gambling on foreign websites. Some also gambled on the new VLTs. However, these increases in participation were much smaller than the reduction for slot machines. With the second change, an increase in participation in online interactive games was detected. Despite a growth in such games internationally, increased online gambling in general and an increased marketing of foreign gambling websites, the participation on foreign websites seemed stable and the new regulated alternative seemed to have a channelizing effect. In total, the changes in gambling participation coinciding with the regulatory changes could be explained by transformations of physical and social availability, and in terms of mechanisms outlined by the model of total consumption. Study 3 was based on data collected in 2019. Gamblers were asked if they had used six different measures to control their gambling, if they had been seeking help for gambling problems and if they had let other persons control their economy. Logistic regression analysis identified significant predictors of use. Use of measures varied from 0.8% (contacted help services) to 23.2% (pre-commitment to an affordable loss limit). Characteristics of the gamblers (e.g., place of birth, moderate risk- or problem gambler), the game itself and the online distribution seemed to be the most consistent predictors.

Overall, the studies did show that gamblers are not alike and differ in their beliefs and their use of RG /CP measures. It was not always the same variables that characterized individuals who had positive beliefs in the measures and individuals who actually used them. For some of the changes in gambling participation, differences between gender

and age were found. Some of the measures discussed can be considered as individualistic approaches to prevention whilst others have a population or public health approach. Results from the studies will have implications for different stakeholders in the gambling field. Study 1 and 3 have relevance for regulators, gambling operators and treatment providers. Study 2 is relevant for policy makers and authorities which both legislate and regulate gambling markets.

Abstract in Norwegian

Majoriteten av vaksne i Norge deltek i pengespel. Nokon kjem til å vinne, men fleire vil tape. Nokon kan vere i risiko eller allereie er blitt problemspelarar. Risiko og problemspelarar opplever på ulikt vis alvorleg skade frå pengespel, t.d. økonomisk, juridisk, helsemessig, i forholdet til andre personar som familie, vennar og kollegar, til arbeid, utdanning og på livskvalitet. Frå litteratur er eit forsiktig estimat at seks andre personar blir påverka for kvar problemspelar. Fleire tiltak blir brukt for å førebygge speleproblem. I ei folkehelsetilnærming kan myndigheiter avgrense tilgjenget til spel med høgare risiko for skadeleg speling. I tillegg kan den einskilde spelar bruke andre tiltak, her kalla ansvarlegheitstiltak eller tiltak for forbrukarvern, for å kontrollere si eiga speling, t.d. ved å bruke verktøy for å sette personlege tapsgrenser. Denne avhandlinga omfattar tre studiar som har undersøkt ulike aspekt ved førebyggingstiltak brukt av myndigheiter og spelarar. Alle studia var basert på tverrsnittsdata samla inn frå representative utval i den norske befolkninga.

Målet med Studie 1 var å undersøke i kva grad spelarar trur at ulike ansvarlegheitstiltak vil hjelpe dei til å kontrollere si eiga speling. Målet med Studie 2 var å undersøke om to store endringar i den norske spelemarknaden førte til endringar i speleåtferda. Den første endringa omfatta eit forbod mot speleautomatar i 2007 med ei påfølgande utplassering av nye spelterminalar. Den andre endringa gjaldt ein introduksjon av nye regulerte interaktive nettspel i 2014 med føremål å kanalisere spelarar frå utanlandske nettsider utan norske løyve. Målet med Studie 3 var å undersøke den faktiske bruken blant spelarar av tiltak for å regulere personleg speleåtferd.

Studie 1 brukte data innsamla i 2013 og 2015, og spelarane vart spurde om dei var einige eller ikkje i at ti spesifikke tiltak ville hjelpe dei med å kontrollere eiga speling. Mellom 35% og 42% var verken samde eller usamde, men blant dei med ei meining var dei fleste samde. Ei multippel regresjonsanalyse identifiserte prediktorar for positiv tru på tiltak, til dømes kvinneleg kjønn, ung alder, berre å spele tilfeldigheitsspel og å vere ein moderat risiko- eller problemspelar. Positiv tru på tiltaka kan gjenspegle at spelarar har behov for meir spesifikke tiltak for å førebygge speleproblem. Negativ tru kan kome frå eit ønske om å spele utan hindringar, å ta risiko eller stole på sjølvkontroll.

Studie 2 brukte data frå spørjeundersøkingar frå 2005 til og med 2018. Respondentane vart kvart år spurde om dei hadde delteke i ulike spel. Logistiske regresjonsanalysar vart brukt til å predikere deltaking i grupper av spel og om endringar falt saman i tid med dei store marknadsendringane. Med den første endringa blei det sett ein stor reduksjon i speling på speleautomatar og ein reduksjon i deltaking i spel totalt sett. Resultata viste ein liten auke i kvinneleg deltaking i spel i landbaserte bingolokale og generelt i spel på utanlandske nettstader. Nokon spelte også på dei nye spelterminalane. Desse endringane i speldeltaking var likevel mykje mindre enn reduksjonen for speleautomatar. For den andre endringa vart det sett ein auke i deltaking i interaktive online spel. Til tross for ein vekst av slike spel internasjonalt, auke i nettspel generelt og auka marknadsføring frå utanlandske speltilbydarar, såg deltaking på utanlandske nettsider ut til å vere stabil. Det nye regulerte alternativet såg ut til å ha ein kanaliserande effekt. Totalt sett kan endringane i speldeltaking som fell saman med dei regulatoriske endringane forklarast av endringar i fysisk og sosialt tilgjenge, og av mekanismar skissert i totalkonsum-teorien. Studie 3 var basert på data innsamla i 2019. Spelarar blei spurde om dei hadde brukt seks førebyggingstiltak for å kontrollere pengespelinga, og om dei hadde søkt hjelp for speleproblem og om dei hadde latt andre personar kontrollere økonomien sin. Ein logistisk regresjonsanalyse identifiserte signifikante prediktorar for bruken av tiltak. Bruken varierte frå 0,8 % (kontakta hjelpetenester pga. av speleproblem) til 23,2 % (sett ei tapsgrense dei hadde råd til). Karakteristikkar ved spelarane (f.eks. fødestad, moderat risiko eller problemspelar), sjølve spelet og online distribusjon av spel ser ut til å vere dei mest konsistente prediktorane.

Sett under eitt, har dei tre studiane vist at spelarar ikkje er like og er forskjellige i tru på og i bruk av tiltak for å hindre skadeleg speling. Det var ikkje alltid dei same variablane som karakteriserte individa som hadde tru på ansvarlegheitstiltak og dei som faktisk brukte tiltaka. For nokre av endringane i deltaking i pengespel, blei det sett skilnader mellom kjønn og alder. Nokre av tiltaka som blir diskutert her kan sjåast som individretta tilnærmingar til førebygging, medan andre tiltak har ei befolknings- og folkehelse-tilnærming. Resultata frå studiane vil ha implikasjonar for ulike interessentar på pengespelfeltet. Studie 1 og 3 har relevans for regulatørar,

speloperatørar og behandlarar. Studie 2 er relevant for politikarar, beslutningstakarar og myndigheiter som utarbeidar lovverk og som regulerer pengespelmarknader.

List of publications

Engebø J, Torsheim T, Mentzoni RA, Molde H, Pallesen S. (2019). Predictors of gamblers beliefs about responsible gambling measures. *Journal of Gambling Studies* 35(4), 1375–1396. doi:10.1007/s10899-019-09835-2

Engebø J, Torsheim T, and Pallesen S. (2021). Regulatory measures' effect on gambling participation: Experiences from Norway. *Frontiers in Psychiatry*, 12, 672471. doi:10.3389/fpsyt.2021.672471

Engebø J, Torsheim T, and Pallesen S. (2022). Gamblers' use of measures to prevent gambling problems and reduce harm. *Frontiers in Psychiatry*, 13, 857280. doi:10.3389/fpsyt.2022.857280

Contents

1. Introduction

This thesis investigates some of the tools and measures which have been implemented in the Norwegian gambling market to prevent gambling problems and to reduce harm from gambling. Such tools and measures are also available internationally. The whole thesis is based on three articles which are published from 2019 through 2022.

The Norwegian gambling market consists of different money games. Norway has a monopoly system where only two operators, Norsk Tipping and Norsk Rikstoto are allowed to offer most of the games, although some games, e.g., smaller lotteries and bingo may be offered following permission. Most of the market is under the Norwegian legal regulation, but there are also foreign operators that offer online games to Norwegians without having permissions from the national authorities. According to the Norwegian gambling law, money games give the participants (gamblers) an opportunity to win a prize of financial value in return for a bet, where result/outcome is wholly or partly random (Pengespilloven (2022) § 2). Examples of games are number games (e.g., Lotto), sports betting and horse racing, games on video lottery terminals (VLTs) and online casino games. Many games, like number games, sports betting and horse racing are offered both online and land based. The VLTs are only land-based terminals. Except from casino games on seven Norwegian ships, casino games are offered online only (Engebø, Torsheim, & Pallesen, 2022). When it comes to risks for gambling problems and harm caused by gambling, the number games because of e.g., their non-continuity, are seldom associated with problems (Delfabbro, King, Browne, & Dowling, 2020). Larger risks will be found in faster games, e.g., VLTs and online casino. Other characteristics with games will also affect the risk for gambling problems, e.g., availability (how near home the game is located), length of continuous play (play without interruptions), multigame opportunities (number of games, one to many), variable stake size (fixed to unlimited) and payment options (cash, debit- or credit card) (Gamgard, 2018; Meyer, Fiebig, Häfeli, & Mörsen, 2011). Some of the risks can be reduced by implementing tools and measures in the games. Such tools and measures are subjects for this thesis.

Preventative or harm reducing measures can be set by the authorities which are responsible for the regulation of the national gambling markets and are normally directed towards operators in the market. One example from Norway is the ban on slot machines which came into force in 2007. With this ban, over 100 operators had to remove their slot machines, and the state-owned monopolist, Norsk Tipping, was given a monopoly to introduce the new video lottery terminals, VLTs. These terminals, which were introduced from 2009, had similar games to the removed slot machines, but were connected to a central server and were equipped with several tools and measures for player protection. How this ban and the introduction of new terminals affected the gambling market is examined in the second article of this thesis.

Another measure which is directed toward operators, and thereafter the gamblers, is the maximum loss limits in certain games. In Norway, such measures apply for some game categories (e.g., online casino and VLTs). Within a regulatory framework, gambling operators can also on their own initiative impose restrictions or measures. Together with other measures and tools which the gamblers can use themselves, these are studied in the first article of this thesis where it is examined how gamblers believe that such tools and measures can help them to control their gambling consumption.

There are several tools where the gamblers can regulate their own gambling behaviour and expenses. Examples are budget tools where gamblers can set restrictions for how much they can lose in a certain period, tools to restrict the time to gamble e.g., on online casino games or voluntary self-exclusion systems (Auer, Littler, & Griffiths, 2015). The gamblers' actual use of such tools is investigated in the third article.

Measures to regulate gambling and prevent problem gambling can therefore be set by authorities, gambling operators and the gamblers themselves. In this introduction I will focus mostly on what the authorities can do and what gamblers can do. However, what gamblers can do will depend on both the regulatory framework and how and to which degree gambling operators make relevant tools available for their customers, and e.g., to what extent the gambling operators encourage their customers to use such tools to regulate their gambling behaviour.

Many of such measures are referred to as responsible gambling measures or tools (RG) (Blaszczynski, Ladouceur, & Shaffer, 2004) and more recently also consumer protection tools (CPT) (Gainsbury, Angus, Procter, & Blaszczynski, 2020).

In the thesis, I will use the concepts *responsible gambling (RG)* and *consumer protection (CP)*. Both concepts mean the same and refer to tools or measures that are in place to prevent gambling problems and reduce harm. The word *tool* refers to a feature where a gambler can e.g., get information or regulate gambling behaviour e.g., the loss limits. The word *measure* refers to the restrictions set by authorities (e.g., maximum loss limits) or the gambler (e.g., personal time limits set by using an RG- or CP tool).

The regulation of gambling is anchored in the Norwegian gambling law, regulations, and other central documents. For the Norwegian authorities, it is an objective to regulate lotteries and gambling in such a way that problematic behaviour, such as gambling addiction and other negative consequences of gambling, can be prevented. This was emphasized in the Ministry of Culture's report to the parliament, "Everything to win - a responsible and active gambling policy", which was presented on December 16th, 2016 (Ministry of Culture and Equality, 2016–2017).

Prevention of problems in the gambling market has for a long time been a stated goal. It has been one of three purposes with the laws in the lottery and gambling market. These three laws became merged into one law which came into force January 1st, 2023. Here, the prevention and harm reduction is the first listed and prioritized purpose with the legislation (Stortinget, 2022). Further, since 2005 the Ministry of Culture has published six successive national action plans against gambling problems. All plans (Ministry of Culture, 2012, 2015, 2018; Ministry of Culture and Church Affairs, 2005, 2009; Ministry of Culture and Equalitiy, 2022) have had prevention as one of three overarching objectives. The other two main goals concern knowledge generation (data collection, research and dissemination of knowledge) as well as the development of treatment and help services. The current plan applies from 2022 throughout 2025. Work with regulatory measures is not specified in the plan, because such work is part

of the authorities' ordinary activity. The action plan first and foremost covers measures that can be organized through projects and developmental work, often carried out by external agencies. However, knowledge produced through activity from the action plan may be input to further regulatory work.

By setting laws, regulations and guidelines for the gambling market, the authorities can affect gambling availability, gambling participation and prevent gambling problems. Examples of regulation are restrictions for marketing, age limits, availability of games, number of licences and other regulatory requirements.

In terms of prevention of problem gambling and its consequences, it is a central goal in Norway to restrict the number of permits in a large part of the market (Ministry of Culture and Equality, 2016–2017). Two operators hold each a sole permit to operate several games in the Norwegian gambling market, where Norsk Tipping has the right to offer e.g., the largest number games and lotteries, sport games, VLTs and online casino. Norsk Rikstoto has the exclusive right to offer horse racing betting. Measured by gross gambling revenue (GGR) / stakes minus paid out prices, Norsk Tipping had in 2021 78% of the market. Norsk Rikstoto had 9%. The rest of the market (13%) was mostly left to bingo and lottery operators, seven Norwegian registered vessels with route traffic from Norwegian to foreign harbours, and non-profit organisations (e.g., sports, humanitarian and health) selling their own bingo games or lotteries. 2020 and 2021 was affected by Covid-19, but a market share closer to 90% for the two monopolists has been seen for several years (Norwegian Gambling Authority, 2023).

The magnitude of the Norwegian gambling market

The Norwegian regulated gambling market is large, and in 2021 the Norwegians wagered NOK 51.9 billion on regulated money games (1 Euro ≈ 10 NOK in 2021). After the winnings were paid out, there was NOK 11.1 billion left to be distributed between the various actors in the market: The latter amount is often referred to as gross gaming revenue (GGR), and nearer NOK 7.4 billion was in 2021 distributed to various purposes such as sports, culture, and socially beneficial and humanitarian organizations. The rest, NOK 3.7 billion, went to the actors who offer the games, or

others e.g., commissioners who contribute to the distribution and sale (e.g., convenience stores that sell money games for the operators Norsk Tipping and Norsk Rikstoto, the horse race tracks and online distributors). In addition to the NOK 11.1 billion in GGR from Norwegian regulated games, the Norwegian Gambling Authority estimates that Norwegians in 2021 left between NOK 1.8 and 2.2 billion with foreign online gambling operators (Norwegian Gambling Authority, 2023). Among the foreign operators that mostly offer online casino and online betting, there are several who aim/wish to obtain a Norwegian license to offer their games in Norway.

In the report to the Norwegian parliament in 2016, the government proposed to maintain the current system of exclusive rights (monopolies) in Norway, and that the market should not be liberalized. The parliament agreed to this with a decision in May 2017 and this is now stated in the new Lottery Act which was approved by the parliament (Stortinget, 2022) and has had effect from January 1st, 2023.

1.1 Theoretical framework

An important question in a study of prevention is why some individuals become problem gamblers. A study with a large impact in the gambling field is Blaszczynski and Nower's *The Pathways Model*, published in 2002 (Blaszczynski & Nower, 2002; Delfabbro & King, 2022). According to the model there are three pathways to problem- and pathological gambling. All three pathways contain ecological factors, i.e., availability and accessibility to games. Further steps are learning processes and cognitive distortions through the gambling experience, which can lead to increased gambling involvement, misconceptions, gambling habits and gambling to win back losses (Blaszczynski & Nower, 2002). These steps together make up the first pathway. The second pathway encompasses in addition emotional and biological vulnerability (e.g., anxiety, depression, and neurotransmitter reward dysregulation). The third pathway contains all factors from pathway 1 and 2 and emphasize in addition impulsivity and antisocial personality disorder (e.g., ADHD and substance abuse) as vulnerability factors. Even if all pathways include availability and accessibility of games, the emphasis on individuals and how problem gambling develops from internal

processes including psychiatric factors seems to be dominating. A recent meta-analysis of problem gambling risk factors including 104 studies of gambling problem prevalence, showed that the strongest associations to problem gambling were found among variables describing gambling activities: Gambling on internet, on gambling machines, and poker. In general, the gambling activity variables had the strongest associations whilst the socio-demographic variables had the smallest. The psychosocial and the substance abuse categories were generally in between the aforementioned categories in terms of effect sizes (Allami et al., 2021). A revision of *The Pathways Model* was published in 2022. Two of the three authors of the revision were authors of the original model introduced twenty years earlier. In the revised model, there are still three pathways, but the third pathway is now considered as a distinct pathway, and not a subgroup of the second. In the third pathway, the vulnerable factor such as depression and anxiety has a lower impact whilst risk taking, and anti-social traits are stronger emphasised. The ecological factors are still availability and accessibility to games (Nower, Blaszczynski, & Anthony, 2022).

The revised model raises implications for both prevention and treatment. Relevant to prevention, persons in the largest problem gambling group from pathway 1 can have developed their problems from exposure and continued gambling which can lead to misconceptions and conditioning effects. Here, the cause of problem gambling can be as simple as the repeated and increased gambling involvement. Responsible gambling (RG) features, such as limit setting tools in an RG framework should therefore be standard and not optional elements of gambling regulation (Nower et al., 2022).

The prevalence study in Norway, with data collected in the autumn of 2019, estimated that 4.5% of the population aged 16-74 years could be categorised as moderate risk or problem gamblers, amounting to 177,000 persons (Pallesen et al., 2020). Problem gambling was measured by the Canadian Problem Gambling Index (CPGI) (Ferris & Wynne, 2001). In the following, a theoretical framework will be presented for *problem gambling*, *treatment, harm,* and *prevention*.

1.1.1 Instruments for screening problem gambling

Excessive gambling / pathological gambling / gambling disorder was first recognized as a psychiatric disorder in 1977, specifically in the ninth edition of the International Classification of Diseases (ICD). Three years later it was recognized as a formal diagnosis in the third edition of the international diagnostic system Diagnostic and Statistical Manual for Mental Disorder (DSM-III) (American Psychiatric Association, 1980; Fauth-Bühler, Mann, & Potenza, 2017; World Health Organization, 1978). Internationally, many prevalence studies have been carried out to estimate the prevalence of participation in gambling and gambling problems (Abbott, 2020a).

The construct *problem gambling* usually refers to gambling problems that are not serious enough for the formal diagnostic criteria to be met, but where some symptoms or gambling-related harms are present (Potenza et al., 2019).

A systematic review showed the prevalence of gambling problems among young people to be between 0.2% and 12.3% (Calado, Alexandre, & Griffiths, 2017), whereas another review estimated the prevalence for adults to be between 0.12% and 5.8% (Calado & Griffiths, 2016). A recently conducted meta-analysis showed that the prevalence of help-seeking for problem gambling was 0.23%. The estimate for lifetime prevalence was 0.50%, and for current help-seeking 0.14% (Bijker, Booth, Merkouris, Dowling, & Rodda, 2022). Thus, only a minority of those with gambling problems seek help.

To measure the prevalence of problem gambling, several instruments have been developed / are available. The mostly used instruments are the South Oaks Gambling Screen (SOGS), the CPGI and instruments based on DSM-IV diagnostic criteria for pathological gambling where one instrument is The National Opinion Research Center DSM Screen for Gambling Problems (NODS) (R. J. Williams & Volberg, 2014).

With SOGS, an endorsement of 5 or more out of 20 gambling-related questions indicates that a person is a probable pathological gambler (PPG) (Lesieur & Blume, 1987; Stinchfield, 2002). Epidemiological researchers typically use a score of 3 or 4 on SOGS as an indication of problem gambling (Cox, Kwong, Michaud, & Enns,

2000). The CPGI consists of nine items related to gambling. The nine items are scored on a scale ranging from 0 (never) through 3 (always). Thus, the composite score varies from 0 to 27. Based on the composite score the respondents are divided into four groups: Non-problem gamblers (composite score 0), low risk gamblers (composite score 1 and 2), moderate risk gamblers (composite score 3 through 7) and problem gamblers (composite score 3 or higher, but most often composite score 8 or higher) (Ferris & Wynne, 2001; R. J. Williams & Volberg, 2014). NODS encompasses 34 items related to gambling, 17 assessing current problems and 17 that assess life-time problems. The instrument is based on the diagnostic criteria for pathological gambling found in the DSM-IV (American Psychiatric Association, 1994). A total score of 1 or 2 confirmed symptoms categorizes "at risk gamblers", a score 3 or 4 indicates a "problem gambler" and subjects scoring between 5 to 10 is diagnosed as a "pathological gambler" (Hodgins, 2004). A revised version of NODS based on the DSM-5 criteria (American Psychiatric Association, 2022) has recently been developed (Brazeau & Hodgins, 2022). The Problem and Pathological Gambling Measure (PPGM) (R. J. Williams & Volberg, 2010), is an instrument with 14 items. To be categorized as problem gambler according to the PPGM the person must have a Problem sub score of 1 or higher, an Impaired Control sub score of 1 or higher, and in addition report gambling at least once a month. Alternatively, the person can be categorised as a problem gambler if the total score is 3 or higher, and frequency and expenditure are larger than reported for the problem gamblers in the sample (R. J. Williams & Volberg, 2014).

A study was carried out to assess the accuracy of the instruments. Originally, the SOGS and NODS had questions also about gambling problems in a lifetime frame, but in that study, all the instruments were administered with a one-year timeframe (last year). To assess the accuracy of the instruments, participants who had given at least one positive response to any of the questions in any of the instruments and / or had lost at least $50 in a month ($n$=4,071) were rated clinically by two clinicians who assessed each person on basis of a two-page written profile. After several months the clinicians independently had read each profile and set each person's status as recreational, at-risk, problem or pathological gambler. The four instruments gave all a correct classification

of most of the non-problem gamblers. The CPGI and SOGS, both with a 3+criteria for classification of problem gamblers, predicted more problem gamblers than the clinicians who assessed the same persons. NODS identified a lower rate of problem gamblers than the clinicians. Compared to the clinicians, the PPGM had the highest level of accuracy (R. J. Williams & Volberg, 2014). An assessment of CPGI with 8+ criteria was carried out in the southern Korean population with a method like the aforementioned study. Here the CPGI was assessed together with NODS and PPGM. All three instruments showed satisfactory classification accuracies, but the CPGI was somewhat weaker than the NODS and PPGM (Back, Williams, & Lee, 2015).

A much shorter instrument, Lie/Bet, consists of two questions from the DSM-IV criteria. These are about lying to others about ones gambling and if one need to gamble more and more to get the desired excitement (Johnson et al., 1997). The questions are framed as if this has ever occurred (lifetime) and normally an affirmative answer to one of the two questions indicates problematic gambling (Pallesen et al., 2020). A study on a sample of gamblers recruited from the Gamblers Anonymous concluded that the two-item Lie/Bet instrument is promising for the screening of pathological gamblers (Johnson et al., 1997).

From the different instruments and the many studies, the problem gambling prevalence among adults in the past 12 months are mostly within a range of 0.5 to 3.0%. However, the rates for people reporting subclinical problems and harm are three to four times larger (Abbott, 2020a). In a Finnish study, the prevalence of being an affected other of a person with problem gambling was investigated and as many as 21% were affected others. Men were more often an affected friend and women an affected family member. (Lind, Castrén, Hagfors, & Salonen, 2022). A study in Great Britain found 0.7% problem gamblers (CPGI >7) when the instrument CPGI was used. Moderate-risk gamblers (CPGI 3-7) comprised 1.8% and low risk gamblers (CPGI 1-2) 5.5% of the sample. The shares of gamblers who experienced harm was larger and 16.4% had dependence harm (e.g., salience, increased tolerance, impaired control, and withdrawal symptoms), 2.2% experienced social harm (e.g., illegal acts, problems with family or other people, work-related problems, and financial problems) and 7.9% reported

possible dependence harm (chasing losses). At the societal level the distribution of gambling-related harms was largest for the groups of low to moderate risk for gambling problems and smallest for problem gamblers. The authors of that study suggested that prevention of gambling should consider a population approach to minimize gambling related harm (Canale, Vieno, & Griffiths, 2016). With this knowledge about harm, and even if at-risk and low risk gamblers at the individual level experience lower levels of harm than problem gamblers, the at-risk and low risk gamblers represent much larger groups. The implication of this may be that prevention will be more effective to the population as a whole with a public health focus and an universal interventions, as compared to preventive efforts aiming at those with the highest level of problems (Abbott, 2020a). In the current project the CPGI was used to measure the prevalence of moderate risk gamblers and problem gamblers, encompassing gamblers with a composite score of 3 to 8 or more.

1.1.2 Treatment

Treatment options for gambling disorder can mainly be divided into two groups, pharmacological and nonpharmacological (psychological) interventions. Among the nonpharmacological, cognitive-behavioural therapy (CBT) is the most used psychotherapeutic treatment (Bodor, Ricijaš, & Filipcic, 2021), and a review supports previous results showing that CBT reduces gambling behaviour and other symptoms of problem gambling. The durability of the positive effect is however not known (Cowlishaw et al., 2012). The effect of CBT has been seen to be medium to large (in terms of effect sizes) short-term (up to three 3 months following treatment), but less research supports longer-term effects (Potenza et al., 2019). A study which measured relapse rates six months after treatment including CBT (16 weekly sessions), showed that among those who completed the follow-up period, 81.5% did not gamble whereas 18.5% had relapsed (Jiménez-Murcia et al., 2007).

There are different methods of psycho-therapeutic treatment (Bodor et al., 2021) which in some treatment situations are or can be combined.

Cognitive-behavioural therapy (CBT) often includes several elements in the treatment protocol. Keywords are cognitive restructuring, techniques for problem solving,

training of social skills and prevention of relapses. Cognitions which treatment can correct, if necessary, is the gamblers wrongly beliefs in luck or skills when playing games of chance (Bodor et al., 2021; Rizeanu, 2012). Treatment through CBT is normally relatively short, e.g., 8 or 16 weeks or sessions (Rash & Petry, 2014). The treatment can be offered individually or in groups.

Brief and motivational interventions are other forms of treatment. One is the motivational interviewing (MI). Central keywords or principles for communication are empathy, developing a distance from where the gambler is today and the wish for changes, avoiding arguments, letting the gambler use his or her own words and support the feeling of coping by referring to the gambler's previous successful changes (Miller & Rollnick, 2002). The treatment normally consists of two to four sessions (Bodor et al., 2021). MI seems to be an effective treatment, at least short-term (Yakovenko, Quigley, Hemmelgarn, Hodgins, & Ronksley, 2015).

Self-help interventions are also in play. Such interventions are developed because few gamblers seek help from treatment providers. Self-help interventions most often contain written materials, provided in a workbook or internet format, based upon CBT-principles (Petry, Ginley, & Rash, 2017). In order to ease accessibility internet treatments seems to be offered more and more often, and seems to provide reasonably good effects (Sagoe et al., 2021).

Among the earliest treatment options, one finds the Gamblers Anonymous. From early studies a large dropout was often seen at the beginning of the treatment, and only 8% of problem gamblers were not gambling one year after treatment. However, a later study found that integrating Gamblers Anonymous' 12-step program into a formal treatment program showed an effect at the same level as CBT treatment (Bodor et al., 2021). Among Gamblers Anonymous' program of 12 steps rest a belief in a higher power, acknowledgment of powerlessness over gambling, admitting negative consequences of gambling and preparedness to make an effort to improve relations to others affected by ones gambling (Toneatto, 2008).

Mindfulness is a fast-growing psychological treatment alternative. It is based on a type of meditation which stems from Buddhist practice. Mindfulness-based interventions (MBI) are used as treatment for several mental health issues, including gambling problems (Shonin, Van Gordon, & Griffiths, 2014). Meditative technics are used to aid concentration and maintain the awareness of the present and cognitive-affective experience. MBIs can be delivered in a 8-week format, with weekly sessions, psychoeducation, guided exercises, guided meditation and one-to-one therapy. In treatment of behavioural addictions, MBI can be used together with other treatment techniques, e.g., mindfulness-based cognitive therapy (Griffiths, Shonin, & Van Gordon, 2016). A systematic review and meta-analysis revealed that mindfulness might reduce the gambling behaviour, monetary losses and urges, with moderate to large effects. Because of the limited number of studies, quality and different conceptualizations of mindfulness the results are so far regarded as tentative (Maynard, Wilson, Labuzienski, & Whiting, 2018).

There are several pharmacological interventions which are in use for the treatment of gambling problems. The most common entail opioid antagonists, antidepressants, atypical antipsychotic drugs, and mood-stabilizing drugs. Research has shown some positive effects of these approaches (Goslar, Leibetseder, Muench, Hofmann, & Laireiter, 2019). The effects seem better when the pharmacological treatment is combined with psychotherapeutic (Kraus, Etuk, & Potenza, 2020).

For treatment providers it is a challenge that only a few of those with a gambling problem seek help (Gainsbury, Hing, & Suhonen, 2014; Kowatch & Hodgins, 2015; Slutske, 2006). When gamblers first seek help, they typically have struggled for so long that they often have experienced severe harm prior to treatment (Suurvali, Hodgins, Toneatto, & Cunningham, 2008). In a review of studies of motivation for resolving or seeking help (Suurvali, Hodgins, & Cunningham, 2009), most often the help-seeking happened because of gambling-related harms, foremost in terms of financial-, relationships-, and emotional difficulties.

The financial consequences and probably also other forms of harm may last much longer than the treatment itself. For some, a huge gambling debt and financial consequences may follow the gambler for many years. Further, it is not difficult to imagine that such consequences also could affect the gamblers' children and thus also the next generation.

1.1.3 Harm

Previously presented data shows that the prevalence of harm among problem gamblers are lower than prevalence of harm among affected others. A relatively large study with 5,205 participants, comprising people with gambling problems or others who had been negatively affected by someone else's gambling, concluded with an estimated number of six other people being negatively affected by a typical problem gambler. The negative consequences from lower risk gamblers impact fewer, one per low-risk gambler and three others per moderate risk gambler (Goodwin, Browne, Rockloff, & Rose, 2017). Six others affected might be a careful estimate. In a seminal publication about gambling, science and public policy, it is emphasised that the variation between the estimates is large, and hence the authors safely estimated the number to be at least six other persons being affected for each problem gambler (Sulkunen et al., 2021).

A conceptual framework regarding the different types of harms from gambling has been developed on the basis of different methods of data collection; literature review, focus groups and interviews with professionals working with gambling problems, gamblers and the ones affected by their gambling. Finally, posts in public forums for gamblers and affected others were also included. The authors finally came up with seven categories of harm, in addition to one dimension of harm for life and between generations affected by the first seven. All harms can be experienced by gamblers, affected others and communities (Langham et al., 2016). The harm dimensions are presented below, and examples are provided in terms of how these harms are experienced by the gamblers and the affected others. This is mostly collected from Langham et al., (2016).

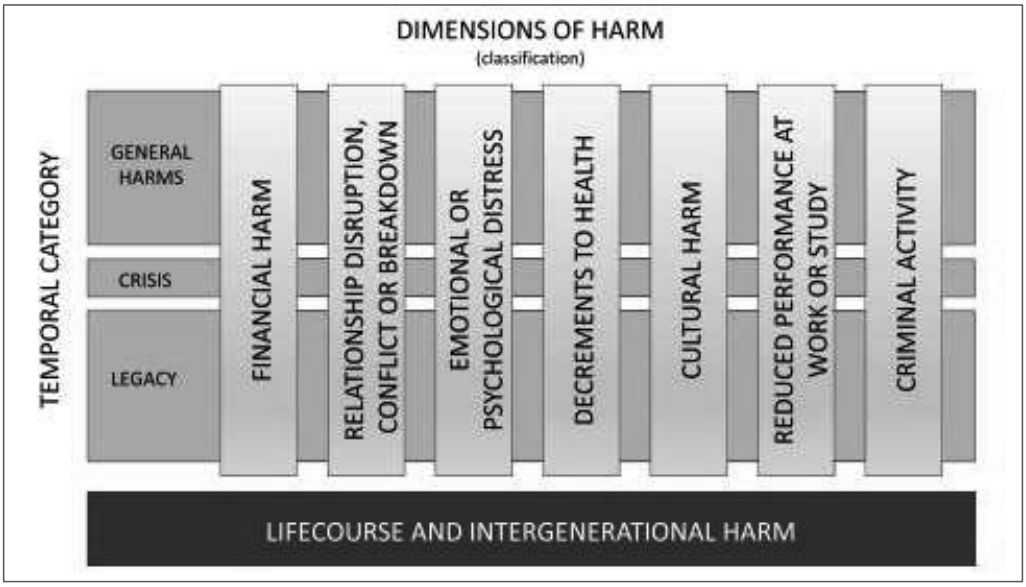
Financial Harm

A person who gambles, or an affected other (e.g., a spouse) can experience that savings

disappear and activities to provide money or cash become dominant and necessary (e.g., to take on extra jobs, credits/ loans, selling items/properties and non-payment of bills). It will be correct to assume that financial consequences often are a root source to the other dimensions of harm.

Relationship Disruption, Conflict or Breakdown

Relationship harm is seen because of financial harm, but also as a primary harm because the gambler would lose time he or she could spend with family members or friends. The harm could also cause loss of trust which again could cause conflicts.



Reproduced from Langham, E., Thorne, H., Browne, M., Donaldson, P., Rose, J., & Rockloff, M. (2016). *Understanding gambling related harm: a proposed definition, conceptual framework, and taxonomy of harms*. BMC Public Health, 16(79), 80-80. In accordance with terms of the Creative Commons Attribution 4.0 International License, http://creativecommons.org/licenses/by/4.0/

Emotional and psychological distress

This harm relates to lack of control and safety. Lack of control can arise because both the gambler and the affected others cannot control the disruptive gambling behaviour. Lack of safety can stem from demands, often high, from creditors, but also from the feeling of not being safe in your own home. A problem gambler could take measures to stop or reduce gambling and then be exposed to advertising through media available at home. To feel unsafe because of gambling adverts will be in line with a Swedish

study which showed that moderate risk and problem gamblers were overrepresented among those who reported negative impact from gambling advertisements. A positive association between self- imposed limits and self-perceived negative impact was also reported (Binde & Romild, 2019).

Decrements to Health

Langham et al. (2016) also identified a group of consequences related to health. One was increased blood pressure or loss of sleep due to psychological distress. The gambler's children could also be affected because of being restricted from activities, e.g., sport activities, where lack of funding could restrict participation and as such have a negative impact on their physical health.

Cultural Harm

For problem gamblers, there might be shame related to their gambling. Shame can also be experienced by the affected others, and for both groups a reduction in the participation in the cultural community can be the consequence. This could also cause distress in terms of feeling loss of identity.

Reduced Performance at Work or Study

Reduced performance can be caused by tiredness or distraction which can be attributed to excessive gambling. Also reduced health stemming from problematic gambling will reduce the performance. If a work or study opportunity is lost due to gambling, this might have further consequences such as financial harm.

Criminal Activity

To get access to money, a person who gambles may perform illegal activities. An affected other can become a victim of the crime (e.g., theft). For the society there will be costs in terms of criminal investigation, to the judicial system and for incarceration.

Life course and intergenerational harms

Changes in life course and inter-generational effects can occur when the different types of harm have a strong impact on the gambler or the affected other. Examples can be loss of homes, savings, jobs, and businesses. In addition to long-term consequences for

themselves, harm may be transferred to the next generation when e.g., parents will not be able to offer their children the same opportunities as other families. A generational loss can also occur if harm due to gambling disturbs family planning involving e.g., marriages and children (Langham et al., 2016).

Consequences for societies

As mentioned above, problem gambling also has societal consequences. In a Norwegian study, based on data from 2019, the total cost for the Norwegian society was estimated to NOK 5.1 billion (Kristensen, Leino, & Pallesen, 2022). A Swedish study with similar method to the Norwegian, estimated the costs to be SEK 14.4 billion in 2018 (Hofmarcher, Gustafsson, & Persson, 2020). A more recent study estimated the costs in Sweden in 2021 to SEK 9.1 billion (Hofmarcher, Gustafsson, & Hjalte, 2022). (NOK 10 and SEK 10 ~ 1 EUR). The Swedish studies show a reduction to 2021, and the main reason is a large reduction in indirect costs from unemployment. In all three studies the costs were divided into direct, indirect, and immaterial costs. Examples of direct costs are those relevant for problem gambling such as treatment expenses, preventive and judiciary work, and research. Indirect costs represent losses from reduced production because of e.g., illness and death due to gambling. These reductions lead to reduced opportunities for consumption in a society. Indirect costs are calculated as the current value of future production loss. Immaterial costs are estimates for the value of suffering and burdens that lead to a decline in quality of life (Kristensen et al., 2022). An Italian study estimated the social costs from gambling harm, and the estimate was 2.3 billion Euro as consequences for the public finances in Italy in 2014 (Lucchini & Comi, 2022). The Italian study also referred to three other studies and pointed at considerable variations, because of variations in methodologies in the estimates between and within jurisdictions. In Australia (Victoria) the costs in 2014-2015 were estimated to 7 billion Australian dollar (Browne et al., 2017). A German study estimated social costs for Germany in 2008 to Euro 326 million (Becker, 2011). A study from the Czech Republic estimated the social costs to be between 542 and 620 million Euro (Winkler, Bejdová, Csémy, & Weissová, 2017). According to the Italian study, the Australian study had included all gambling severity levels (both the low- and moderate-risk gamblers in addition to problem gamblers) (Browne et al.,

2017) whereas the Italian study focused on high-risk gamblers. The German study did not include intangible costs such as stress and quality of life (Lucchini & Comi, 2022).

Because of the burden of harm for individuals (gamblers and affected others) as well as societies, there is a need for a public health and population approach to gambling and a policy which aims to restrict the exposure and access to the gambling forms which create most problems. There is also a need for available interventions which can help gamblers at risk or problem gamblers and also prevent relapses (Abbott, 2020a). Harms that affect the life course and last through generations are focus area under the public health domain. Within the gambling area, researchers often or up to now have used insufficient methodologies and focused on symptoms of gambling problems more than the wide scope on harm which is caused from gambling (Langham et al., 2016). This has restricted initiatives to focus on gambling from a public health perspective (Langham et al., 2016). It can be argued that the focus on harm from gambling seems to be more present in recent years, and hence the perspective of public health. A support for this assumption is found in a newer German review of both the individual and the population approach. The review points at findings in research and practice and conclude that there is an increasing acceptance of public health strategies within the gambling field when it comes to prevention (Meyer & Hayer, 2023).

1.1.4 Prevention

Prevention is an old concept. The Dutch philosopher, Desiderius Erasmus (1466 – 1536), expressed the statement "Prevention is better than cure". In 1796, the first vaccine (for smallpox) was introduced (Hage & Romano, 2010).

Two strategies

Geoffrey Rose, a physician, and epidemiologist presented two strategies for prevention. One was the individual or "high-risk strategy". The other was the population strategy (Rose, 1981, 2001). Rose (1926-1993) started his work around prevention of cardiovascular disease and his thinking was expanded to include other issues, e.g., behavioural and consequences for physical and mental health in society (Rose, Khaw, & Marmot, 2008). The two strategies for prevention stem from two different approaches. To illustrate the first approach, a concrete question is why some people get

an illness. For the second approach, the question is why some populations have more incidents of an illness than other populations. To answer these two questions, there is a need for different studies (Rose, 2001).

If these two strategies are applied within the field of gambling, the first question will be why some people become problem gamblers and the second question would be why there are more problem gamblers in one population compared to other populations. Providing answers to these two questions requires different studies and consequently different preventive strategies.

Both strategies have advantages and disadvantages. Among the advantages for the high-risk strategy is that the intervention is appropriate to the individual as it typically is tailored to his or her needs. One of the advantages with the population strategy is that the strategy can be radical. A radical approach denotes a social and political approach which confront root causes and aims to remove underlying impediments to healthier behaviour, or to control the adverse pressures. Among disadvantages of the high-risk strategy is that it is often temporarily and not dealing with the root of the problem since there always will be vulnerable individuals. One of the disadvantages of the population strategy is that the prevention in general offers little benefits to the individual (Rose, 2001). In terms of gambling specifically, the advantages of a high-risk approach will be that appropriate help, e.g., treatment or debt counselling is provided to the problem gambler. For the population approach it can be to radically limit the availability of games that causes gambling problems. One disadvantage with the high-risk strategy is that the causes of gambling problems in a population are not delt with. A disadvantage of the population strategy is that the benefits for the individual by limiting the availability of games, in general are perceived as limited for the individual gambler and may for some even be perceived as something intrusive and negative.

The prevention paradox

This concept, prevention paradox, is relevant in this regard, and has two different meanings, both having importance to prevention. The first paradox, which is a

challenge due to lack of motivation by the individual, implies that the population strategy of prevention can bring many positive outcomes for the population, but offers little benefits to the individuals in a particular population. For example, a driver seldom or never experiences a traffic accident, therefore drivers can think they never need a seatbelt, so why should they wear it? The same goes for other efforts to change types of problematic behaviour in the population (e.g., consumption of alcohol). An effort can be of great importance to the population, but for individuals it is not so clear that they will benefit from the preventative measure. Most people will not get alcohol problems. From this, one can expect poor motivation by the individual to the population strategy for prevention (Rose, 1981). The relevance to the gambling field can be found in regulatory measures which e.g., restrict availability to gambling opportunities whilst gamblers might see this type of regulation as irrelevant to them. The second meaning to the concept prevention paradox, is an argument for the use of a population strategy or a public health approach. Here, referring to incidents where negative consequences or problems from a certain behaviour is experienced by a larger group of individuals with a lower risk compared to a smaller group with a higher risk. The lower risk group is by number so large that the largest proportion of consequences or problems in a population will appear among this group and not the smaller group (Browne, Rawat, Tulloch, Murray-Boyle, & Rockloff, 2021). This prevention paradox will appear in studies of harm from gambling. Even if problem gamblers experience most harm, a larger proportion of harm can be attributed to the group of at-risk gamblers and non-problem gamblers. The reason for more harm in this group where there are no problem gamblers, is that here, the number of individuals is much larger (Abbott, 2020a).

Three levels of prevention

In 1964 Gerald Caplan published his text, Principles of Prevention Psychiatry (Caplan, 1964). He grouped prevention into three groups of methods. The first is *primary*, where the goal was to reach everyone in a population with messages and interventions. The main purpose with this approach was to stop problems before they occurred. Use of seatbelts and administration of vaccines are examples of such measures. With the next, *secondary* prevention, the purpose is to target specific groups at-risk for problems, e.g., youths where there can be risks for alcohol related problems. Other relevant examples

may be groups where problems have just appeared and are still small or show early signs only. The third method is *tertiary* prevention. Here, the purpose is to reach out to individuals who after a treatment can be vulnerable for relapses. All these three terms of types of prevention are still used (Hage & Romano, 2010). For the gambling field, examples of primary prevention can be information campaigns toward everybody in a country and changes in the regulation of games which are available for everyone (e.g. upper loss limits). For secondary prevention an example can be information campaigns targeting youth or certain parts the labour market where some characteristics at the workplace make the employees more vulnerable to gambling, e.g., work where games are more available (Revheim & Buvik, 2009). An example of the tertiary prevention is when regulation restricts gambling operators from sending promotional material to gamblers who have self-excluded because of gambling problems.

Based on Caplan (1964) and Rose (1981), it is evident that prevention can take place from an approach towards the individual or towards a population. The population doesn't have to be the whole society, but may comprise subgroups (e.g., certain age groups) as Caplan described for secondary prevention. For the gambling field the two approaches (Rose and Caplan), have similarities relevant for the concepts of responsible gambling and the public health approach.

The Reno model - responsible gambling

The Reno model was introduced as a response to social observers who to a larger extent perceived problems stemming from gambling as a public health concern. According to the Reno model, stakeholders in the gambling field should together address problems related to gambling. Among the stakeholders are gamblers, operators, health services and regulators. The authors, presenting the model, pointed at two barriers which prevented responsible gambling strategies to be implemented and evaluated. The first was the lack of clarity in defining gambling related harm. The second was the lack of consensus when it came to parameters of responsible gambling (Blaszczynski et al., 2004). An important principle for responsible gambling programs, was that the decision to gamble was taken by the individuals. However, the decision should be made with informed choices based on sufficient and correct information provided by the gambling

industry. Interventions towards the gamblers, which was not justified (e.g., time limits on gambling sessions) were seen as something that could increase problem behaviour and was thus deemed inappropriate to promote responsible gambling. The Reno Model also emphasized the need for a global body which could represent all relevant elements and stakeholders connected to the gambling field. The target should be to agree on definitions, terminology, and standardization of measures. The role of the global body should be to coordinate research in order to minimize the number of evaluation projects. Among relevant research topics were guidelines for the roles and responsibilities of the individual gamblers and the gambling operators, staff training, evaluation of measures for reducing harm, marketing, and promotion of gambling products, early prevention programs, development of measures to estimate the costs of gambling and severity of harm, health service needs, health-related impacts on gamblers and their families and consultation structures with service providers. The body should also assist in developing resources, e.g., player information, which can be used in primary, secondary and tertiary prevention (Blaszczynski et al., 2004). A review of RG literature (peer-reviewed publications, 1999–2015) identified five areas where research showed some or possible effect of responsible gambling measures. This concerned self-exclusion, monitoring behaviour, tools for limit setting, RG features implemented in games (e.g., warning messages) and staff-training (Ladouceur, Shaffer, Blaszczynski, & Shaffer, 2017).

An extension of the Reno Model, was introduced in an article about the model and its relationship with the concept of responsible gambling (Shaffer, Ladouceur, Blaszczynski, & Whyte, 2016). Among the shareholders with an interest and responsibility for responsible gambling are the gambling industry, regulators, treatment providers and the community. According to the extended Reno model, different interest groups are obliged to assess the program following its implementation. Regulators are responsible to determine if the RG elements are available and in use, researchers if they are effective and have an impact. The ethicists are obliged to determine if the program is in line with the values of the society.

Activities in an RG program can be implemented and managed at both a population and at the individual level. Relevant information to gamblers can be distributed widely and reach larger groups of gambling populations. Elements such as loss limits, self-exclusion and treatment are directed towards individuals or smaller groups.

A review of the model's core principles showed that RG programs not always followed the RENO model, sometimes ignoring evidence based on science. In most of the RG programs, only a few RG strategies had so far been included: e.g., pre-commitment, self-exclusion, evaluation of mental disorders and some evaluation of treatment. In planning of an RG program and treatment strategies, it was deemed necessary to define the gambler's or the client's needs and distinguish responsible gambling from irresponsible gambling and gambling related to other mental disorders (Shaffer et al., 2016).

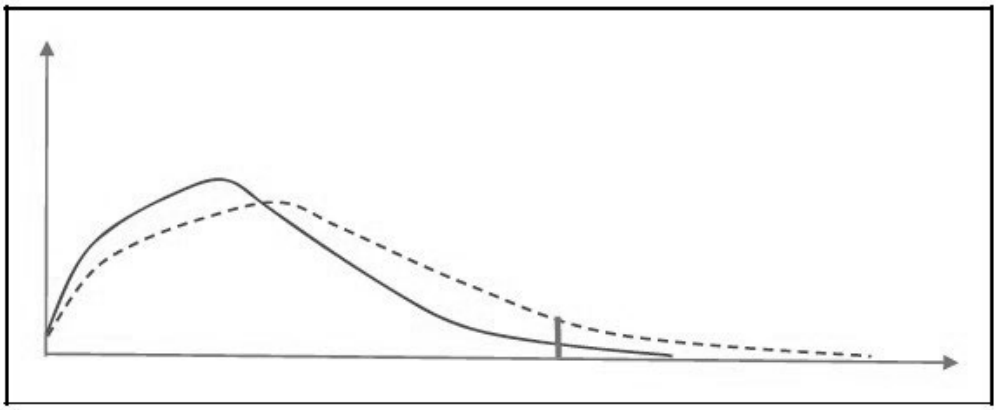
The Public health model

Under this model, prevention will mostly target groups in a society as described with Rose's population strategy and Caplan's primary prevention. A critical historical review of the international development of a public health perspective on gambling harm presents five strategies for a public health approach: 1) Health promotion, 2) Health protection, 3) Disease and injury prevention, 4) Population health assessment and 5) Health surveillance (Price, Hilbrecht, & Billi, 2021). In terms of health promotion, people are encouraged to follow a healthy lifestyle (Glouberman & Millar, 2003). Opposite to other public health strategies, the health promotion generally approaches individuals and is voluntary. When it comes to gambling, some of the responsible gambling measures can be seen as agents which promote a healthy lifestyle (Price et al., 2021). Examples are pop-up messages, voluntary self-exclusion systems and budget tools (pre-commitment). Regarding health protection, measures against gambling harm typically comprise regulatory measures (Price et al., 2021), examples can be age limits and mandatory registration with maximum loss limits and restricted availability of games associated with most harm. Prevention at the population level comes under the third strategy, disease prevention and harm minimization. One example is addressing harm from problematic behaviour. Secondary prevention is also

relevant with an approach towards those who are at risk of experience gambling harms (Price et al., 2021). An example of a preventive measure for an at-risk population of gamblers is the relatively recently developed guidelines for safer gambling (Hodgins et al., 2021). Population health assessment consists of data collection and analysis of health in a population. Reports from such analyses can serve as input to planning and policy making in the society. Examples are population based surveys on gambling problems in the general populations, which has been emphasized in the Norwegian governmental action plans (Ministry of Culture, 2012, 2015, 2018; Ministry of Culture and Church Affairs, 2005, 2009; Ministry of Culture and Equalitiy, 2022), where use of screening instruments such as the CPGI (Ferris & Wynne, 2001) may be administered. Health surveillance represent collection and analysis from health systems. In Norway data from the Helpline for problem gamblers and from the Norwegian Patient Registry are relevant examples. Another source can be player data from gambling operators. Many gambling companies monitor their customers behaviour continuously (Price et al., 2021).

The total consumption model

Because the total consumption model (TCM) encompasses the total population, the model is relevant to the public health approach. Originally, the model was established from studies of alcohol consumption which showed a strong association between total consumption in a population and prevalence of harmful consumption. The model is also relevant for gambling. A literature review of twelve studies who met the criteria for the review, identified eleven studies which showed a positive association of the population gambling mean and the prevalence of excessive or problem gambling. The criteria were continuous measures of gambling behaviour (e.g., proportion of income lost to gambling) and prevalence for excessive gambling. As an alternative to excessive gambling, the studies could instead report the prevalence of problem or pathological gambling (Rossow, 2019).



Reproduced in accordance with regulation by SAGE: Rossow, I. (2019). *The total consumption model applied to gambling: Empirical validity and implications for gambling policy.* Nordic Studies on Alcohol and Drugs, 36(2), 66-76.

The x-axis (horizontal) can here reflect gambling expenditures, and the y-axis the percentage of gamblers. The curves above illustrate two unimodal and skewed to the right distributions. The distributions differ from the normal distribution (bell shaped) curves because the individual consumer engages with different intensity. With a curve skewed to the right, there will be more gamblers who consume less compared to the number of gamblers who consume more. With only one peak (mode) in a curve it is unimodal, and it is skewed to the right because the median and the mean lie further to the right than in a normal distribution. A higher mean of consumption (more to the right than the median) comes from the fewer, but strongly engaged gamblers who increase the average (Sulkunen et al., 2018). The difference between the two curves above illustrates the differences for two populations. The first, with the solid line has a lower mean (average) than the second curve with the dotted line. The part of the population with excessive consumption is to the right of the vertical line and show that this part of the consumers is larger under the dotted than under the solid line where the mean was lowest (Rossow, 2019). From this model and the illustrative curves, all consumers e.g., gamblers are on the same curve from the left to the right. An implication from the model is that when the total mean for gambling behaviour (e.g., average loss) increases it will change the distribution of groups along the curve (e.g., small losers will be fewer and bigger losers will be more frequent).

A study which looked at four variables, systolic blood pressure, body mass index, and consumption of alcohol and sodium found independent associations between population mean and the prevalence of deviance for all four variables. An implication from this finding is that the population is collective responsible for its own health, and also for the health of the population's deviants (Rose & Day, 1990).

When validating the TCM for the gambling field, there are four issues to be aware of: 1) For alcohol, the model encompasses the drinkers, and the model doesn't cover a change in the proportion of drinkers. In a population, the percentage of gamblers are normally lower than for drinkers. 2) For alcohol there is no distinction in terms of type of alcohol, and different alcohol beverages still have the same effect when it comes to health consequences. For gambling, however, there are different risk factors for different games. 3) Studies have mostly looked at large populations, but subgroups of the population can also have differences in risk factors, e.g., for age and gender. 4) How skewed to the right the curve will be will differ between alcohol and gambling. Since a consumer can use more money when gambling compared to when drinking, the gambling consumption measured by expenditures can be relatively higher than the consumption of alcohol which sooner reach a limit in a given period of time, implying a larger dispersion of money spent on gambling than on alcohol (Sulkunen et al., 2018).

Findings from a study over 5 years in Victoria (Australia), where gambling availability increased, participation decreased and the prevalence of risk and problem gambling didn't change, suggested that the total consumption model is over-simplistic. Further suggestion is that for prevention to be effective, it needs to go further than gambling availability and also include interventions toward individual gamblers and other environmental factors which can influence individuals' susceptibility and gambling related harm (Abbott, Stone, Billi, & Yeung, 2016).

From the TCM there are both implications and consequences. The model imply that few gamblers have higher expenditures. If a policy with e.g., prevention through availability is implemented to reduce excessive gambling and the prevalence of

gambling problems, the number of these gamblers might be reduced but also the gambling revenue which affects beneficiary actors. According to this notion, several agencies obtaining income, taxes or funding from gambling (e.g., gambling industry, governmental institutions, voluntary and sport organisations) might thus have a reason to take a dim view on stricter regulation of gambling (Rossow, 2019).

An international study with self-reported gambling data from Germany (2010-2011), Québec 2012 and France 2013- 2014 (Fiedler, Kairouz, Costes, & Weißmüller, 2019), showed that problem gamblers spent much more money on gambling than recreational gamblers. Non-problem gamblers, problematic gamblers and pathological gamblers spent accordingly and annually in average €132, €253 and €3,100 in Germany, $492, $3,653 and $23,928 in Québec and finally €430, €4,200 and €13,424 in France. The different categories of gamblers were categorized from CPGI 0–2 or DSM-IV 0–2, CPGI 3–7 or DSM-IV 3–4, and CPGI>7 or DSM-IV > 4, respectively which represents different cut-offs to described earlier in this thesis. However, the point is that more symptoms of problem gambling correlate with higher spending. The ones that are high spenders contribute relatively more to the gambling providers, but studies show that high spenders also often are problem gamblers. Even if the share of problematic and pathological gamblers (CPGI 3+ or DSM-IV 3+) is relatively small, the share of gambling revenue in the abovementioned study was calculated to 32% in Germany, 31.6% in Québec and 40.2% in France (Fiedler et al., 2019). Earlier, we have seen that there are different types of social costs which in total add up to considerable costs for societies, also a Norwegian study which estimated social costs from gambling to NOK 5.1 billion showed that low and moderate risk gamblers had higher expenditures than gamblers without any risk but lower expenditures than problem gamblers (Kristensen et al., 2022). Measures which can reduce the level of problem gambling will also reduce social costs and can from this been seen as positive measures for public health (Fiedler, Kairouz, & Reynolds, 2021).

The Reno model (responsible gambling) seen from the public health position

The Reno model has been criticized, among others for placing to much responsibility on the gambler on basis of the individual gambler's personal informed choice.

Delimited, the model also emphasizes treatment programs for problem gamblers. For a long time, the model internationally, has had an large impact on responsible gambling policies (Hancock & Smith, 2017). Focus on responsible individuals and problem gamblers has moved the regulatory attention away from the games which create harm, the wider groups affected by gambling harm and a broader or stricter approach to prevention which could have reduced the games' availability (Hancock & Smith, 2017; Wardle, Reith, Langham, & Rogers, 2019). The Reno Models' focus on evidence and research has also been criticised. It has been argued that an implementation of measures which can affect the gambling business negatively will be met with stronger demands for evidence than less extensive responsible gambling measures supported by industry. Gambling research, often funded by the industry has also focused on individuals and problem gamblers which reduce the attention to other parts of the wide gambling complex (van Schalkwyk et al., 2021). As an alternative to the Reno Model, a new model is proposed which change focus from the self-regulated and self-monitored codes of practice to a broader attention on power, interests, public health, gambling companies' duties to care for their customers, regulatory openness and independent research (Hancock & Smith, 2017). When introducing new and more effective measures to prevent gambling problems, it is possible to learn from existing areas of public health, also from gambling. For example, changes in regulatory requirements towards physical electronic gambling machines in Australia, Norway and UK (Livingstone & Rintoul, 2020).

The public health approach seen from the Reno model side

Opposite to what some of the critics of the Reno model express, the Reno model is a complementary approach to public health, where both the Reno and the public health models seek to stimulate responsible gambling and to reduce the harm from gambling (Shaffer, Blaszczynski, & Ladouceur, 2020a). It is argued that some of the critics of the Reno model do not differ between strategical and tactical measures. The public health approach represents a more general strategy to prevent and reduce harm from gambling. The Reno model includes tactics for more specific measures that can be used to reach the goals in the public health strategy. Four principles, important to the public health model, are scientific research as foundation for knowledge, knowledge from

observations in a population, proactive health initiatives and the consideration of both costs and benefits of gambling. The first principle, that research should be based on scientific principles is challenged for many reasons: Both anti- and pro-gambling advocates can claim research or the use of it to be biased. Research should focus on both costs and benefits from gambling and the research on gambling disorder should be developed so that treatment and prevention could be more effective. The second principle relates to epidemiological research which has found certain groups in various populations to be more vulnerable to develop gambling problems (e.g., youth and groups with lower income), and these groups should be investigated to identify the external and internal factors that affect the vulnerability. The third principle which comprises proactive public health strategies, can have several goals, where one is to reduce harm for vulnerable groups. The strategy should then be to implement harm reducing measures instead of trying to completely remove gambling related problems. Two examples of such measures are healthy gambling guidelines and a system for early detection of gambling problems. In terms of the last principle, most of available studies have not focused on the positive effects from gambling as improved health for individuals or positive benefits for societies (Shaffer et al., 2020a).

Most of the authors behind the Reno model (Collins et al., 2015) have together published an article on how three moral perspectives, which more than empirical evidence, seem to influence gambling policy. It is argued that scholars must be neutral, and not take sides on how people should live their lives and how societies should regulate gambling. For prohibitionists, gambling is so harmful, that it ideally should be banned. From this, the concept ‘‘responsible gambling’’ are two words which don’t fit together. Opposite to this, the libertarians say that individuals should be free to gamble as much as they want if they don’t harm others. The regulation of gambling should be up to the individual and not the authorities. The restrictivists, which are somewhere in between, believe gambling should be legal, but restricted in different ways. Restrictivists typically think gambling can create more harm than other leisure activities, and that restrictions can lead to responsible gambling by the individuals. Arguments appear when moral values conflict. Two examples will be a government’s respect for freedom of choice vs. a demand for consumer protection and gambling

companies' legal right to maximize profit vs. the moral refusal of accepting profit from destroyed lives from gambling. When researchers contribute to decision making on responsible gambling they should present their empirical findings, make clear the issues and what views they stem from by pointing out and distinguish the empirical facts from moral and political views (Collins et al., 2015).

The Reno model and public health

For three of the five strategies in the public health approach, health promotion, health protection and disease prevention / harm minimization it is shown that responsible gambling measures for the gamblers to use, implemented by operators and/or authorities are relevant (Price et al., 2021). The results from a metanalysis on pop-up messages showed that the measure had moderate effect, and it was argued that the results were encouraging for the public health, but also for the Reno model (Bjørseth et al., 2021). In an article (Abbott, 2020b) which examines some of the authors of the Reno models' responses (Shaffer, Blaszczynski, & Ladouceur, 2020b) to a call for a more effective public health approach to gambling (van Schalkwyk, Cassidy, McKee, & Petticrew, 2019) it is argued that even if the Reno Model's focus is not restricted to individuals only, many of the measures for responsible gambling focus on the individual and might have low efficacy. However, the conclusion is that the Reno model and its' responsible gambling measures can contribute to a regulatory and public health approach. High efficiency measures, and the Reno models' view on evaluations could contribute to reduce harm from gambling (Abbott, 2020b).

1.2 Aims

The overall thesis' aim is to investigate beliefs in, actual use of and effects of measures to reduce gambling problems and negative consequences from gambling. Many of such measures are referred to as responsible gambling measures or tools (RG) (Blaszczynski et al., 2004) and more recently also consumer protection tools (CPT) (Gainsbury et al., 2020).

Here I differentiate between two types of perspectives. The first is the gamblers perspective, and the corresponding research tasks are to investigate to which degree

measures implemented by authorities, operators or set by the gamblers themselves, are assessed as helpful by the gamblers. Further, it is relevant to investigate if tools available for the gamblers to set personal restrictions are actually used. It will also be analysed if it is a relationship between having positive beliefs in such tools and the actual use of them.

Many of the tools which the gamblers can use are mandatory for operators to make available for gamblers, and as such it can be said to be implemented by the authorities. Still, it is often down to the gamblers to decide if they want to use these tools.

The second perspective concerns the impact of overarching market regulatory decisions, specifically two regulatory changes of the gambling market. Especially the first, the ban on slot machines in 2007 with the replacement of new VLTs in 2009, can be seen as a measure from the authorities to reduce gambling problems. The old slot machines had no measures to prevent gambling problems whilst the VLTs that were introduced were equipped with several RG /CP measures. The second change, the introduction of regulated online casino – bingo and - scratch games can be viewed as a measure to channelise gambling activity from the foreign operators to regulated games with several measures to prevent gambling problems. Here, the main question is what happens with gambling participation in a market when a game is removed and when a new group of games is introduced. The effects will be operationalized in terms of changes in gambling participation.

1.2.1 Aims of Study 1

The topic of this study was to investigate to what degree gamblers believe that different measures to reduce gambling problems or the negative consequences of gambling will help them (actually or hypothetically) to control their own gambling. Several independent variables were investigated to identify predictors for the beliefs in these measures.

Study 1 had two research questions:

1) What are the beliefs among gamblers about how RG or CP measures can help to control their gambling?

2) Which variables contribute to explain how the beliefs vary between gamblers?

1.2.2 Aims of Study 2

The topic of this study was to see if changes in a gambling market would lead to changes in gambling behaviour. Two changes were investigated. First, a ban of slot machines in 2007, where new gambling terminals were introduced in 2009. Secondly, to investigate if the introduction of regulated interactive online games (casino, bingo, and scratch games) in 2014 affected gambling behaviour.

Study 2 had two research questions:

1) Have regulatory changes for specific games or game categories led to changes in participation of other or similar games?

2) Have changes for some specific games led to changes in the total consumption of gambling and is there a relationship between total consumption and indicators of problem gambling?

1.2.3 Aims of Study 3

Whilst Study 1 investigated if gamblers believed that different measures would help them to control their own gambling, Study 3 investigated the actual use of such measures among gamblers.

Study 3 also had two research questions:

1) To what extent do gamblers use measures to help them to control their gambling behaviour?

2) What can predict the use of such measures when controlling for other relevant predictors / independent variables?

2. Methods

2.1 Measures

2.1.1 Measures of Study 1

Gambling participation

In this study the respondents were asked if they had participated in money games (yes or no) during the last twelve months. Money games were defined as games with monetary stakes where results from an event or a draw could lead to monetary prizes.

Demographics

The respondents were asked about gender, age, and place of birth. For gender the response alternatives were female or male. For age, the respondents were asked to provide their exact age. For place of birth, eight response alternatives were provided: Norway, the other Nordic countries, Europe outside the Nordic countries, Africa, Asia, Oceania, North America and South- and Central America.

Games played

Covering all available games in the Norwegian gambling market, the respondents were asked if they had participated in: Number games, pools, betting, horse racing, bingo, bingo machines, scratch cards, private games (e.g., poker games with friends), online casino, VLTs, games on ships (slots and table games), and online poker. In addition to the Norwegian regulated games, the respondents were also asked if they had played games offered on websites belonging to foreign operators. The respondents confirmed if they had participated or not by answering for each game the alternative reflecting their yearly gambling spending (none/not gambled, NOK 1-1,000, NOK 1,001-5,000, NOK 5,001-10,000, NOK-10,001-25,000 and more than NOK 25,000) (10 NOK ~ 1 Euro). The questions were only answered by those who initially confirmed that they had gambled during the last 12 months. Those who confirmed gambling were also asked if they had gambled online. Four dichotomous variables were constructed regarding the characteristics of the games: Low risk games only vs. medium/high risk

game participation, random games only vs. skill game participation, game spending (low vs. high) and online gambling (no vs. yes).

Canadian Problem Gambling Index (CPGI)

The CPGI was used to measure gambling problems in the Norwegian population and among gamblers. CPGI consists of nine items related to gambling the last twelve months. Five items measure problematic gambling behaviour and four measure consequences from gambling. All nine items are scored on a scale ranging from 0 (never) through 3 (always). By this, the composite score for each gambler varies from 0 to 27. The respondents are divided into four groups: Non-problem gamblers (composite score 0), low risk gamblers (composite score 1 and 2), moderate risk gamblers (composite score 3 through 7) and problem gamblers (composite score 8 or more) (Ferris & Wynne, 2001). In this study the gamblers were divided into two groups: No problem/low risk gamblers and moderate risk/problem gamblers. Among the gamblers (n=9,066), the percentage of moderate risk and problem gamblers was 5.2%. Cronbach's alpha for the CPGI was .89. Cronbach's alpha above .70 are considered acceptable and values above .80 are preferable (Pallant, 2016), although this also depends on the number of items (Cortina, 1993).

Mini-International Personality Item Pool (MINI-IPIP)

MINI-IPIP has 20 items which measure the main dimensions of the five-factor model of personality. Each dimension has four items (Donnellan, Oswald, Baird, & Lucas, 2006). The respondents answered on a scale from 1 (very inaccurate) through 5 (very accurate). Neuroticism (N) is one of the factors, where being sad and scared is at the high end of the factor in contrast to calm and stable at the other end. Extraversion (E) reflects being warm, outgoing, and cheerful in contrast to being reserved, solitary and somber. Openness to experience (O) describes being imaginative, curious, and having exploratory tendencies, opposite to being rigid, practical and traditional. The factor Agreeableness (A) measures if respondents are generous, honest, and modest versus being selfish, aggressive and arrogant. The last factor, Conscientiousness (C) reflects being hardworking, purposeful and disciplined versus being laid back, unambitious and weak willed (Boyle, Matthews, & Saklofske, 2008). Among the gamblers, the

Cronbach's alpha for the sub-scales Neuroticism, Extraversion, Openness, Agreeableness and Conscientiousness were .67, .79, .66, .71 and .67, respectively. Lower alpha values are common to find when there are few items in a scale (Cortina, 1993; Pallant, 2016).

Impacts from gambling advertising

Nine items measured if gambling advertising had an impact on the gamblers. Five items were adopted from the Effects of Gambling Advertising Questionnaire (EGAQ) (Derevensky, Gupta, & Messerlian, 2007). Four new items were added, where two were related to knowledge about gambling opportunities, another measured change in gambling behaviour due to advertisement, and the last was related to attitude towards gambling because of advertisements (Hanss, Mentzoni, Griffiths, & Pallesen, 2015). Each item is scored from 1 through 4 (i.e., strongly disagree through strongly agree). A total composite score was created (adding the score on each item divided by the number of items). Cronbach's alpha for the nine items was .76.

Belief in responsible gambling (RG) / consumer protection measures (CP)

The gamblers' beliefs about RG /CP measures were investigated by ten items. The items were based on existing measures or features which already existed in some gambling markets, e.g., that prize money go directly to a bank account and are not directly available for further gambling (Mentzoni, 2013). The items were also based on an article that investigated gamblers' view on potential RG measures (Gainsbury, Parke, & Suhonen, 2013). The ten items covered measures that were available in parts of the Norwegian gambling market. There were five response alternatives for each item. The gamblers were asked to which degree they agreed that these measures would help them to regulate their own gambling consumption: Totally disagree, disagree, neither agree nor disagree, agree, and totally agree. Ranging from 1 (totally disagree) through 5 (totally agree), a total score was calculated by adding the scores from each item divided by ten. The higher score, the more positive beliefs about the measures. The mean total composite score was 2.98 (*SD* =1.12) and Cronbach's alpha was .96. The items were subjected to an exploratory factor analysis (principal component) showing support for a one-factor solution based on Kaisers' criterion. The factor

explained 74.7% of the variance and the factor loadings varied between .75 and .90. Only respondents who had gambled the last 12 months answered these ten items. Therefore, the data only comprised gamblers.

2.1.2 Measures of Study 2

Gambling participation

Also here, the respondents were asked if they had gambled or not for each available game in the Norwegian market. Games offered by foreign operators were included. If the respondents confirmed to have participated in minimum one game e.g., betting, casino games or number games, they were categorized as gamblers under the general variable, gambled or not. Because they were deemed to have a low "gambling factor", raffles without money prizes and a bottle recycling lottery, were not included. The survey included games on ships in traffic between Norwegian and foreign harbours from 2011 and these games were thus included in the general gambling variable. Number games, e.g., Lotto, are the most popular games in Norway and have the highest participation rate. A national prevalence study in 2015 showed that 77% of gamblers took part in number games at least once during the last 12 months (Pallesen, Molde, Mentzoni, Hanss, & Morken, 2016b).

Among the more specific variables, one variable was constructed for gambling or not on land-based slot machines or VLTs (video lottery terminals, called Multix) outside bingo premises. The VLTs were in Study 2 named as IVTs Multix. The change in terminology from IVTs (interactive video terminals) is made because the term VLT is the most used term for this game type. To be a gambler under this category, the respondents confirmed to have gambled on land-based slot machines the last twelve months in the survey period from 2005 through 2007 (banned in 2007), or on VLTs (introduced from 2009). Another variable was gambling on games in land-based bingo premises. The respondents who confirmed that they participated in at least one game available in bingo premises (i.e., traditional bingo, bingo machines, side games and slot machines or VLTs located in bingo premises) were categorised as gamblers in such premises. A third specific variable was gambling or not on games on foreign websites. These games offered by foreign operators comprise mostly of casino games, poker, and

sport betting, but also bingo, scratch games and horse racing. Respondents who answered that they gambled on online games with foreign companies were categorised as gamblers under this variable. The last specific variable was gambling or not on online interactive games. The gamblers could have participated on such games offered by foreign operators from 2005 through 2018, and/or with the Norwegian operator from when the regulated games were launched in 2014. To be regarded as a gambler under this variable, respondents had to confirm that they gambled on online bingo, online slot machines or online table games (not poker), online scratch games or similar games.

Demographic

The demographic variables were gender and age. In the total weighed sample, 50.3% were female and 49.7 male (*N*=28,251). By age, 4.0% were under 18 years, 11.2% were 18-24 years, 24.7% were 25-39 years, 33.4% were in the group 40-59 years and 26.6% were 60 years or older, respectively.

Time

There were two time-variables. The first was year and continued from year 0 (2005) through year 13 (2018). Each level comprised one year. The second was categorical and reflected three epochs, Epoch 1 (2005 through 2007), Epoch 2 (2008 through 2013) and Epoch 3 (2014 through 2018). In the analyses, the second (Epoch 2) was set as the contrast to both Epoch 1 and 3.

2.1.3 Measures of Study 3

Gambling participation

The items / questions are the same as for Study 1.

Demographic

The sample was drawn from the National Population Registry of Norway and data on gender and age for each participant were provided from this registry. For the third demographic variable, respondents were asked about place of birth and the eight alternatives were the same as in Study 1. The data on place of birth were used to construct dummy variables (born in Norway, born outside Norway either in Europe,

North America or Oceania (Western countries), born in Africa, Asia, South or Central America (non-Western countries).

Games played

Same instrument as for Study 1. Deposit bottle lottery was a new item.

Canadian Problem Gambling Index (CPGI)

Same instrument as for Study 1. Among the gamblers (n=5,850) the prevalence of moderate risk or problem gamblers was 7.0%. Cronbach's alpha for the CPGI was .91. As mentioned for Study 1, Cronbach's alpha above .70 are considered acceptable and values above .80 are preferable (Pallant, 2016).

Impacts from gambling advertising

Same instrument as for Study 1. Cronbach's alpha for the nine items was .82. For the analysis, the composite score was divided by median or nearest value into two groups, lower composite score, and higher composite score.

Belief in responsible gambling / player protection measures

Same instrument as for Study 1. Cronbach's alpha for the nine items was .95. For the analysis, the composite score was divided by median or nearest value into two groups, lower composite score, and higher composite score.

Gambler's use of measures to regulate their gambling behaviour

By six items it was measured if the gamblers had used external tools or features in the games to regulate their gambling (e.g., had set amount limits in games low enough to not gamble more than one could afford or had set a temporary break in one or more games). In addition, one item measured if the gamblers had contacted help services because of gambling problems. Another item measured if the gambler had let others control his or her finances because of gambling problems. For each item the respondents could answer: "No", "yes – during the last year", or "yes – but a longer time ago". In this study, the two last categories were merged into one. In this way the eight variables were dichotomized (never used the measure vs. used the measure at least once).

2.2 Samples and procedures

2.2.1 Sample and procedure of Study 1

Participants and sample

The quantitative survey data stemmed from Norwegian prevalence studies conducted by the University of Bergen (Pallesen, Hanss, Mentzoni, Molde, & Morken, 2014; Pallesen et al., 2016b). The data were collected during the autumns of 2013 and 2015. In all, 38,000 persons (24,000 in 2013 and 14,000 in 2015, gross sample) aged 16 through 74 years were randomly selected from the National Population Registry of Norway and then invited to take part in the survey. First, a letter was sent by postal mail, and the respondents were invited to answer to a paper-based survey. In 2013 a subgroup of the participants could also answer through a web-based survey. Two reminders were sent out. In total, the two surveys received 15,566 valid answers (net sample). The final response rate was 42.6% (43.6% in 2013 and 40.8% in 2015). Data were weighted for age, gender, and place of residence (county) in Norway.

In the weighted data, 57.8% had gambled the last 12 months, 54.8% of the women (*n* = 7,624) and 62.4% of men (*n*=7,934). Between the age groups, the gambling rate was lowest among the youngest (16-25 years: 39.2% (*n* = 2,780)). Older age groups had higher percentages of gambling participation, 26-35 years: 60.2% *(n* = 2,809), 36-45 years: 61.4% (*n* = 3,035), 46-55 years: 63.7% (*n* = 2,836), 56-65 years: 66,7% (*n* = 2,451), and 66-74 years: 63.4% (*n* = 1,646). A total of 54.2% of the gamblers were male and the average age among gamblers was 45.3 year, *SD*=15.2 (*n*=9,129).

Procedure

The gamblers were categorised according to how high a risk their games had in terms of leading to gambling problems. The variable was dichotomized into low-risk games only or higher risk if the gamblers had played at least one game with higher risk (i.e., medium, or high). An assessment tool (Gamgard) categorises and divides games into very low, low, medium, high, or very high risk, respectively. By using Gamgard, we considered ten game characteristics with regards to which degree different games contribute to developing gambling problems, e.g., event frequency (time from buying a game, getting the result (lose or win) and then buy the same game again) and

availability (e.g., having to travel to gamble or gambling online) (Gamgard, 2018). Gamgard also comprises four RG features that reduce the risk, e.g., monetary budget tools (Gamres, 2018). For this study, these latter features were not included. In all 24.0% had played low risk games only (very low or low) and 76.0% had participated in at least one medium- or high-risk game (medium, high, or very high). The games are mentioned below. Only number games, pools and a deposit bottle lottery were categorized as low risk games and all other games were categorized as higher risk (medium or high). Since different games in one game category (in the questionnaire) can have different risks, and the questionnaire didn't specify all games within one category (e.g., for horse racing), the game type was consequently categorized as medium/high risk.

In another variable, the gamblers were grouped according to whether they had participated in at least one skill based game or random games only. If the gamblers can increase the chances to win because of skills / knowledge, it is a skill-based game. The skill-based games were pools, betting, horse racing, online poker, and private games such as poker among friends. The non-skill or random games were number games, deposit bottle lottery, bingo and bingo machines, scratch cards, online casino, video lottery terminals (VLTs), and games on ships (slots and table games). Online casino and games on ships were categorised as random because the questions about these games did not differentiate between skill and non-skill games. Inn all, 64.5% of the gamblers had taken part in random games only, whereas 35.5% had participated in at least one skill game.

Gamblers were also allocated into two groups based on money spent. Those who spent more than NOK 5,000 (~ €500) on at least one game type within the last 12 months were labelled as high spenders (comprising 11.1% of the gamblers). Those who gambled for less in every game (88.9%) were labelled as low spenders.

Further, the gamblers were asked how often they used the following four electronic devices for gambling: Stationary computer, lap-top, tablet, or mobile phone. For each device, the response alternatives ranged from never to daily. An online gambler was

defined as someone who had used one of the four devices during the last 12 months and 58.4% were categorised as online gamblers, and 41.6% were categorised as only land-based gamblers.

2.2.2 Sample and procedure of Study 2

Participants and sample

Data used for this study were collected based on Norwegian population samples (15 years and older) during 2005 through 2018. The data was used to predict if participation in gambling had changed over the period. On behalf of the Norwegian Gambling Authority, the data were collected through semi-annual surveys conducted by an external research company. Phone interviews, landline and mobile, were used for these surveys. Most survey questions were unchanged during the whole period (see next paragraph). This enabled the merging of all the data into one dataset with about 28,000 respondents.

Due to changes in the gambling market in the period from 2005 through 2018, some questions about certain games have been removed or added. Except for these changes, there had not been any changes in terms of format, survey description, inclusion/exclusion criteria of participants or other aspects of the surveys. Because of procurement rules, a total of three external companies had conducted the surveys, without changing the method, questions, or procedures. Mobile phones have gradually taken over for land-line phones, therefore the number of mobile phone respondents increased over the years. In June 2005, the percentage of mobile phone users was 29.1%. In December 2018, the corresponding percentage was 92.6%. The samples for land-line phone numbers were selected randomly from a database with land-line phone users. The samples for mobile phone numbers were selected randomly from series of phone numbers kept by the Norwegian Communication Authority.

Response rates in surveys have in general decreased over the years, also for surveys conducted over the phone (mobile or land based). An example from the US illustrates this. A typical survey from Pew Research Centre decreased in contact rate from 90% in 1997 to 62% in 2012. For the same period, also the cooperation rate decreased (contacted persons who agreed to participate), from 43% to 14%. Hence, the overall

response rate for the period was reduced from 36% to 9% (Dillman, Smyth, & Christian, 2014). For most of the years, the exact response rates for the data used in Study 2 was not reported. However, the contact rates for the June 2010 survey and the June 2020 survey were accordingly 56% and 32%. The cooperation rates were 19% and 13%, respectively. Hence, the overall response rate then amounted to 10% and 4% when the persons never reached were taken into consideration. The survey in 2020 had a similar cooperation rate to the typical rate mentioned above in 2012. Overall response rate was lower. To match the demography of the adult Norwegian population, the data for Study 2 were weighed for age, gender, and place of residence (county).

For this study we included data for gender and age. In the total weighed sample (*N*=29,281) 76.3% had gambled at least once during the last 12 months. Females comprised 50.3% and males 49.7%. Divided by age, 4.0% were below 18 years, 11.2% were in the age group 18-24 years, 24.7% were in the group 25-39 years, 33.4% were in the group 40-59 years and 26.6% were 60 years or older, respectively.

Procedure

To address the research questions, the gamblers were allocated into five groups. One variable was general (gambled on one or more game types vs. not gambled at all). In addition, four other specific gambling categories/variables were made: 1) If gambled or not on land-based slot machines or VLTs, 2) If gambled or not on games in land-based bingo premises, 3) If gambled or not on foreign websites, and finally, 4) If gambled or not on interactive online games (excluding online poker). The games or game groups for the four specific categories reflect games with similar characteristics to the slot machines which were banned in 2007 or the online interactive games which were introduced in 2014.

Except for two small trial licenses which ceased in 2005, foreign operators were alone to offer online interactive games until 2014, when such games were introduced to the regulated market by the Norwegian monopolist, Norsk Tipping. The fourth specific variable thus reflect participation in such games before and after 2014.

2.2.3 Sample and procedure of Study 3

Participants and sample

Study 3 is based on quantitative data from a Norwegian prevalence study conducted by the University of Bergen (Pallesen et al., 2020). Data were collected in the autumn of 2019. A random selection of 30,000 persons (gross sample) aged 16 through 74 years were drawn from the National Population Registry of Norway. First, a letter was sent by postal mail where the invitation was to respond to a web-based survey. After that, two reminders were sent. The reminders included the possibility to answer on a paper-based questionnaire that was enclosed (together with a pre-paid return envelope) with the reminders. In all, 9,248 valid answers (net sample) were received, and after reducing the gross sample for persons with wrong addresses, illness, deaths, etc., the overall response rate was 32.7%. Data were weighted for age, gender, and place of residence (county) in Norway.

In the weighted net sample, 63.6% had gambled the last 12 months, 60.2% of the women (n = 4,742) and 67.1% of men (n=4,506). Between the age groups, the gambling rate was lowest among the youngest respondents (16-25 years: 50.1% (n = 1,730). Older age groups had higher rates of gambling participation, 26-35 years: 64.1% (n = 1,806), 36-45 years: 66.7% (n = 1,644), 46-55 years: 68.2% (n = 1,628), 56-65 years: 67.4% (n = 1,401), and 66-74 years: 67.7% (n = 1,039). Among the gamblers 51.5% were male and the average age was 44.3 year, SD=15.9 (n=5,878).

Procedure

Since the construction of variables mentioned here followed the same procedure as for Study 1, it is referred to Study 1 for a more detailed description of the procedure regarding variable construction/operationalization.

One variable comprised if the gamblers had played low risk games only or if they had played games with higher risk (i.e., medium, or high). All the games are mentioned in Study 1, except deposit bottle lottery which was added to Study 3. Number games, pools and the deposit bottle lottery were categorized as low risk games and all other games as higher risk (medium or high) games.

Another variable comprised if the gamblers had played at least one skill based game or random games only. The gamblers were also divided into two groups based on money spent. Finally, an online gambler was defined as someone who had participated in money games online at least once during the 12 last months.

2.3 Statistical procedures

2.3.1 Statistical analysis in Study 1

The dependent variable comprised the composite score of ten items which were answered by the gamblers regarding their beliefs in the usefulness of ten specific RG or CP measures. Results from the ten questions are presented as frequencies or means and standard deviation. The correlations between all study variables were investigated. A rough guideline to interpretation of correlations suggests small correlations when r=.10 to .29, medium correlations when r=.30 to .49 and large correlations from r=.50 to 1.00 (J. Cohen, 1988). The data was analysed with a multiple regression analysis. Missing data was deleted pairwise. Independent variables comprised gender (women=0, men=1), age, place of birth (outside Norway=0, Norway=1), game risk (middle/high=0, low=1), game type (at least one skill game=0, random only=1), game spending (low=0, high=1), online gambling (no=0, yes=1), being a moderate risk/problem gambler (no=0, yes=1), Extraversion, Agreeableness, Conscientiousness, Neuroticism, Openness to experience, and self-reported impact from gambling advertisement. To ensure no violation of the assumption of normality, linearity, multicollinearity and homoscedasticity, preliminary analyses were conducted.

2.3.2 Statistical analysis in Study 2

Five different dichotomized (no=0, yes=1) dependent variables were included, each reflecting different aspects of gambling participation: Gambled or not on: 1) any available game, 2) land-based slot machines or ITVs Multix, 3) games in land-based bingo premises, 4) games offered from foreign web sites and, 5) online interactive games, but not poker. The study variables are presented in terms of frequencies or means and standard deviation. The data were further analysed with logistic regression analyses adjusted for different variables. The independent variables comprised year

(2005=0, 2006=1, …. 2018=13), epoch (2005-2007, 2008-2013 and 2014-2018, where 2008-2013 comprised the reference), gender (female=0, male=1) and age. In the first block, all independent variables were entered simultaneously, but without interaction terms. In the second block the interactions between year and epoch were added, and in the third block also the interactions between year and age, year and gender, epoch and age and epoch and gender were included. To assess the explained variation of the different regression models, Nagelkerke R-square was used. Potential multicollinearity between Time (year) and Epoch (1, 2, 3) were investigated. The variance inflation factor (VIF) came all out below 10, which is regarded as a threshold for problematic collinearity (Mason & Perreault, 1991).

2.3.3 Statistical analysis in Study 3

As for the Study 1 and 2, the results are presented in terms of frequencies or means and standard deviations for all variables. Further, a cross-tabulation was conducted, and the use of measures was investigated towards each independent variable. The results were presented in terms of percentages, chi-square values and phi or Cramer's V (effect sizes). Phi values and Cramer's V values indicate the strength of the predictors on the dependent variable. For the phi values, 0.1 is regarded as a low effect, 0.3 as a medium effect and 0.5 as a strong effect, respectively. For Cramer's V (with three degrees of freedom), 0.06 is regarded as a small effect, 0.17 as a medium effect and 0.29 as a strong effect, respectively (Kim, 2017). The personal regulation of gambling behaviour was measured by eight items which comprised the dependent (dichotomized) variables. Because of their substantial content specificity (not being a reflective scale), these variables were analysed separately with logistic regression analyses. Missing data was deleted pairwise. Independent variables comprised gender (women=0, men=1), age, dummy coding of place of birth (outside Norway in a western country=1, Norway and non-western countries=0 ; outside Norway in a non-western country=1, Norway and other western countries=0), game risk (middle/high=0, low=1), game type (at least one skill game=0, random games only=1), game spending (low=0, high=1), online gambling (no=0, yes=1), being a moderate risk/problem gambler (no=0, yes=1), and a dichotomised score for self-reported impact from gambling advertisement and for

beliefs about RG measures (based on median split into low and high). To ensure no violation of the assumption of multicollinearity, preliminary analyses were conducted.

3. Results

3.1 Results of Study 1

The gamblers did not very often have a strong opinion about the RG or CP measures. In terms of whether the measures would help the gamblers to regulate their gambling consumption, between 35% to 42% neither disagreed nor agreed. A comparison of the frequencies for all 10 items showed that for those with an opinion (who agreed or totally agreed compared to those who disagreed or totally disagreed), they more often agreed than disagreed. However, a comparison among those who only answered they totally agreed or totally disagreed showed that more gamblers totally disagreed. To find the most valued RG /CP measure (based on the 1-5 scale), a one-way repeated ANOVA was used. Overall, there was a significant difference in terms of how the mechanisms were valued ($F_{9,65194} = 183.1$, $p < .001$; Greenhouse-Geisser correction). Bonferroni-corrected post hoc tests revealed that the most valued mechanism was the item "Prior to gambling, I can set a loss limit in the game". This item was valued significantly higher than the other nine items ($p < 0.001$). The item "Continuous feedback from the game regarding my losses", was valued significantly higher than seven other items ($p < .001$ - $.005$). The item "The game has predefined limit for losses", was valued significantly higher than six other items ($p < .001$). The total average score summarized across all ten mechanisms was used in the further analyses. Gamblers' view was deemed as positive when they agreed that the RG measures would help them. When they disagreed, the view will be expressed as negative.

Many of the independent variables had significant zero-order correlations with the gamblers' view on responsible gambling measure. No significant correlation was found between view and game type (random only or at least one skill game), gambled online/land-based, and Extraversion. The strongest zero-order correlations with beliefs about RG /CP measures were found for age (r=-.19) and for self-reported impact from gambling advertisement (r=.15).

Based on the regression analysis, it was found that the predictors explained a total of 7.1 % of the variation of the dependent variable "Beliefs about RG measures".

Out of fourteen independent variables, eleven were significant predictors of beliefs about RG measures. The three that didn't reach significance were Place of birth, Gambled online/land-based and the personality trait Conscientiousness. The total regression model was significant ($R^2 = .071$, $F_{14,8261} = 44.901$, $p < .001$).

The strongest predictors were age and self-reported impact from gambling advertisement. Older gamblers assessed the mechanisms less positive and the gamblers who self-reported strong impact from gambling advertisement assessed the mechanisms more positive. When it came to gender, females had more positive beliefs than males.

High spenders had a more negative belief than low spenders. Moderate risk or problem gamblers had more positive beliefs than non-problem/low-risk gamblers. Those who played low risk games only had a more negative belief than those who at least gambled on one medium/high risk game. Those who played random games only had more positive beliefs about the measures than those who were involved in skill-based games.

Of the personality factors, four of five were significant. The three which were positively associated with beliefs about the consumer protection measures were Agreeableness, Openness to experience and Neuroticism. The one which was negatively associated with the belief was Extraversion.

3.2 Results of Study 2

From 2005 through 2018 a reduction in participation was found for two of the five variables examined. The clearest reduction was found for land-based slot machines and VLTs Multix. The mean predicted participation was 18.7% in the first epoch (2005-2007), and 1.5% and 1.6% in the two following epochs (2008-2013 and 2014-2018), respectively. For gambling in total, the mean predicted probability was 82.1% for the first epoch, 76.3% for the second, and 72.7% for the third epoch.

For two other variables, the predicted participation increased. The mean predicted participation for gambling on foreign web sites was for the three epochs, 3.6%, 4.2%

and 4.5%. For gambling on online interactive games, the mean predicted participation were 0.7%, 1.6% and 5.6%. The increase was strongest for online interactive games.

For gambling on games in land-based bingo premises the predicted mean showed the lowest overall participation. For the three epochs (Epoch 1-3) the mean was 1.7%, 2.3% and 1.8%, respectively.

Among the gamblers in the four specific game groups, a large majority also participated in other games or game groups. This varied from 92.5% (n=1.509) for those who gambled on slot machines and VLTs (Multix) to 98.7% (n=797) for those who gambled on the online interactive games.

To analyse the effects of the variables for time, gender, and age on the participation in gambling and changes between the epochs, a logistic regression analysis was conducted. The analyses were run in three blocks. This is previously described in the section 2.3.2 Statistical analysis in Study 2. For two variables, the analysis explained only a small proportion of the variance, 1.3% for gambling in total and 1.7% for gambling in land-based bingo premises, respectively. For the other three variables the models explained far more of the variance, 31.5% for gambling on slot machines and VLTs Multix, 19.8% for gambling on foreign web sites and 15.5% for online interactive games. Most of the explained variance was attributed to the independent variables in the first block, before the interaction terms were added.

On the first block, age and gender had a significant association with all five gambling variables. For gambling in total, participation increased with age. For the other four and specific gambling categories, participation decreased with age. The participation rate was higher for men in all game types except one as it was higher for women than men for bingo in land-based premises. The increased participation in overall gambling by age, most likely reflects a higher prevalence of older gamblers participating in other games (e.g., number games) than the specific ones which were analysed. According to a prevalence study from 2015, 77% of those who had gambled the last year had taken part in number games (e.g., Lotto), and showed that participation rate for these games increased strongly with age (Pallesen et al., 2016b).

After the first block, predicted rate for gambling in total was reduced from Epoch 1 to Epoch 2 (contrast) and further to Epoch 3. Also, by year a reduction was detected. A significant decrease in predicted participation was seen for slot machines or VLTs Multix from Epoch 1 to Epoch 2, and an increase was seen from Epoch 2 to Epoch 3. In addition, a reduction by year was found. However, an increase in predicted participation from Epoch 1 to Epoch 2 was found for games in land-based bingo premises. For gambling on foreign websites, the predicted participation was neither affected by year nor epoch. Another predicted increased participation was found for online interactive games, and the predicted participation per year was lower in Epoch 1 compared to Epoch 2 and a higher participation rate in Epoch 3 compared to Epoch 2 was found. For online interactive games, these associations were nonsignificant when interactions were included. As mentioned previously, most of the variation was explained by the model without interactions.

For gambling in total, the predicted gambling participation was reduced over the years with a significant drop from Epoch 1 to Epoch 2. The epochs by year interaction shows that the reduction by year was strongest in Epoch 1. With the years, the reduction was strongest for women.

For gambling on land-based slot machines / VLTs Multix, there was also a reduction in participation. First a steep drop from Epoch 1 to Epoch 2 was detected followed by a smaller increase from Epoch 2 to Epoch 3. The epoch by year interaction showed that there were reductions in participation by year in both Epoch 1 and Epoch 3, but not in Epoch 2. The younger gambled more often on slot machines and VLTs Multix. The year by gender interaction predicted a steeper reduction by year for males than females. The gender by epoch interaction showed a similar decrease for both genders in Epoch 1, but also that the predicted probability to gamble increased for male but not for female gamblers in Epoch 2.

There was a significant decrease by year and a significant lower participation in the first epoch compared to the second for games in land-based bingo premises. A higher probability to gamble amongst women and younger gamblers was found. The

interaction epoch by year showed decreased participation by year in the second epoch and increased participation in the third epoch. Also, gender interacted significantly with year and the epochs. The participation by male gamblers increased, and the participation of female gamblers decreased by year. By gender, the epoch interaction showed a steeper increase for women than males from Epoch 1 to 2 whereas the opposite development was found from Epoch 2 to Epoch 3.

The participation on foreign websites increased slightly over the years, and the strongest increase was seen in Epoch 1. Yearly change was not statistically significant in Epoch 2. There was still a significant lower participation in Epoch 1 compared to Epoch 2. Younger and male persons had a higher predicted probability to gamble on such websites. The interaction between epochs by year showed a steeper increase by year in Epoch 1 than Epoch 2. The interaction epoch by age showed that the effect of age on participation increased from Epoch 1 to Epoch 2. The interaction epoch by gender showed a slight reduction in gambling participation from Epoch 2 to Epoch 3 for females, whereas for males an increase was found.

For gambling on interactive online games, the predicted participation increased from Epoch 1 to Epoch 2. A higher predicted probability for men and young subjects to gamble than for women and older was found. The interaction between epochs and year showed a steeper increase per year in Epoch 1 than in Epoch 2. Without any interaction (block 1), a significant increase from Epoch 2 to Epoch 3 for interactive online games was found.

3.3 Results of Study 3

Among the eight items (dependent variables) that reflected different measures to control gambling or reduce negative consequences, the most used measure was to pre-commit to affordable amounts (23.2% of the gamblers). The use of the seven other measures ranged from 5.5% who had set temporary break(s) in one or more games to those 0.8% who had contacted a helpline, support groups or treatment providers for help.

The predictors showed at least four significant associations with the dependent variables. The highest phi (and strongest effect sizes; medium) was found for being a moderate risk or problem gambler setting temporary breaks in games (.33) and letting others control their economy (.31). Online gambling had a medium strong effect size for having pre-committed to affordable amounts (.36). Highest Cramer's V (and strongest effect size; small) found for age was having pre-committed to affordable amounts (0.12). There were several significant predictors for all, but one dependent variable. The measures to set temporary player breaks, to set a permanent exclusion, to take a self-test for gambling problem and to download an economical overview, had an increased probability for males. For the age group 18-25 years, a higher probability to use four of the measures (to pre-commit to affordable amounts, to set temporary player breaks, to take a self-test for gambling problem and to set a time limit which restricts gambling) compared to the contrast group (age 66-74 years) was found. In addition, those in the 26-65 years group had a higher probability to take a self-test for gambling problems. Gamblers born outside Norway, in a western or a non-western country, showed an increased probability to have used all the eight measures. To have gambled on low-risk games only was associated with lower probability of having used six of the eight measures (to pre-commit to affordable amounts, to set temporary player breaks, to set a permanent exclusion, to take a self-test for gambling problem, to download an economical overview and to set a time limit which restricts gambling). Those who had participated in random games only showed a lower probability when it came to having used three of the eight measures (to pre-commit to affordable amounts, download an economical overview and let others control the economy) compared to those who had participated in at least one skill-based game.

For the high spenders an increased probability to have used four of the eight measures (to pre-commit to affordable amounts, to set temporary player breaks, to set a permanent exclusion and to let others control the economy) was found. For those who had gambled online, an increased probability to have used six of the eight measures (to pre-commit to affordable amounts, to set temporary player breaks, to set a permanent exclusion, to take a self-test for gambling problem, to download an economical overview and to set a time limit which restricts gambling) was reported. The moderate

risk or problem gamblers had an increased probability to have used all the eight measures (to pre-commit to affordable amounts, to set temporary player breaks, to set a permanent exclusion, to take a self-test for gambling problem, to download an economical overview, to set a time limit which restricts gambling, to contact help services for help and to let others control the economy). For self-reported impact from gambling advertisements, only one (reduced probability of having taken a self-test for gambling problems) association was found. Finally, for those believing that RG/ CP measures would help to control the gambling consumption, an increased probability to have used four of the eight measures (to pre-commit to affordable amounts, to set temporary player breaks, to take a self-test for gambling problem and to set a time limit which restricts gambling) was found.

Fewest (three) significant predictors were seen for the dependent variable to contact help services. Most (nine) predictors were reported for setting temporary player breaks and taking a self-test. All predictors showed significant associations with minimum one dependent variable.

4. Discussion

4.1 Main findings

4.1.1 Beliefs in RG /CP measures

Gamblers can hold different beliefs in tools and measures which are made available or implemented to help them to control their gambling. In addition to prevent gambling problems, some measures will probably have a stronger function as harm reduction measures e.g., self-exclusion and maximum loss limits. In the Norwegian regulated market, the players cannot adjust or opt out of some of the measures (e.g., predefined loss limits or maximum stake sizes) as such measures are set by authorities and affect all players of a game. For other measures the gambler has different options in terms of how to use an RG tool (e.g., to set a temporary player break or set personal time or loss limits). In between these two alternatives, there can be RG-tools which are mandatory for all players to use, but where it at least partly is voluntary how they are used/applied. An example of the latter will be if tools for monetary limits are mandatory to use, and where there in addition are maximum limits which the gambler cannot exceed when setting a personal limit. From this it can be argued that some measures or tools lie closer to the public health and population approach regarding prevention (Abbott, 2020a), while other tools are closer to how it is described in the Reno model and the more "individual based approach" where gamblers can choose to use preventative measures based on relevant information (Blaszczynski et al., 2004).

In Study 1, the beliefs in tools and measures were investigated to which degree gamblers who participated in a national survey about gambling and gaming problems reported to agree with ten statements. The statements addressed if different RG /CP measures would help them personally to control their own gambling consumption. Three tools or measures were valued significantly higher than the other seven: 1) *that gamblers prior to gambling, could set their own loss limits,* 2) *the gambler receives continuous feedback on the losses,* and 3) *the game had predefined limits for losses* (Engebø, Torsheim, Mentzoni, Molde, & Pallesen, 2019). The third of these measures is nearer to the population approach whereas the first two are nearer an individual

approach. The other seven measures were: 4) *Prizes go directly to the gamblers bank account,* 5) *upper limit for stakes,* 6) *continuous feedback from the game on time spent gambling,* 7*) upper limit for prize size,* 8) *prior to gambling the player could set a time limit in the game,* 9) *that the gambler can exclude themselves from the game for a certain period,* and 10) *the game offers self-test for gambling problems with feedback.* The gamblers' beliefs were analysed with a composite score based on all ten statements and several predictors were identified for having positive beliefs. Among these were female gender and young age. Also, gambling behaviour was a predictor for positive beliefs about the RG /CP measures, i.e., playing games with higher risk, playing random games only and reporting lower amounts of spending in games. Corresponding to this, playing low risk games, skill games and spending higher amounts predicted less beliefs in the measures. Being a moderate risk or problem gambler and reporting high (in contrast to low) impact from gambling advertisements predicted more positive views. Being born outside Norway and gambling online were not significant predictors (Engebø et al., 2019).

Studies show that women generally take less risks than men (Byrnes, Miller, & Schafer, 1999; Harris, Jenkins, & Glaser, 2006). This can explain why women are more positive to measures which can control gambling. Young age is a risk factor for problem gambling (Johansson, Grant, Kim, Odlaug, & Götestam, 2009) and there are tendencies of reduced risk-taking with age (Rolison, Hanoch, Wood, & Liu, 2014). A suggested explanation for the positivity among younger gamblers to the measures is that the younger gamblers acknowledge they take more risks, hence they perceive the external tools or measures as helpful to stay in control over gambling consumption. Both for gender and age, this is in line with a study of online casino and poker players where women and younger gamblers were most positive to RG /CP measures (Gainsbury et al., 2013).

An explanation for a less positive view among those who gamble on low-risk games only is that they seldom experience a need for these measures. Those gambling on skill games and spending higher amounts had also less beliefs in the measures. Playing skill games can relate to an illusion of control, where gamblers trust their own skills and

have an inappropriate confidence in the gambling situation (Johansson et al., 2009) and therefore also regard the RG /CP measures as less helpful. This is partly in line with the study of casino and poker players, where the poker players were less likely to assess three RG /CP measures as useful (Gainsbury et al., 2013). For the gamblers who spend most money, measures to control gambling can also be seen as measures to restrict their gambling too much. A suggested explanation for the moderate risk and problem gamblers to be more often positive is that among these groups, there will be gamblers who perceive themselves to have gambling problems and regard the measures as helpful to reduce problems and reduce negative consequences from gambling. This is in line with a study which showed that most of the players with higher risk for problem gambling agreed in part or totally that they felt positive towards an introduction of maximum loss limits by a Norwegian gambling company (Auer, Reiestad, & Griffiths, 2020).

4.1.2 Actual use of RG /CP tools

In Study 3, the actual use of eight RG tools- or measures were investigated. Six measures corresponded to tools which often are available in an online gambling environment: 1) *Pre-commit to affordable amounts,* 2) *set temporary player break(s) in one or more games,* 3) *set a permanent exclusion in one or more games,* 4) *take a self-test to test for gambling problems,* 5) *download an economical overview of the gambling,* and 6) *set a time limit to restrict gambling longer than intended.* We also investigated the use of two individual actions which gamblers can take outside the gambling situation, namely, 7) *to contact a help service for gambling problems* and 8) *to let other control one's economy*. In regard of all the 8 measures, the use varied from 0.8% of gamblers who at one time had contacted help services to 23.2% who had set affordable loss limits. The measures were investigated individually in terms of correlates/independent variables. The variables being analysed as predictors were among the same as those used in Study 1 as predictors for the beliefs in tools or measures as helpful to control their own gambling consumption (Engebø et al., 2022). The finding, that only a minority of gamblers use tools to regulate their own gambling is also found in other studies (Delfabbro & King, 2021).

Male gender was a significant predictor for the use of four RG tools: To set a temporary player break, permanent exclusion, to take a self-test for gambling problem and download an economical overview. Young age was also a predictor for four tools, which were to pre-commit to affordable amounts, set temporary player breaks, take a self-test for gambling problems and to set a time limit to restrict gambling. An explanation for men more often using RG /CP tools can be that men are stronger involved in gambling than women. This is supported with finding from two Nordic studies (Latvala, Alho, Raisamo, & Salonen, 2019; Romild, Svensson, & Volberg, 2016). An additional explanation to the gender difference is that men more often than women take risks (Harris et al., 2006), hence they more often need and use these measures.

Further, being born outside Norway was a predictor for the actual use of all six RG tools and the two individual measures. Being born outside Norway in a western country was not a predictor for the measure to let other control the gambler's economy. To be born in a non-western country was not a predictor for using a monetary RG tool to pre-commit to affordable amounts. There were no obvious and direct explanations to why the regression analysis showed that being born outside Norway was a predictor for the use for most of the tools However, it is reasonable to suggest stigma, cultural, religious and financial issues to be among important factors (Radermacher, Dickins, Anderson, & Feldman, 2017; Raylu & Oei, 2004; Statistics Norway, 2021; B. M. Williams, Browne, Rockloff, Stuart, & Smith, 2021; Wilson, Salas-Wright, Vaughn, & Maynard, 2015).

Gambling on games with higher risk, having gambled on skill games, spending higher amounts, and having gambled online were all significant predictors for the use of RG tools or measures. Participating in games with low risk only, was associated with more seldom use of six RG measures: Monetary tool for limit setting, temporary breaks, permanent exclusion, self-test for gambling problems, download of economical overview and setting time limit to restrict gambling. A reason for more seldom use is that with low-risk games only, it will more seldom be necessary with external tools to keep control when gambling. At the same time the results imply that gamblers who

play games with higher risk use alle the six measures more often. Participating in random games only was a predictor for more seldom use of three measures: Monetary tool for limit setting, download of economical overview and letting other control the economy. A reason for more seldom use can be when gambling on random games only, the risk factor "illusion of control" (Johansson et al., 2009) is not present in the same way as for gamblers of skill games. In contrast to gambling on random games only, the gambling on skill games was a predictor for more often use. Being a high spender was a predictor for the use of four measures. Financial limit setting, temporary breaks, permanent exclusion and letting other control the economy. An explanation is that these tools will be necessary to use when the spending becomes higher than what is affordable. Online gambling was a predictor for the use of all six RG tools available in online gambling environments. This result is not surprising as gamblers in land-based environments seldom have access to any of these tools.

Being a moderate risk – or problem gambler was a significant predictor for the use of all eight measures, i.e., all six RG tools available when gambling online and the two individual measures for help seeking and reduce harm. The two last predictors investigated, were to have experienced impact from gambling advertisement and the beliefs in RG /CP tools and measures. The experienced impact from gambling advertisements predicted only a decrease in the use of one tool, namely self-tests. The belief in RG tools was found to be a significant predictor of the use of four tools: Pre-commitment to loss limits, setting temporary player breaks, taking a self-test for gambling problems and setting a time limit to restrict gambling.

4.1.3 The belief vs. the actual use

To set a personal loss limit was most often valued by the gamblers and was also the most often used measure. For some tools and measures it was a positive association between gamblers' view and actual use, however for others *a negative association* or no association between view and actual use was found.

Men use RG tools more often than women, but women have more often positive beliefs in the measures. An explanation for this is that men are stronger involved in gambling (Latvala et al., 2019; Romild et al., 2016), and therefore more often need to use external

tools to prevent problems and reduce harm from gambling. Women, on the other hand, are not so strongly involved in gambling. Further and compared to men, they also take more seldom risks and assess negative consequences from gambling as more severe and to occur more often (Byrnes et al., 1999; Harris et al., 2006).

When it comes to age, younger gamblers use tools more often than older. This is in line with young age as a predictor for positive beliefs.

The predictors being born outside Norway or in Norway, didn't predict beliefs in measures, but quite consistently predicted use. This can be explained in at least three ways: 1) As shown for gender above, it is not always a positive association between beliefs and actual use. Drawing upon the literature on attitudes it is well known that there is not a one-to-one relationship between attitudes and behaviour. The reasons for discrepancies between the two constructs may be other influences on behaviour such as values (e.g., freedom which may imply a more negative view on regulation), other conflicting views, strength of view, norms and control of the behaviour in question, and whether the behaviour is deliberate or spontaneous (Guyer & Fabrigar, 2015). 2) Discrepancy may have been caused by use of different methodology between the two studies. Both studies used regression analysis, but the dependent variables differed in the analyses. The beliefs were investigated with a composite score (Engebø et al., 2019) whilst the use was analysed for each individual measure/variable (Engebø et al., 2022). Two studies, which were based on the same data as Study 1, and compared the individual means instead of the composite score, showed that those who were not born in Norway (both in western and non-western countries) had significantly more positive belief of some of the items (i.e., statements about RG tools or measures); four of ten items in 2013 and two of ten items in 2015 (Pallesen et al., 2014; Pallesen et al., 2016b). 3) Gamblers' beliefs in tools as helpful can change over time. A third study, which was based on the same data as Study 3, showed that significantly more gamblers in general had positive beliefs in 2019, and further that gamblers not born in Norway didn't value any of the 10 measures as more helpful than those born in Norway (Pallesen et al., 2020).

When it comes to gambling on low-risk games only, the findings showed a positive association between belief and use. Being involved in this type of gambling predicted both less belief in RG measures as helpful, and more seldom use of tools, assumably because external tools were perceived as unnecessary. Gambling on skill games or being a high spender were two predictors for less belief in RG tools and measures, but on the contrary, belonging to these gambling categories predicted more use of tools. The belief can be affected by the trust in own skills or the perception that RG tools and measures might restrict spending, but the use might have been experienced as necessary when the losses or the spending comes out of control. Among the gambling categories, online gambling was not a significant predictor for beliefs in RG tools but was a significant predictor for actual use. Online gambling was a significant predictor for the use of all six RG tools which often is available at online gambling sites. The reason for the use can therefore be availability, and not as much the belief in itself.

Belonging to the group of risk- and problem gamblers was a predictor for the use of all RG tools and individual measures. This is line with Study 1 showing that risk- and problem gamblers had positive beliefs in the RG measures as helpful. This association also in terms of actual use was expected as these gamblers need external tools and measures most. Having experienced impact of gambling advertisement was a predictor for belief in RG tools, but not a predictor for the use of such tools. Finally, having a positive belief in RG tools and measures was a predictor for the use of four of the RG tools. From this we see that for several groups of gamblers, there are not always a positive association between beliefs and the actual use of RG measures.

4.1.4 Regulatory market changes

Ban on slot machines - a population strategy

Slot machines, a risky gambling form (Delfabbro et al., 2020) with a large and spread distribution (Prop L 44, 2002-2003; Rossow & Hansen, 2016), were banned and removed from the Norwegian gambling market in 2007. A year before, in 2006, the machines' note acceptors were banned, and thereafter the machines only accepted coins during the last year. The slot machines didn't have any player protection tools.

The ban was a political decision and affected the slot machines owned by more than a hundred private operators. Further, the banned machines would be replaced with new and stricter regulated video lottery terminals (VLTs) operated by a state-owned operator. The purpose was to remove a game which caused gambling problems. The decision was taken to court, both in Norway and to the European Free Trade Association (EFTA) court. Both the EFTA court and the Norwegian Supreme court decided that Norway could have a monopoly on gambling machines (Rossow & Hansen, 2016).

In 2009, VLTs were introduced in the market. The new terminals had mandatory registered play which made it possible to implement RG tools and measures to prevent gambling problems and reduce harm, e.g., maximum loss limit per month and other RG tools where gamblers could set further limitations on losses and take player breaks. The number of new VLTs was much lower compared to the number of the former slot machines (Rossow & Hansen, 2016). The distribution of the new VLTs was also more restricted compared to the banned slot machines, e.g., the new VLTs were not placed in grocery stores or in the public areas of supermarkets and travel hubs.

In Study 2, changes in gambling behaviour were investigated with the use of quantitative data in logistic regression analyses. The data was collected from 2005 through 2018 (N=28,000) and was used to predict gambling participation for five different groups of gamblers. The data stemmed from representative samples of the Norwegian population 15 years and older. For gambling on slot machines, the analyses predicted a strong reduction in participation, and for the later participation on the new VLTs, the predicted participation was far below the earlier participation for the slot machines. In 2007, the year the slot machines were banned, the participation on the machines was predicted to 14.9%. Later participation for VLTs was at its largest in 2013 with 2.1%. For the total amount of gamblers in the market, a reduction in overall gambling participation was seen which coincided in time with the reduction in gambling on slot machines (Engebø, Torsheim, & Pallesen, 2021). A reason for this overall reduction can be that some of the slot machine gamblers stopped gambling totally. This assumption is supported by a panel study of slot machine gamblers with

data from before and after the ban. The study found a significant reduction in the gambling participation in general, frequency of gambling as well as gambling problems (Lund, 2009). After the slot machine ban, the analyses in Study 2 predicted a significant increase in women's participation on games available in land-based bingo premises. The bingo premises offered similar games to the slot machines which was banned. Also, an increase in predicted participation was seen for gambling on foreign websites, which offered online slot machine games. However, both increases were much smaller than the reduction for slot machines, but can still partly reflect a substitution from one game form to another (Engebø et al., 2021).

This ban on slot machines illustrates a radical population strategy which attempts to eliminate a cause to a disease by reducing the availability of a harmful type of gambling (Abbott, 2020a; Rose, 2001). That description fits the ban on slot machines. At the time, slot machines were by far most often mentioned as the problematic game at the national helpline for problem gamblers (Rossow & Hansen, 2016).

Along with the regulatory changes for slot machines, a large reduction in the gambling market's total revenue was seen. A significant reduction in the number of calls to the national helpline for problem gamblers was also reported. These changes were first seen in 2006 when the ban on note acceptors were enforced July 1st, 2006, and then for the ban on slot machines a year later (Pallesen et al., 2014). Furthermore, a reduction in the number of patients seeking treatment for gambling problems was seen after the ban, and one implication was that options for group therapy were no longer available (Rossow & Hansen, 2016).

The effects of the ban of note acceptors were investigated with data based on school-based surveys among teenagers. A significant reduction in gambling participation and a reduction in problem gambling were found (Hansen & Rossow, 2010; Hansen & Rossow, 2012). Another study based on data collected from schools found that among adolescents, the prevalence of gamblers and problem gamblers were reduced significantly in the period from 2002 to 2010. The study identified the ban of note acceptors in 2006 and the ban of slot machines in 2007 as the causes for the reductions

(Sletten, Soest, Frøyland, Torgersen, & Hansen, 2010). A prevalence study of the adult population in 2013 which compared the prevalence of risk and problem gamblers with previous surveys, found a certain reduction in people who struggled from gambling. The reduction was most apparent after the ban on slot machines in 2007 (Pallesen et al., 2014). This finding was also corroborated by results from a longitudinal study of adults with data collected before and after the ban on slot machines. Here it was reported that half the gamblers who used slot machines frequently reduced or totally stopped their gambling (Øren & Leistad, 2010). An indication on how the ban affected problem gambling can also be detected in the data from the national helpline for problem gamblers. In 2005, the year before the first regulatory change (the ban on note acceptors), the helpline received 1,256 first time calls about slot machines. The equivalent figures were 981 in 2006 and 267 in 2007. For the first whole year without slot machines, 2008, the figure was 12. In 2018 the Helpline received 9 calls about the VLTs which after the ban replaced the slot machines (Hjelpelinjen, 2023; Ministry of Culture and Equality, 2016–2017).

The total consumption model is supported by the findings showing that the ban on slot machines led to a reduction in the total gambling revenue and furthermore, a reduction in problem gambling and number of gamblers seeking help. As showed in Study 2, the association between excessive or harmful gambling and total gambling consumption is at least indirectly supported by the steeper drop in persons seeking help compared to the reduction of the gambling revenue (Engebø et al., 2021).

A qualitative study conducted in 2015, analysed the views and stories from 13 agents who represented stakeholders with different interests related to the slot machine reform. Some had conflicting interests, and their views differed on the political process which resulted in the monopoly. The study presented three primary explanations to the reform. These were *harm reduction*, *regulation power* (increased control of the gambling market), and *revenue distribution*. *Regulation power*, could also lead to an enforcement of a regulation which emphasizes harm reduction and revenue distribution (Borch, 2018). When different views from conflicting interests are present, it is reasonable to see different explanations for the reform. From a public health

perspective, two of the three presented explanations are valid arguments for a public health approach, namely *harm reduction* and *regulation power*. When the EFTA court in 2007 ruled in favour of a monopolization of the slot machine market, the court acknowledged the explanation that the purpose was to reduce harm from the slot machines (Borch, 2018; EFTA Court, 2007; Nikkinen, Egerer, & Marionneau, 2018).

Launch of online interactive games - a strategy targeting subgroups

In addition to the prohibition of slot machines with a subsequent replacement by the VLTs, another regulatory change was investigated in the same study, using the same data. This change relates to the Norwegian state-owned monopolist that in 2014 introduced online interactive games in the market. This was done to establish a regulated alternative to the foreign websites which offer games to Norwegian gamblers without having Norwegian permissions. The new interactive games comprised mostly online casino, online scratch games and online bingo. Compared to similar games on foreign websites, these games were introduced with far more restrictions, significantly lower stake limits, mandatory use of RG tools and maximum loss limits per day and month (Engebø et al., 2021). The games were introduced to channelize gambling from foreign websites to the new regulated games equipped with more measures and tools to protect the gamblers. With the channelizing, also new gamblers should start their gambling on the regulated alternative instead of the foreign websites. Both online casino and online bingo games have a strong overrepresentation of moderate risk or problem gamblers (Pallesen et al., 2014; Pallesen et al., 2020; Pallesen et al., 2016b). The foreign websites also offer betting and poker. Betting already had a regulated alternative but there was no Norwegian permission to offer poker in Norway, therefore the introduction of new interactive games was not introduced to directly channelize betting and poker players.

The analysis of gambling participation at the time when the new regulated games were introduced showed that the predicted overall participation in interactive games increased significantly from 2014 and onwards. The participation on foreign websites seemed to be stable despite large marketing efforts from foreign operators (Norwegian Media Authority, 2023) and a large growth for such games internationally (Global

Betting & Gaming Consultants, 2020; H2 Gambling Capital, 2020). The data supported a channelizing effect which was relatively stronger for women. Explanations to the increased participation rate for interactive online games can also be the general growth for such games and increased use of mobile phones (Pallesen et al., 2020). With the mobile phones the gambling opportunities are easily accessible and follow a person through the whole day. According to Hing and Haw (2009), the availability to gambling can be physical, social or cognitive. A mobile phone can contribute to physical access, acceptance from family and friends to social access, and understandable game rules to cognitive access (Hing & Haw, 2009). In Study 2, it cannot be ruled out that the growth in the number of gamblers also was caused by an increase in the physical and social availability instigated by the launch of the new regulated interactive games. (Engebø et al., 2021).

The regulatory change, i.e., introduction of a new game category in the market can illustrate a prevention strategy if it targets specific groups in a population which are at risk for problems (Hage & Romano, 2010). The introduction of new games for channelizing gambling can be regarded as a preventative measure if it successfully targets the group of gamblers who already participate in the actual game form, or gamblers who in the future will take part in these games. In addition, the alternative must come with more protective and harm reducing measures compared to the alternative (here foreign websites) which have offered the same types of games for years. As such, the strategy in 2014 aimed to reach two subgroups of gamblers, one group who already gambled on such games and another with gamblers who later would start to gamble on these types of games.

After the introduction of new games and despite the excessive marketing from foreign operators and the general growth of such games in general, the analysis did not predict any increase in gamblers on the foreign websites. This finding supports the notion of channelization from foreign websites. The analysis also found a smaller, but significant decrease in the female participation on foreign website at the same time as the new games were introduced (Engebø et al., 2021). This finding can be understood as a relatively larger channelization of female than male gamblers. A suggested explanation

will be that women take less risks than men (Harris et al., 2006) and also have stronger beliefs in tools and measures for player protection (Engebø et al., 2019). When a new alternative of games, offered with more player protection was available, women to a larger degree seemed to prefer the new alternative.

There is not much research on the consequences related to the introduction of new interactive games as those in 2014. However, a study from 2015 found no significant change in the prevalence of risk and problem gamblers (CPGI 3+) between 2013 and 2015, which was 3.0% and 3.2%, respectively (Pallesen et al., 2016b). A longitudinal study with data from 2013 and 2015 concluded that the new games introduced in 2014 may have had a channeling effect (Pallesen, Molde, Mentzoni, Hanss, & Morken, 2016a). A later study found a significant increase in the prevalence of moderate risk and problem gamblers from 2013 and 2015 to 2019 when the prevalence was 4.5%, and it was concluded that the share of people with gambling problems had increased the last four years, from 2015 to 2019. That study presented several explanations for the increased rate for problematic gambling. Among others, the proportion of people who gambled had increased, as well as the gambling advertising and influence from it. Further an increase was seen for the use of mobile phones for gambling (Pallesen et al., 2020).

The helpline data also provides an indication regarding the development of problem gambling related to casino games. Among the interactive online games, casino games are the most often mentioned game type at the helpline. In 2013, the year before the launch of the new interactive games, the helpline received 175 first time calls about online casino, in 2014, 2015 and 2018, the numbers were 149, 214 and 286, respectively. However, most of the calls referred to gambling on foreign websites: In 2018, 5% of the calls were about the new games launched in 2014, 15% were about both the new games and the games offered from foreign websites, and 71% were solely about the games offered from foreign websites, whereas 9% of the calls didn't have information about where the gambling took place (Hjelpelinjen, 2023; Ministry of Culture and Equality, 2016–2017).

Together with the new interactive online games also regulatory measures (e.g., banning of marketing and payment services) have most likely contributed to the stabilizing of the foreign web sites' share of gamblers. These measures were enforced earlier than 2014 but have later been developed further. After 2018, which was the last year of the timeline of Study 2, several noticeable changes have been enforced. First, the ban on payment services became more efficient and later a new ban was enforced on marketing which include intermediaries of advertisement broadcasted from outside Norway. Further, the use of DNS warning/blocking is now under planning to be implemented (Ministry of Culture, 2021 ; Stortinget, 2022). Due to the aim of these regulatory efforts being to restrict or exclude the foreign gambling operators' access to the market, the measures can be seen as radical since the effect imply removal of more harmful gambling opportunities.

Ban on slot machines vs. launch of online interactive games

The ban on slot machines (2007) is here discussed in terms of prevention through a population strategy. Further, the introduction of regulated online interactive games in 2014, offered with protective measures, can with certain conditions illustrate a prevention strategy which targets two specific groups of gamblers. The ban on slot machines targeted the entire population and affected slot machines which had relatively many gamblers, wide distribution and were deployed in areas available for the entire population. Many people visited the areas for other purposes than gambling (e.g., grocery stores or public areas of shopping centres). The launch of new online interactive games targeted subgroups at risk, i.e., gamblers participating in online interactive games offered by foreign gambling companies and those who in the future would start to gamble on such games.

The ban on slot machines was followed by the placement of fewer and more narrowly distributed VLTs equipped with RG tools and measures. This change resulted in a decreased physical availability from restricted types of locations, fewer gambling machines, and mandatory use of player card (registered gambling). Furthermore, for some, the new terminals were probably more socially acceptable, and hence the social availability increased. Since the foreign operators continued to offer online games in

the market, the introduction of new interactive online games in 2014 increased their overall physical availability. The new regulated online games probably also increased social availability, as the games offered by a monopolist which already had most of the Norwegian gamblers as customers became the only games of that type under the national regulation and further, were equipped with more tools and measures for player protection compared to games offered from foreign web sites.

The successor for the land-based slot machines, the new video lottery terminals (VLTs) deployed in 2009, and the new interactive online games launched in 2014 both came with measures for player protection (e.g., maximum loss limits). A suggested explanation to relatively fewer calls to the helpline due to these two game types can be that the maximum loss limits are effectful measures for harm reduction and therefore indirectly also reduce the need to seek help for gambling problems. In addition to the maximum loss limits, for both game categories, it is mandatory to set a personal limit below or equal to the maximum. A study on gamblers with Norsk Tipping which offer both game types, found that even if some gamblers went elsewhere to gamble (i.e., foreign websites) after they had reached their loss limits most, including high-risk gamblers, did not. Instead, they waited for their loss-limits to be reset (Auer et al., 2020).

If the goal with the regulatory measures was to reduce gambling on risky and harmful games and instead offer similar games with tools and measures which prevent problems and reduce harm, the ban on slot machines seems to have been effectful. Availability is an important keyword, and for authorities it is easier to reduce harmful gambling opportunities from a land- based and regulated market compared to an online market with foreign operators. After the launch of new regulated interactive games in 2014 and up to 2018, the number of gamblers on foreign websites seems to have been stable, and the launch of a regulated alternative of games have in combination with existing regulatory measures channelized gamblers and prevented this number to grow despite marketing efforts from foreign operators and a general growth for such games. After 2018, the last year of Study 2, regulatory measures are both strengthened, implemented or under planning. The purpose is to further restrict the availability of foreign gambling

websites (Norwegian Gambling Authority, 2023; Norwegian Media Authority, 2023). For the changes both in 2007 and 2014, helpline data indicated that the protective measures were effective.

Regulation of gambling behaviour

Behavioural regulation can be instigated both by individual gamblers and by authorities. The authorities' measures are aimed for groups of gamblers or wider parts of a population. Measures the gamblers can set themselves are mainly for those who will choose to use them. On an in-between-level, it can be mandatory to use a measure, but it is up to the individual how it is used. Both the gamblers' belief in and use of measures have been investigated in this thesis. Their view is not always consistent with their use.

Several studies have looked at the use and effect of these measures. A review of 29 peer-reviewed RG publications (1999–2015) showed some or possible effects of five RG measures. Among those, self-exclusion had some effect, but had low utilization rates. RG features on gambling machines (e.g., warning messages) were modestly effective and limit setting could be effective for promoting responsible gambling (Ladouceur et al., 2017). Study 3 in this thesis also found that few gamblers had used several of the RG /CP measures, but 23% reported to have set affordable loss limits. Considering that the sample represented the total Norwegian gambling population, and therefore also included those who played land-based games and low-risk games only, this rate of limit setters can still be regarded as relatively high. A possible reason for why use of this tool was reported far more frequently that the other tools is that several games require mandatory limit setting (losses) with ceilings which cannot be exceeded.

A later review of 25 papers and reports on trials of voluntary and mandatory systems for limit setting (2005-2020) found support for the previous findings where voluntary limit systems had low uptake rates and confirmed possible benefits from mandatory systems. However, it was noted a risk that mandatory monetary limits could cause gamblers to move to less- or unregulated operators (Delfabbro & King, 2021). A Norwegian study found that risk to be relevant, but not for all gamblers. When gamblers

reached their loss limits, some stated they went elsewhere to continue gambling, however, the majority of gamblers, including high-risk gamblers opted to wait for their loss-limits to be reset (Auer et al., 2020).

A study with real player-data (Jan. 21–Aug. 22) based on British online casino gamblers investigated the effect of voluntary short- and long-term self-exclusion. Most of the players with a short self-exclusion (up to 38 days) started to gamble again, whilst those with a long-term exclusion did not return to gambling on the same platform (Hopfgartner, Auer, Helic, & Griffiths, 2023). A meta-analysis on pop-up messages showed that the measure had moderate effects on gambling behaviour and cognitions short-term (Bjørseth et al., 2021).

Both mandatory monetary limits and self-exclusion will be more efficient if other gambling options are not available when a limit is reached or an exclusion is set. In some countries with license systems and several operators, e.g., Sweden and Denmark, central registries for exclusion prevent gamblers to move from one regulated operator to another. Of 22 European regulatory authorities responding to a survey in 2022, Germany reported that their regulation implied mandatory total monetary limits where all operators must connect to a registry and check if the stated limit is exceeded or not. At the time it was noted that the German legislation was still in its implementation phase (Meerkerk, 2022).

Several European countries, also with licence systems, use measures to keep unregulated operators out of the markets. Measures such as blocking of payments to operators without a licence, banning of marketing from such operators and website blocking in order to channel the gambling to controlled and regulated offers (European Commission et al., 2019).

Prevention and harm reduction interventions have also been investigated at local levels. An umbrella review of 16 reviews concluded that one of the effective strategies for both the general population and for the risk or problem gamblers was to reduce the availability to gambling opportunities (Velasco et al., 2021).

Analyzes in Study 2 show that regulatory measures which remove or introduce new games in a market will affect gambling participation and depending on RG /CP measures also affect the degree of gambling problems. One possible strategy can be to remove risk-full games that do not have RG measures and/or introduce alternatives with more RG measures. In a market that also consists of unregulated operators, it also seems to be necessary to limit the access to the irregular gambling offers.

Relevant to prevention (slightly circumscribed) the epidemiologist Geoffrey Rose asked two questions: *Why some people get an illness* and *why some populations have more incidents of an illness than other populations* (Rose, 2001). Related to gambling, some answers can be found in the Pathway Model which describes how gambling problems can emerge through three pathways. All three pathways start with an *ecological factor*, i.e., availability and accessibility of games. Another factor common for the three pathways is a *cognitive distortion factor* where problems can develop because of exposure and continued gambling (Blaszczynski & Nower, 2002; Nower et al., 2022).

From a prevention perspective, a public health population-based strategy could be effective for the ecological factor and possibly radically change the availability of risk- and harmful games (Abbott, 2020a; Rose, 2001). Also, a public health-strategy that aims to reduce the availability of the means to gamble such as by introducing maximum loss limits for all gamblers of certain games could be relevant. RG /CP measures can also modify the cognitive disorder factor. In the revised pathways model, the authors suggest that tools for limit setting should be available for players in an RG intervention which applied to all operators. Ideally the loss limit setting option should be incorporated when gamblers registered for an online gambling account or a loyalty program. For the gamblers the promotion of responsible gambling and early intervention could obstruct the process which can lead to gambling problems due to the cognitive disorder factor (Nower et al., 2022). Limit setting options can be for time and size of monetary losses. However, other measures could also be relevant, e.g., mandatory player breaks, voluntary short-term exclusions, and pop-up messages to obstruct the repeated and escalating involvement of gambling.

Based on the points discussed above, a public health and population approach to prevention seems to be more effective than the prevention which targets the individual gamblers who often can choose whether or not to use protection measures. The fact that the amount of people who experience harm from gambling is not limited to the problem gamblers themselves, increases the relevance of a population-based approach in terms of prevention and harm reduction, and presumably also for mandatory use of tools where groups of gamblers must set a personal monetary limit. The latter could still be considered if the limit should have a ceiling. However, the question should not be which approach to prevention is best. The question should rather be based on how different approaches and RG /CP measures best can be combined. This will depend on many factors, e.g., the characteristics of the games, availability, other conditions associated with the games, and what impact the games have on the gamblers and others.

4.2 Methodological and ethical issues with the thesis

4.2.1 Generalizability

All analyses in Study 1, 2 and 3 are based on data from large samples, representing large populations. The gross samples are randomly drawn from two kind of registries. The gross samples for Study 1 and 3 are drawn from the National Population Registry of Norway. The gross sample for study 2 is drawn from two telephone registries, one for land phones and one for mobile phones.

The variables, analysed as predictors in Study 1 and Study 3 stem from identical instruments used in three prevalence studies (data from 2013 and 2015 in Study 1, and data from 2019 in Study 3). The variables analysed in Study 2 stem from surveys where the included variables have remained unchanged from 2005 through 2018 except from necessary minor adjustments due to physical changes in the gambling market. Most of the results are relatively stable over the years within each type of data, and a consistency in results can be seen as an indicator for reliability in data (Salmond, 2008). However, the gambling market has not been static, and this is reflected in changes in time when participation in games is analysed against regulatory changes (Study 2).

Most of the variables used in all three studies are from validated instruments relevant to the gambling field. Data for other constructs, e.g., personality traits were collected through a well-known and validated instrument, Mini-International Personality Item Pool (MINI-IPIP) (Donnellan et al., 2006).

Although a formal and a priori power analyses were not conducted for any of the three studies, the large sample sizes allowed for detection of practical relationships between variables (Ferguson, 2016). For some of the logistic regression analyses, the number of subjects who answered affirmative on the dependent variables was however low which could have lowered the statistical power.

In total and for these qualities, I will argue that the datasets used for the analyses are reasonable representative for Norwegian gamblers. However, the response rates were relatively low. Even if the data are weighted for gender, age, and place of residence (county), it is still an open question if some groups in the population are underrepresented on other parameters where data are not weighted for e.g., income and education. Research has generally shown that respondents in surveys are healthier and have more resources than those who were invited and didn't respond (G. Cohen & Duffy, 2002). This might also be a limitation with the data used in this study. The more representative a sample is, the more can findings be generalized to the studied population.

4.2.2 Measurements

There is always a chance for biased data with the use of self-reported surveys. Examples of such biases are measurement error, recall bias, social desirability bias, and common methods bias.

Measurement error is the distance from results in a survey compared to how these are reflected in the population which the surveys' sample is drawn from. The errors can occur from all stages in the process from asking questions to receiving answers. Errors can e.g., occur from memory, difficult questions or respondents taking shortcuts by giving answers they think is good enough, instead of taking time to provide a total precise answer (Cernat & Toepoel, 2022). Measurement errors are most likely

systematic if they occur because of something that is wrong in the instruments or methods which are used in a survey. Random errors are most likely caused by the respondent's actions, e.g., if a person who is asked about the weight misread the scale (Drost, 2011). Random errors can be reduced with larger sample sizes (Phillips & Jiang, 2016) or by using several items reflecting the same construct (Schmidt, Le, & Ilies, 2003). The three studies in this thesis have all relatively large samples of data. Further, Study 1 has data from two prevalence studies, Study 2 has yearly data from fourteen years with two surveys each year and Study 3 has relatively stable results compared to results from the data in Study 1.

Recall bias can occur when a respondent is asked to report something that lies back in time (Raphael, 1987). In addition to the time interval, recall can be affected by characteristics with the respondents, the significant of the event, social desirability and interviewing techniques (Coughlin, 1990). This can be a limitation with my studies and has relevance for some of the variables. Two examples are: To be a high spender or not, was a predictor in Study 1 and 3, and gamblers were categorized from how much money they had reported to have used in each game. Furthermore, the variables measuring participation in different groups of games were used as predictors in Study 1 and 3, and as the dependent variables in Study 2. These variables were constructed from the individual games the respondents confirmed to have played the last twelve months. A time frame going back as far as 12 months will obviously be associated with limitations of human memory (Öztaş & Işiksal, 2005).

Social desirability bias occurs when a respondent answers what the person thinks is socially acceptable, rather than the true answer. Studies have showed that respondents answer more honestly to sensitive questions if the personal contact is not present in the process of collecting data (Gnambs & Kaspar, 2015; Grimm, 2010). For my thesis, this is mostly relevant for the measure for gambling problems. Assumably the nine questions in the instrument Canadian Problem Gambling Index (Ferris & Wynne, 2001) will be regarded as sensitive among those with a problematic gambling behaviour. However, this instrument was administered through postal or web-based

surveys. The survey data used for Study 2 was collected over telephone, where questions about gambling problems were not included.

Common method bias may occur when data in one study is collected at the same time point (e.g., both the dependent and independent variables) and where the source of the data is the same (e.g., self-report). Due to this there may be unmeasured factors (e.g., negative affectivity) which may influence all variables creating inflated relationships between them (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). This potential problem is most relevant for Study 1 and 3 in the current thesis.

Study 1, 2 and 3 are based on several instruments, and some are used in more than one study.

Demographics, time and gambling participation were all measured by one-item measures. *Demographic* variables were age, gender, and place of birth in Study 1 and 3. Study 2 did include the same, except place of birth. In the analyses, age was divided into age categories in Study 3. Also place of birth was categorized to broader categories (One variable: Born in Norway or not in Study 1, two variables: Born outside Norway in a western country or not and Born in a non-western country or not in Study 3). *The time measure* was analysed in Study 2 with two variables. One variable concerns year and started with year 0 (2005) and continued through year 13 (2018). The other variable was categorical and reflects three epochs, the first from 2005 through 2007, the second from 2008 through 2013 and the third from 2014 through 2018. Respondents did not report time, the time for the phone interview was automatically coded in the datasets.

Gambling participation was included in all three studies. In the surveys for Study 1 and 3, the respondents first had to confirm participation in gambling the last 12 months. A definition of gambling was a part of the question. Thereafter the respondents were asked for one game at the time if they had participated in the game in question, covering all games available in the gambling market. A confirmation of participation was provided by confirming the interval of expenditures which was nearest to the yearly spending or reporting not to have participated in the game. For Study 2, the respondents had no filter question and answered, yes or no, directly to participation in each

individual game. Here, respondents did not report on expenditures. As with other measurements in a survey, there is a risk for bias when respondents are asked what games they have participated in, and e.g., the risk for recall bias will be more relevant the longer the time frame is. Here, the gamblers were asked about participation in games the last twelve months. However, this is a usual time frame for this type of question as this, in the context of the present thesis, coincides with the Norwegian prevalence studies which use a 12 months' time frame to measure prevalence for both gambling and gambling problems. The 12-month time frame is also common in most studies and instruments assessing gambling problems.

Participation in different games where for the studies' purposes categorized into different *categories of gambling*. For Study 1 and 3 the categories were *random game only versus skill game* participation, *game spending* (low vs. high), *online gambling* (no vs. yes) and *participation in low-risk games only versus medium/high risk games.*

If a chance to win in a game is partly determined by the gambler's skills, it is a skill game, otherwise it is a random game. The categorisation of low and high spenders was based on the responses for expenditures, and the high spenders had at least confirmed one game with yearly expenditures of more than 5,000 NOK (~ 500 €). Recall bias will here be a relevant issue, and most likely the vast majority of gamblers will not know exactly how much money they have spent on each game within a 12-month period. However, the alternatives for answers were relative wide categories e.g., NOK 1-1,000. Furthermore, it was a limitation that the instrument which measured the frequency of online gambling did not differentiate between types of gambling. To gamble online can be to participate in games which are offered online only (e.g., online casino and live betting), but can also be to participate in a game which takes place outside the remote environment (e.g., a weekly draw number game) and the online activity is limited to the transaction of payment (Pallesen et al., 2021). Still, it can be argued that a game is more readily available when it is offered online, and further that tools and measures for player protection can be available for all types of games when offered online. For the categorisation of low-risk games and games with higher risk, an external tool (Gamgard) was used. Gamgard is available for gambling operators and regulators in

order to assess the risk for the development of gambling problems in games. The tool was developed in 2006 with input from an international team of advisors, representing research and treatment. Later, it has been updated with new input from several researchers, clinicians and people who have recovered from gambling problems (Gamgard, 2018). Gamgard has been evaluated twice. The first time (2018) in a third-party evaluation commissioned by the founders and developers to meet requirements from the World Lottery Association (WLA, for state-regulated lottery and sports betting operators) and Gamgard customers. The evaluation was conducted by an evaluation specialist from the University of Ottawa's Centre for Research on Educational and Community Services. The evaluation followed standards from the Joint Committee for Standards in Educational Evaluations. The conclusion from the evaluation was that the strengths of the tool weighed up for its limitations. Users of the tool, developers, operators and regulators, found Gamgard credible and based on science. However, users also identified both risk factors and RG measures that were absent in the tool. Concerns were also raised about interrater reliability, i.e., if the assessment differs between assessors, between gambling operators and the company which offers Gamgard (Gamres), or between gambling operators and regulators. Hence, more should be done to improve the consistency in the use of the tool (Cousins, 2018). The second evaluation (2021) was conducted for New Zealand's Ministry of Health by WSP, an international consultancy company. This evaluation also pointed to certain limitations and recommend Gamgard as an "adequate preliminary screen", where a game, before it is approved should be considered with the entire gambling environment in mind. It was also here pointed at possibilities to improve the interrater reliability by using a standard application processes or an independent assessor of games (Frith, Beetham, Thomas, & Malcolm, 2021). For Study 1 and 3, Gamgard was used to categorise the risk in games without taking any responsible gambling measures into considerations. For Study 1 and 3, the games which were scored as low risk games (i.e., number games, deposit bottle game and pools) are all among games which are seldom mentioned as problematic at the help line for problem gamblers (Hjelpelinjen, 2023).

To measure the prevalence of gamblers at risk and problem gamblers, the instrument *Canadian Gambling Problem Index* (CPGI) was used in Study 1 and 3. Internationally, the CPGI (Ferris & Wynne, 2001; Wynne, 2003) is among the most used instruments to measure the prevalence of problem gambling. In a study with three other instruments, CPGI was assessed for accuracy. All four instruments gave a correct classification of most of the non-problem gamblers, but CPGI (3+) and another instrument, SOGS, had lower criteria for the classification of problem gamblers and thus predicted more problem gamblers than clinicians who also assessed the same persons. However, in an assessment using the same method and including CPGI with 8+ criteria in the southern Korean population showed satisfactory classification accuracies for the instrument (Back et al., 2015; R. J. Williams & Volberg, 2014). In Study 1 and 3 of this thesis, the gamblers were grouped into two categories: No problem/low risk gamblers and moderate risk/problem gambler. The group of moderate risk and problem gamblers was categorised with the same lower criteria as mentioned above. Among the gamblers, the prevalence of moderate risk and problem gamblers was 5.2% (*n*=9,066) in Study 1 and 7.0% (*n*=5,850) in Study 3. The Cronbach's alpha, which measure the internal consistency for the nine items included in the CPGI was .89 and .91, respectively. CPGI has been criticized for having too much focus on negative economic consequences and hence too little on other consequences (Svetieva & Walker, 2008). In this thesis, I have discussed seven different types of harm from gambling (Langham et al., 2016). An argument for continuing the use of CPGI is that it has been used in other Norwegian surveys to measure the extent of problem gambling in the population (Pallesen et al., 2020).

In Study 1, *The Mini-International Personality Item Pool (MINI-IPIP)*, was used to measure the gamblers' personality. With the MINI-IPIP, 20 items are used to measure five dimensions of personality (Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness) (Donnellan et al., 2006). Cronbach's alpha for the sub-scales (dimensions of personality) were .67, .79, .66, .71 and .67, respectively. Lower alpha values are common to find when there are few items in a scale (Pallant, 2016).

The three last measures are partly or completely developed for the Norwegian prevalence studies which was conducted in 2013, 2015 and 2019, and from which I have used data in Study 1 and 3.

Study 1 and Study 3 used data from an instrument which measured *impacts from gambling advertising*. Nine items on how gambling advertising affected gamblers were included. Five items were taken from the Effects of Gambling Advertising Questionnaire (EGAQ) (Derevensky et al., 2007). Four other items were constructed for national prevalence studies (Hanss et al., 2015). Cronbach's alpha for the nine items were .76 in Study 1 and .82 in Study 3. The four new items have had limited psychometric evaluation, but the instrument including all nine items has been published in an international journal (Hanss et al., 2015). However, the authors pointed at limitations such as self-reported data and hence vulnerability for e.g., social and recall bias. Furthermore, that the instrument do not distinguish between different media, context, content and design. Only respondents who had gambled the last 12 months answered the questions about gambling advertising.

Study 1 and Study 3 also used an instrument which measured the *gamblers' beliefs in RG measures*. Ten items measured how gamblers believe that RG /CP measures would help them to regulate their own gambling consumption. In the questionnaire, the gamblers were asked to which degree they agreed or not agreed that these measures would help them to regulate their own gambling consumption. By formulating the question in this way, tools and measures could be regarded as helpful or not, despite any eventual personal views on regulation as such, generally or political. The Cronbach's alpha was .96 for Study 1 and .95 for Study 3. Only respondents who had gambled the last 12 months answered the questions. Still, a more thorough evaluation of the psychometric properties would have been preferrable.

Study 3 included an instrument which measured *gamblers' use of measures to regulate their own gambling and reduce harm from gambling*. The gamblers were asked if they had used six specific external tools to regulate their gambling, e.g., had set affordable amount limits in games. In addition, they were asked if they had contacted help services

or let others control their finances because of gambling problems. Due to their content specificity, the eight measures were analysed separately. This instrument which provides self-reported data has so far not been evaluated by comparing the data with real player tracking data. Such an approach would be of interest to investigate its validity.

The three last instruments are partly or totally developed to collect the data which also is used in Study 1 and Study 3. The instruments have not been validated and there is a lack of psychometric information. However, the Cronbach's alfa, which measure the consistency in results from the individual items in an instrument showed acceptable, and most often preferable results. The two instruments who measure the beliefs and the use of tools and measures also address the items to tools and measures which are available in the gambling market.

4.2.3 Ethical considerations

Ethical approval

Data used in Study 1 and 3 stem from data collected for three prevalence studies. Study 1 used data from two studies conducted in 2013 and 2015 (Pallesen et al., 2014; Pallesen et al., 2016b). Study 3 used data from one study conducted in 2019 (Pallesen et al., 2020). Procedures performed in all studies were in line with the ethical standards of the Regional Committee for Medical and Health Research Ethics, and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The studies in 2013 and 2015 were approved by the Regional Committee for Medical and Health Research Ethics, Western Norway (2013/120). The study in 2019 was approved by the Norwegian Centre for Research Data (no. 528056). For data collected and used for Study 2, an ethical approval was not required as the study was anonymous.

Considerations concerning respondents

Even if all necessary approvals are in place, there are still ethics to consider when undertaking research on humans. Researchers asking questions about gambling problems and harm experienced from gambling through an instrument measuring gambling problem, can arouse emotions among some respondents. Researchers sending out reminders can cause irritation among people who have decided not to

respond. Both issues were handled by all three prevalence studies which data to Study 1 and 3 stem from. The data were collected through postal paper and web-based surveys. In the information which followed the questionnaires, the receivers were provided contact details to relevant persons should they need to talk with someone after taking part in the study. People who did not want to participate were informed that they could ignore the invitation to participate and further ignore eventual reminders. Data used for Study 2 was collected through phone-based surveys which did not contain questions about gambling problems. People who did not want to participate, could just inform the interviewer and nobody received any reminders. Still, it cannot be completely ruled out that some may have felt pressured to participate, especially when reminders were sent.

Regarding the surveys for Study 1 and 3, prizes (gift cards) were drawn among those who participated in order to increase the response rate. It can be discussed if this is ethically sound, especially taken into consideration that one of the main topics of the studies was gambling problems. However, the prizes were gift cards to spend in shops and for the last study (Pallesen et al., 2020) also two mobile phones were among the prizes. No prize represented direct gambling opportunities, e.g., scratch cards. In addition, as the respondents themselves did not stake anything of material value when participating, the drawing of prizes were by definition and according to current legislation not gambling per see. The advantage of the use of incentives has been documented in a previous study showing increased participation in groups who normally have lower representation in surveys (Olsen, Abelsen, & Olsen, 2012). However, in that study all who received the questionnaire received a scratch ticket. In the prevalence studies, only the ones who answered the questionnaire had a chance to win a prize.

Considerations concerning economy and human resources

Collecting data through surveys is demanding both financially and for members of the studied population. The data for Study 1 and 3 was collected after having initially sent out 68,000 letters/questionnaires and thereafter mainly the same content was sent out again to those who didn't respond to the first letter/invitation and to the first reminder

(Pallesen et al., 2014; Pallesen et al., 2020; Pallesen et al., 2016b). In addition, between 25 and 26 thousand respondents have spent time completing the questionnaire. Data for study 2 was collected over 14 years with two surveys each year. This amounted to totally 28,000 respondents contacted from a significant higher amount of initial phone calls (Engebø et al., 2021). By using these data, which originally and mainly were collected for other purposes, I have given the already spent resources another/new purpose and as such reduced the need for financial resources and peoples time to respond to surveys.

Considerations concerning access to research results

How research is published effect the accessibility of research results. I have published Study 2 and 3 in the open access journal, Frontiers in Psychiatry. Study 1 was published with Springer in Journal of Gambling Studies, and the article wasn't published with open access. However, Study 1 is also published in the Bergen Open Research Archive (BORA) (preprint of the final submitted paper) and at the researchers' network ResearchGate. All three articles are as such fully accessible and can freely be shared among those interested.

Considerations concerning conflict of interests

For researchers it is important to be open about different roles and possible conflicts of interests (Staksrud et al., 2021). On one side, I am a researcher connected to the University of Bergen, working on a PhD project. On the other side, I have for many years been working at the Norwegian Gambling Authority. Until June 2023 I was a board member of GREF (Gambling Regulators European Forum). I am a co-chair of GREFs working group on responsible gambling. Further, I am a member of the executive committee of EASG (the European Association for the Study of Gambling). As an adviser with the Norwegian Gambling Authority, I have also met as a member of the World Health Organisations Expert Group on Gambling and Gambling Disorder. Both my work within the gambling authority and in these external organisations have been an inspiration and a resource for my PhD work. In addition to my own efforts, several other mechanisms contribute to secure unbiased research. In my papers and in the current synopsis, I have mostly used international literature and formulated the

research questions with international relevance. The use of existing data has allowed widely examinations of results, and together with wide literature searches this has resulted in unbiased representations of theory and empiricism. Through different stages in the research process, I have made choices. Important choices have not been made by me alone, and I have consulted my supervisors. I am part of several research environments, both in formal networks where e.g., my supervisors have an important role, and in more informal networks where I meet other researchers e.g., at conferences and meetings. Both the formal and the informal research colleagues contribute directly or indirectly to ethical approaches in research. Among the more formal mechanisms is also the peer review process, where reviewers assess if the presented literature is relevant and not biased and if the relationship between research questions, data, analysis and conclusions is reasonable.

4.3 Strengths and limitations

Study 1 and Study 3 are based on data from prevalence studies where the methodological approaches were nearly identical.

Study 1 investigates gamblers view on RG /CP tools and measures which can control gambling consumption. Study 3 investigates the actual use of such measures. Based on these research topics, these two studies are the only studies I know of which is based on samples representing the entire population of gamblers in a country who participate in all available games, land-based and online. Sample sizes were relatively large, but still too small for analyses on single games played by few gamblers. However, analyses were conducted on gamblers participating in groups of games.

I will argue that Study 2 also has qualities which makes the study unique. As far as I know, no other study has used trend data in one dataset over such a long period analysing gambling participation. To prevent seasons as a confounder, the data was collected in June and December every year. Ideally, a study analysing effects from market interventions should include a control group. Further, it would also have been an asset if the study was based on panel data. However, the data covered the three last years before the first market change and the four years after the second. This partly

compensated for not being able to compare the results with a control group and is as such somewhat comparable to a quasi-experimental interrupted time-series design (Campbell, 1969). Panel data would also have been difficult to achieve for a period of 14 years. This would in addition excluded both the new, the young and the oldest gamblers.

For all studies, due to fact that explained variance was small to moderate, it can be questioned whether all the relevant independent variables that could explain variance of the dependent variables were included, both regarding the views and the use of player protection tools, and further for the changes in gambling participation. In Study 1, the explained variance was relatively low. This could indicate that some relevant independent variables were not included in the study of views. Study 3 used to a large degree the same independent variables. The explained variance was however larger, and all variables came out as significant predictors for the gamblers' use of tool and measures to control their gambling behaviour. Study 2 concluded that behavioural changes most likely were caused by market changes at two points in time. With the existing data it was not possible to examine if other causes, e.g., stricter regulation or changes in what games the gamblers prefer, could have affect the alternations found in participation.

All studies are based on self-reported data and response rates are relatively low. As discussed earlier, both issues can lead to biased data. Personal views on the tools and measures as helpful to control personal gambling are inherently subjective in nature, but the personal use of tools and measures can now for many games be measured more precisely with the actual use of objective player account data from registered play. Player account data would also have given more accurate data on gambling participation. A limitation with the real player data is that such data are mostly available for online gambling only, and therefore would not cover the total gambling market (e.g., scratch cards or land-based bingo games) which in my thesis is covered with self-reported survey data. Player account data would thus have comprised representative data or all the data from groups of gamblers.

With self-reported data from surveys with low response rates high level of representativeness may not be achieved. When more than half of a drawn sample fail to respond to surveys, there is a good chance that relevant characteristics or conditions with the respondents are difficult or impossible to weight in an effort to make data more representative.

Another limitation is issues of *cultural differences.* Personal views on tools or measures as helpful to protect gamblers against gambling problems can be affected by cultural differences. A study with focus groups from several countries, Norway not included, showed that the gamblers are more positive to RG tools which can be used based on personal choices than to mandatory tools (Parke, Parke, Rigbye, Suhonen, & Williams, 2012). In Study 1, Norwegian gamblers were positive also to a mandatory measures, i.e., maximum loss limits (Engebø et al., 2019). Further, another study in Norway showed that a large share of the gamblers hold a positive attitude towards mandatory loss limits (Auer et al., 2020). In Study 3, the results showed that gamblers who were not born in Norway used tools and measures more often than those born in Norway. This implies that results from a specific country not necessarily will apply for another country. Another issue that should be mentioned regarding culture is that of language. As all study questions were in Norwegian, people not able to understand Norwegian were in reality excluded from the studies, although they still could be gamblers.

4.4 Implications for practice and future research

The findings from my work have implications for several types of actors with interests in the gambling field. Study 2 is relevant for policy makers and authorities which both legislate and regulate gambling markets. Important keywords from this study are physical and social availability, the total consumption model, and that successful measures to reduce gambling problems often work simultaneously.

Study 2 showed that regulatory measures, implemented to change the physical accessibility have consequences on the gambling participation. The removal of slot machines reduced to a large degree participation on similar games even when new VLTs were introduced as a replacement. Several studies at the time also showed a

reduction in the level of problem gambling. These effects can come directly because of the changed regulation, but both my and other studies showed in addition an indirect effect on overall gambling participation. The latter supports the total consumption model which implicate that regulation in one part of a market can affect other parts, and thus affect the gambling involvement in games which the change was not intended for. The introduction of a regulated alternative of interactive games, e.g., online casino, seemed to have had an intended effect of channelizing gamblers from foreign websites and being a preferred choice to new gamblers. However, some gamblers, still gamble on foreign websites. Different groups of gamblers can prefer the new and regulated alternative with more protective tools: Those who *move* their gambling partly or completely, those who *start gambling and choose* the regulated alternative, and finally those who *start gambling because of* the introduction of a regulated alternative. Study 2 did not differentiate between these reasons. Social elements of availability are present when some can be guided by what is socially acceptable when they choose between gambling alternatives. It is important to mention that the launch of the regulated alternative was not the only regulatory measure at the time. Other restrictive measures towards the foreign websites were working in parallel and were later improved, e.g., regarding marketing and payment transactions. These measures can also have affected gambling participation without this being investigated separately in my study.

Study 1 and 3 have relevance for regulators, gambling operators and treatment providers. In contrast to the regulatory measures discussed in Study 2, the ones discussed in Study 1 and 3 are for gamblers to regulate their own gambling behaviour, or mandatory measures already in place in games. The purpose is still the same, to prevent problems and reduce harm. Keywords from these studies are, internal vs. external tools for responsible gambling, beliefs in tools and actual use of such tool.

External tools for player protection can be seen as a fortification of an internal intention, e.g., to not gamble for more than one can afford to lose. The results in Study 1 showed that different groups of gamblers have different beliefs in measures set by such tools. Study 3 revealed that the actual use of tools also differs between groups. For some groups the belief in the usefulness of RG measures seems to be linked to the

actual use. However, this association was not seen for all groups. Young age was a significant predictor for both a positive view and actual use, whilst gambling on skill games was not a predictor for a positive view but was still a significant predictor for the actual use. This indicates that it might be quicker and easier to reach out to some groups than others when promoting the tools. For other groups it might be important to find a different approach to encourage gamblers to use protective tools before gambling problems occur. In addition, the knowledge of risk factors and the knowledge of predictors for views and actual use are important for the implementation of protective elements in existing or new games.

All three studies shed light on new issues for future research. Some of these issues are mentioned as limitations in my studies. Self-reported data is one limitation. Because an increased share of gambling takes place registered and online, player account data is thus for many games available for research. The use of such data can avoid biases which occur in self-reported data (e.g., when it comes to participation, game spending and gambling frequencies). However, registered player data is restricted to gambling activity where player data is recorded. In Study 2, I used data which had been collected for the Norwegian Gambling Authority over a long period. The purpose with the surveys has all the time been to measure how gambling participation develops in Norway. I used the data from 2005 through 2018. In this way I could analyse the impact of two interventions in the Norwegian market. Potentially larger changes in a market are often known long before they are implemented. When larger market changes or new regulatory measures are planned, future research should be organized in a way that enabled enough data being collected before and after the interventions take place with the main aim to evaluate their effect. In this way researchers could be in a good position to measure potential effects of market interventions. Ideally, a control group should be included. However, if a market change applies for a total market, it is not achievable to include a control group from the same market. An alternative to consider would be to simultaneously carry out a study in a comparable country without the same market changes.

Future research could also pick up some of the themes which are analysed or discussed in my thesis. One task could be to investigate factors which can explain the gamblers' use of internal or external measures to control gambling consumptions. Are there groups of gamblers where an "internal strategy" without any external RG tools is sufficient? Further research is also needed on what role social availability has on gambling participation. A third research item should be issues related the total consumption model. Implications from this model are that intended changes in one game can lead to changes in other games and that an increased average gambling expenditure in a population of gamblers will lead to a relatively large increase in gamblers who have the highest gambling expenditures. One relevant research question would be if there are some games the model is more relevant for than other games. Another relevant question is if RG /CP measures can prevent an increase in the number of people with gambling problems even if there is an increase in the average gambling expenditure in a population.

4.5 Conclusion

This thesis has analysed different methods for regulation with the purpose to prevent gambling problems and reduce harm. Study 1 analysed gamblers' beliefs in tools and measures as helpful to prevent problems, some set by the authority and others set by the gamblers themselves. Study 3 analysed if gamblers used such tools. Both studies found several significant predictors. Study 2 analysed how two large regulatory measures affected gambling participation.

Gamblers with an opinion had relatively often positive beliefs in tools. Of ten specified items, the three most valued were 1) *Prior to gambling, I can set a loss limit in the game*, 2) *Continuous feedback from the game regarding my losses,* and 3) *The game has predefined limits for losses.* Among six tools which are available when gambling, mostly online, the actual use varied from 23.2% for *Pre-commit to affordable amounts,* to 3.4% for both *Download an economical overview of my gambling and Set a time limit to restrict gambling longer than I have intended*. Fewer, 0.8% and 1.0% had contacted help services because of their gambling problems or let others control their

economy. The two large regulatory measures in the Norwegian gambling market, the ban on slot machines in 2007 and the launch of regulated online interactive games in 2014 had significant effects on gambling participation. Firstly, a large decrease after 2007 for slot machines/VLTs specifically and for the total gambling participation was found. Secondly, an increase after 2014, specifically for the participation in online interactive games was detected, albeit no increase was found for the overall gambling participation. The studies have shown that gamblers are not a homogeneous group. Gamblers differ in both their beliefs in RG measures and in the use of such measures. Furthermore, there is not always an association between being positive to tools and actual using them. Regarding the changes in gambling participation, some gender and age differences were seen.

Some of the regulation mechanisms discussed in this thesis can be considered as individualistic approaches to prevention (i.e., the tools gamblers can choose to use) whilst other measures have a population or public health approach (e.g., the removal of the slot machines). Tools or measures seems to be effective when they are implemented together. One example is the ban on slot machines and the subsequently replacement with new video lottery terminals (VLTs). It is conceivable that if the new gambling terminals had not been stricter regulated (i.e., restricted in numbers and types of locations) and neither been equipped with tools for player protection, the level of gambling participation and gambling problems would not have decreased.

5. References

Abbott, M. (2020a). The changing epidemiology of gambling disorder and gambling-related harm: public health implications. *Public health, 184*, 41-45.

Abbott, M. (2020b). Gambling control and public health: Let's be really honest. *International Journal of Mental Health and Addiction, 18*(3), 825-834.

Abbott, M., Stone, C. A., Billi, R., & Yeung, K. (2016). Gambling and Problem Gambling in Victoria, Australia: Changes over 5 years. *Journal of Gambling Studies, 32*(1), 47-78. doi:10.1007/s10899-015-9542-1

Allami, Y., Hodgins, D. C., Young, M., Brunelle, N., Currie, S., Dufour, M., . . . Nadeau, L. (2021). A meta-analysis of problem gambling risk factors in the general adult population. *Addiction, 116*(11), 2968-2977.

American Psychiatric Association. (1980). *Diagnostic and Statistical Manual of Mental Disorders (3rd ed.).* (Fifth edition, text revision. ed.). Washington, DC: American Psychiatric Association Publishing.

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders: DSM-IV* (Vol. 4): American psychiatric association Washington, DC.

American Psychiatric Association. (2022). *Diagnostic and statistical manual of mental disorders : DSM-5-TR* (Fifth edition, text revision. ed.). Washington, DC: American Psychiatric Association Publishing.

Auer, M., Littler, A., & Griffiths, M. D. (2015). Legal aspects of responsible gaming pre-commitment and personal feedback initiatives. *Gaming Law Review and Economics, 6*, 444-456.

Auer, M., Reiestad, S. H., & Griffiths, M. D. (2020). Global Limit Setting as a Responsible Gambling Tool: What Do Players Think? *International Journal of Mental Health and Addiction, 18*(1), 14-26. doi:10.1007/s11469-018-9892-x

Back, K.-I., Williams, R. J., & Lee, C.-K. (2015). Reliability and validity of three instruments (DSM-IV, CPGI, and PPGM) in the assessment of problem gambling in South Korea. *Journal of Gambling Studies, 31*, 775-786.

Becker, T. (2011). *Soziale Kosten des Glücksspiels in Deutschland*. Frankfurt am Main: Lang.

Bijker, R., Booth, N., Merkouris, S. S., Dowling, N. A., & Rodda, S. N. (2022). Global prevalence of help-seeking for problem gambling: A systematic review and meta-analysis. *Addiction, 117*(12), 2972-2985.

Binde, P., & Romild, U. (2019). Self-Reported Negative Influence of Gambling Advertising in a Swedish Population-Based Sample. *Journal of Gambling Studies, 35*(2), 709-724. doi:10.1007/s10899-018-9791-x

Bjørseth, B., Simensen, J. O., Bjørnethun, A., Griffiths, M. D., Erevik, E. K., Leino, T., & Pallesen, S. (2021). The effects of responsible gambling pop-up messages on gambling behaviors and cognitions: A systematic review and meta-analysis. *Frontiers in Psychiatry, 11*, 601800.

Blaszczynski, A., Ladouceur, R., & Shaffer, H. J. (2004). A science-based framework for responsible gambling: The Reno model. *Journal of Gambling Studies, 20*(3), 301-317. doi:10.1023/B:JOGS.0000040281.49444.e2

Blaszczynski, A., & Nower, L. (2002). A pathways model of problem and pathological gambling. *Addiction, 97*(5), 487-499.

Bodor, D., Ricijaš, N., & Filipcic, I. (2021). Treatment of gambling disorder: review of evidence-based aspects for best practice. *Current Opinion in Psychiatry, 34*(5), 508-513.

Borch, A. (2018). Why restrict? Seven explanations for the electronic gambling machines monopoly in Norway. In M. Egerer, V. Marionneau, & J. Nikkinen (Eds.), *Gambling policies in European welfare states: Current Challenges and Future Prospects* (pp. 175-195): Palgrave Macmillan.

Boyle, G. J., Matthews, G., & Saklofske, D. H. (2008). *The SAGE Handbook of Personality Theory and Assessment: Volume 1 - Personality theories and models* [1](Vol. 1, pp. 1-30). doi:10.4135/9781849200462

Brazeau, B. W., & Hodgins, D. C. (2022). Psychometric evaluation of the NORC diagnostic screen for gambling problems (NODS) for the assessment of DSM-5 gambling disorder. *Addictive behaviors, 130*, 107310.

Browne, M., Greer, N., Armstrong, T., Doran, C., Kinchin, I., Langham, E., & Rockloff, M. (2017). *The social cost of gambling to Victoria*. Melbourne: Victorian Responsible Gambling Foundation.

Browne, M., Rawat, V., Tulloch, C., Murray-Boyle, C., & Rockloff, M. (2021). The Evolution of Gambling-Related Harm Measurement: Lessons from the Last Decade. *International Journal of Environmental Research and Public Health, 18*(9), 4395.

Byrnes, J. P., Miller, D. C., & Schafer, W. D. (1999). Gender differences in risk taking: A meta-analysis. *Psychological Bulletin, 125*(3), 367-383. doi:10.1037/0033-2909.125.3.367

Calado, F., Alexandre, J., & Griffiths, M. D. (2017). Prevalence of adolescent problem gambling: A systematic review of recent research. *Journal of Gambling Studies, 33*, 397-424.

Calado, F., & Griffiths, M. D. (2016). Problem gambling worldwide: An update and systematic review of empirical research (2000–2015). *Journal of behavioral addictions, 5*(4), 592-613.

Campbell, D. T. (1969). Reforms as experiments. *American psychologist, 24*(4), 409.

Canale, N., Vieno, A., & Griffiths, M. D. (2016). The Extent and Distribution of Gambling-Related Harms and the Prevention Paradox in a British Population Survey. *Journal of behavioral addictions, 5*(2), 204-212. doi:10.1556/2006.5.2016.023

Caplan, G. (1964). *Principles of preventive psychiatry*: Basic Books.

Cernat, A., & Toepoel, V. (2022). How do social and economic status impact measurement error? *International Journal of Social Research Methodology*, 1-19. doi:10.1080/13645579.2022.2122227

Cohen, G., & Duffy, J. C. (2002). Are nonrespondents to health surveys less healthy than respondents? *Journal of Official Statistics, 18*(1), 13.

Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences*. Florence: Florence: Taylor and Francis.

Collins, P., Blaszczynski, A., Ladouceur, R., Shaffer, H. J., Fong, D., & Venisse, J.-L. (2015). Responsible gambling: Conceptual considerations. *Gaming Law Review and Economics, 19*(8), 594-599.

Cortina, J. M. (1993). What is coefficient alpha? An examination of theory and applications. *Journal of applied psychology, 78*(1), 98.

Coughlin, S. S. (1990). Recall bias in epidemiologic studies. *Journal of clinical epidemiology, 43(1)*, 87-91. doi:10.1016/0895-4356(90)90060-3

Cousins, J. B. (2018). *Evaluation of Gamgard: A tool to identify gaming risks to vulnerable players under 'normal' playing conditions*. Ottawa, Ontario, Canada: University of Ottawa.

Cowlishaw, S., Merkouris, S., Dowling, N., Anderson, C., Jackson, A., & Thomas, S. (2012). Psychological therapies for pathological and problem gambling. *Cochrane Database of Systematic Reviews*(11).

Cox, B. J., Kwong, J., Michaud, V., & Enns, M. W. (2000). Problem and probable pathological gambling: Considerations from a community survey. *The Canadian Journal of Psychiatry, 45*(6), 548-553.

Delfabbro, P. H., & King, D. (2022). Conceptual and methodological issues in pathways model research. *International Gambling Studies, 22*(2), 211-221.

Delfabbro, P. H., & King, D. L. (2021). The value of voluntary vs. mandatory responsible gambling limit-setting systems: A review of the evidence. *International Gambling Studies, 21*(2), 255-271. doi:10.1080/14459795.2020.1853196

Delfabbro, P. H., King, D. L., Browne, M., & Dowling, N. A. (2020). Do EGMs have a Stronger Association with Problem Gambling than Racing and Casino Table Games? Evidence from a Decade of Australian Prevalence Studies. *Journal of Gambling Studies, 36*(2), 499-511. doi:10.1007/s10899-020-09950-5

Derevensky, J. L., Gupta, R., & Messerlian, C. (2007). *The Effects of Gambling Advertising Questionnaire (EGAQ)*. Montreal: McGill University.

Dillman, D. A., Smyth, J. D., & Christian, L. M. (2014). *Internet, Phone, Mail, and Mixed-Mode Surveys : The Tailored Design Method*. New York, UNITED STATES: John Wiley & Sons, Incorporated.

Donnellan, M. B., Oswald, F. L., Baird, B. M., & Lucas, R. E. (2006). The Mini-IPIP Scales: Tiny-yet-effective measures of the Big Five Factors of Personality. *Psychological Assessment, 18*(2), 192-203. doi:10.1037/1040-3590.18.2.192

Drost, E. A. (2011). Validity and reliability in social science research. *Education Research and perspectives, 38*(1), 105-123.

EFTA Court. (2007). Case E-1/06, 14 March 2007, EFTA Surveillance Authority v The Kingdom of Norway. Retrieved from https://eftacourt.int/download/1-06-judgment/?wpdmdl=1087

Engebø, J., Torsheim, T., Mentzoni, R. A., Molde, H., & Pallesen, S. (2019). Predictors of Gamblers Beliefs About Responsible Gambling Measures. *Journal of Gambling Studies*. doi:10.1007/s10899-019-09835-2

Engebø, J., Torsheim, T., & Pallesen, S. (2021). Regulatory Measures' Effect on Gambling Participation: Experiences From Norway. *Frontiers in Psychiatry, 12*. doi:10.3389/fpsyt.2021.672471

Engebø, J., Torsheim, T., & Pallesen, S. (2022). Gamblers' use of measures to prevent gambling problems and reduce harm. *Frontiers in Psychiatry, 13*. doi:10.3389/fpsyt.2022.857280

European Commission, Directorate-General for Internal Market, I. E., Smes, Ibosiola, D., Littler, A., Hörnle, J., . . . Tyson, G. (2019). *Evaluation of regulatory tools for enforcing online gambling rules and channelling demand towards controlled offers*: Publications Office.

Fauth-Bühler, M., Mann, K., & Potenza, M. N. (2017). Pathological gambling: a review of the neurobiological evidence relevant for its classification as an addictive disorder. *Addiction biology, 22*(4), 885-897.

Ferguson, C. J. (2016). An effect size primer: A guide for clinicians and researchers. In E. A. Kazdin (Ed.), *Methodological issues and strategies in clinical research* (pp. 301–310): American Psychological Association.

Ferris, J., & Wynne, H. (2001). *The Canadian problem gambling index: Final report*. Ottawa: Canadian Centre on Substance Abuse.

Fiedler, I., Kairouz, S., Costes, J.-M., & Weißmüller, K. S. (2019). Gambling spending and its concentration on problem gamblers. *Journal of Business Research, 98*, 82-91. doi:https://doi.org/10.1016/j.jbusres.2019.01.040

Fiedler, I., Kairouz, S., & Reynolds, J. (2021). Corporate social responsibility vs. financial interests: the case of responsible gambling programs. *Journal of Public Health, 29*(4), 993-1000. doi:10.1007/s10389-020-01219-w

Frith, B., Beetham, J., Thomas, J., & Malcolm, L. (2021). *Gamgard Evaluation Final report*. Retrieved from WSP New Zealand Limited: https://www.health.govt.nz/system/files/documents/publications/gamgard-evaluation-final-report.pdf

Gainsbury, S. M., Angus, D. J., Procter, L., & Blaszczynski, A. (2020). Use of Consumer Protection Tools on Internet Gambling Sites: Customer Perceptions, Motivators, and Barriers to Use. *Journal of Gambling Studies, 36*(1), 259-276. doi:10.1007/s10899-019-09859-8

Gainsbury, S. M., Hing, N., & Suhonen, N. (2014). Professional Help-Seeking for Gambling Problems: Awareness, Barriers and Motivators for Treatment. *Journal of Gambling Studies, 30*(2), 503-519. doi:10.1007/s10899-013-9373-x

Gainsbury, S. M., Parke, J., & Suhonen, N. (2013). Consumer attitudes towards Internet gambling: Perceptions of responsible gambling policies, consumer protection, and regulation of online gambling sites. *Computers in Human Behavior, 29*(1), 235-245. doi:https://doi.org/10.1016/j.chb.2012.08.010

Gamgard. (2018). Welcome to Gamgard. Retrieved from www.gamgard.com

Gamres. (2018). Gamgard Version 3.0 has launched! Retrieved from http://gamres.org/gamgard-version-3-0-launched-2/

Global Betting & Gaming Consultants. (2020). Retrieved from https://www.gbgc.com/

Glouberman, S., & Millar, J. (2003). Evolution of the Determinants of Health, Health Policy, and Health Information Systems in Canada. *American Journal of Public Health, 93*(3), 388-392. doi:10.2105/AJPH.93.3.388

Gnambs, T., & Kaspar, K. (2015). Disclosure of sensitive behaviors across self-administered survey modes: a meta-analysis. *Behavior research methods, 47*, 1237-1259.

Goodwin, B. C., Browne, M., Rockloff, M., & Rose, J. (2017). A typical problem gambler affects six others. *International Gambling Studies, 17*(2), 276-289. doi:10.1080/14459795.2017.1331252

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

Griffiths, M. D., Shonin, E., & Van Gordon, W. (2016). Mindfulness as a treatment for gambling disorder: Current directions and issues. *Journal of Gambling and Commercial Gaming Research, 1*(1), 47-52.

Grimm, P. (2010). Social desirability bias. In J. N. Sheth & N. Malhotra, K, (Eds.), *Wiley international encyclopedia of marketing*. New York, USA: John Wiley & Sons.

Guyer, J. J., & Fabrigar, L. R. (2015). Attitudes and behavior. In J. D. Wright (Ed.), *International Encyclopedia of the Social & Behavioral Sciences* (2 ed., pp. 183-189): Elsevier Ltd.

H2 Gambling Capital. (2020). Retrieved from https://h2gc.com/

Hage, S. M., & Romano, J. L. (2010). History of prevention and prevention groups: Legacy for the 21st century. *Group Dynamics: Theory, Research, and Practice, 14*, 199-210. doi:10.1037/a0020736

Hancock, L., & Smith, G. (2017). Critiquing the Reno Model I-IV international influence on regulators and governments (2004–2015)—the distorted reality of "responsible gambling". *International Journal of Mental Health and Addiction, 15*(6), 1151-1176.

Hansen, M., & Rossow, I. (2010). Limited Cash Flow on Slot Machines: Effects of Prohibition of Note Acceptors on Adolescent Gambling Behaviour. *International Journal of Mental Health and Addiction, 8*(1), 70-81. doi:10.1007/s11469-009-9196-2

Hansen, M., & Rossow, I. (2012). Does a reduction in the overall amount of gambling imply a reduction at all levels of gambling? *Addiction Research & Theory, 20*(2), 145-152. doi:10.3109/16066359.2011.605968

Hanss, D., Mentzoni, R. A., Griffiths, M. D., & Pallesen, S. (2015). The Impact of Gambling Advertising: Problem Gamblers Report Stronger Impacts on Involvement, Knowledge, and Awareness Than Recreational Gamblers. *Psychol. Addict. Behav., 29*(2), 483-491. doi:10.1037/adb0000062

Harris, C. R., Jenkins, M., & Glaser, D. (2006). Gender Differences in Risk Assessment: Why do Women Take Fewer Risks than Men? *Judgment and Decision Making,, 1*(1).

Hing, N., & Haw, J. (2009). The development of a multi-dimensional gambling accessibility scale. *J Gambl Stud, 25*(4), 569-581. doi:10.1007/s10899-009-9144-x

Hjelpelinjen. (2023). Hjelpelinjen, [The Norwegian helpline for problem gamblers]. Retrieved from https://hjelpelinjen.no/

Hodgins, D. C. (2004). Using the NORC DSM Screen for Gambling Problems as an outcome measure for pathological gambling: psychometric evaluation. *Addictive behaviors, 29*(8), 1685-1690. doi:https://doi.org/10.1016/j.addbeh.2004.03.017

Hodgins, D. C., Brunelle, N., Flores-Pajot, M.-C., Paradis, C., Young, M., Currie, S., . . . Nadeau, L. (2021). Developing Lower-Risk Gambling Guidelines. Retrieved from https://gamblingguidelines.ca/app/uploads/2021/01/LRGG-Developing-Lower-Risk-Gambling-Guidelines-Report-in-Short-2021-en.pdf

Hofmarcher, T., Gustafsson, A., & Hjalte, F. (2022). *Samhällets kostnader før spelproblem i Sverige 2021. "Society's costs from problem gambling in Sweden " IHE Rapport 2022:13*. Retrieved from Institutet för Hälso- och Sjukvårdsekonomi:

Hofmarcher, T., Gustafsson, A., & Persson, U. (2020). *Samhällets kostnader før spelproblem i Sverige (2020:1). "Society's costs from problem gambling in Sweden " IHE Rapport 2020:1*. Retrieved from Institutet för Hälso- och Sjukvårdsekonomi:

Hopfgartner, N., Auer, M., Helic, D., & Griffiths, M. D. (2023). The Efficacy of Voluntary Self-Exclusions in Reducing Gambling Among a Real-World Sample of British Online Casino Players. *Journal of Gambling Studies*. doi:10.1007/s10899-023-10198-y

Jiménez-Murcia, S., Álvarez-Moya, E. M., Granero, R., Neus Aymami, M., Gómez-Peña, M., Jaurrieta, N., . . . Vallejo, J. (2007). Cognitive–behavioral group treatment for pathological gambling: analysis of effectiveness and predictors of therapy outcome. *Psychotherapy Research, 17*(5), 544-552.

Johansson, A., Grant, J. E., Kim, S. W., Odlaug, B. L., & Götestam, K. G. (2009). Risk Factors for Problematic Gambling: A Critical Literature Review. *Journal of Gambling Studies, 25*(1), 67-92. doi:10.1007/s10899-008-9088-6

Johnson, E. E., Hamer, R., Nora, R. M., Tan, B., Eisenstein, N., & Engelhart, C. (1997). The Lie/Bet Questionnaire for screening pathological gamblers. *Psychological reports, 80*(1), 83-88.

Kim, H.-Y. (2017). Statistical notes for clinical researchers: Chi-squared test and Fisher's exact test. *Restorative dentistry & endodontics, 42*(2), 152-155.

Kowatch, K. R., & Hodgins, D. C. (2015). Predictors of help-seeking for gambling disorder from the transtheoretical model perspective. *International Gambling Studies, 15*(3), 450-469. doi:10.1080/14459795.2015.1078391

Kraus, S. W., Etuk, R., & Potenza, M. N. (2020). Current pharmacotherapy for gambling disorder: a systematic review. *Expert Opinion on Pharmacotherapy, 21*(3), 287-296.

Kristensen, J. H., Leino, T., & Pallesen, S. (2022). *Den samfunnsøkonomiske kostnaden av problemspilling i Norge*: Universitetet i Bergen Institutt for, samfunnspsykologi.

Ladouceur, R., Shaffer, P., Blaszczynski, A., & Shaffer, H. J. (2017). Responsible gambling: a synthesis of the empirical evidence. *Addiction Research & Theory, 25*(3), 225-235. doi:10.1080/16066359.2016.1245294

Langham, E., Thorne, H., Browne, M., Donaldson, P., Rose, J., & Rockloff, M. (2016). Understanding gambling related harm: a proposed definition, conceptual framework, and taxonomy of harms. *BMC Public Health, 16*(79), 80-80. doi:10.1186/s12889-016-2747-0

Latvala, T., Alho, H., Raisamo, S., & Salonen, A. H. (2019). Gambling involvement, type of gambling and grade point average among 18–29-year-old Finnish men and women. *Nordic Studies on Alcohol and Drugs, 36*(2), 190-202. doi:10.1177/1455072518800189

Lesieur, H. R., & Blume, S. B. (1987). The South Oaks Gambling Screen (SOGS): a new instrument for the identification of pathological gamblers. *American Journal of Psychiatry, 144*, 1184–1188.

Lind, K., Castrén, S., Hagfors, H., & Salonen, A. H. (2022). Harm as reported by affected others: A population-based cross-sectional Finnish Gambling 2019 study. *Addictive Behaviors, 129*, 107263. doi:https://doi.org/10.1016/j.addbeh.2022.107263

Livingstone, C., & Rintoul, A. (2020). Moving on from responsible gambling: a new discourse is needed to prevent and minimise harm from gambling. *Public health, 184*, 107-112. doi:10.1016/j.puhe.2020.03.018

Lucchini, F., & Comi, S. L. (2022). Social Costs of Gambling Harm in Italy. *Critical Gambling Studies, 3*(1), 71-82. doi:10.29173/cgs50

Lund, I. (2009). Gambling behaviour and the prevalence of gambling problems in adult EGM gamblers when EGMs are banned. A natural experiment. *J Gambl Stud, 25*(2), 215-225. doi:10.1007/s10899-009-9127-y

Mason, C. H., & Perreault, W. D. (1991). Collinearity, Power, and Interpretation of Multiple Regression Analysis. *Journal of marketing research, 28*(3), 268. doi:10.2307/3172863

Maynard, B. R., Wilson, A. N., Labuzienski, E., & Whiting, S. W. (2018). Mindfulness-based approaches in the treatment of disordered gambling: A systematic review and meta-analysis. *Research on Social Work Practice, 28*(3), 348-362.

Meerkerk, G.-J. (2022). *Gambling legislation on duty of care and limit setting in 22 European countries*. Retrieved from The Kansspelautoriteit, The Haguee https://kansspelautoriteit.nl/publish/library/17/onderzoek_meerkerk_engelse_samenvatting_juli_2022.pdf

Mentzoni, R. A. (2013). *Structural characteristics in gambling (Doctoral thesis, University of Bergen, Bergen, Norway)*. Retrieved from Bergen: http://bora.uib.no/handle/1956/6542

Meyer, G., Fiebig, M., Häfeli, J., & Mörsen, C. (2011). Development of an assessment tool to evaluate the risk potential of different gambling types. *International Gambling Studies, 11*(2), 221-236. doi:10.1080/14459795.2011.584890

Meyer, G., & Hayer, T. (2023). Schadensbegrenzung beim Gl?cksspiel. *Pr?vention und Gesundheitsf?rderung, 18*(1), 1-9. doi:10.1007/s11553-021-00924-y

Miller, W. R., & Rollnick, S. (2002). *Motivational interviewing: Preparing people to change. 2nd edn. New York: Guilford Press, 2002*.

Ministry of Culture. (2012). *Handlingsplan mot spillproblemer (2013-2015) Action plan against gaming and gambling problems (2013-2015)*. Oslo, Norway Retrieved from https://www.regjeringen.no/globalassets/upload/kud/spill_og_lotteri/handlingsplan_mot_spillproblemer_des2012.pdf

Ministry of Culture. (2015). *Handlingsplan mot spilleproblemer (2016-2018) Action plan against gaming and gambling problems (2016-2018)*. Oslo, Norway Retrieved from https://www.regjeringen.no/contentassets/2b4b872673364d5a986164dca96b54c8/handlingsplan_mot_spilleproblemer_2016-2018.pdf

Ministry of Culture. (2018). *Handlingsplan mot spilleproblemer (2019-2021) Action plan against gaming and gambling problems (2019-2021)*. Oslo, Norway Retrieved from https://www.regjeringen.no/contentassets/a0c68b4328354008b2fceb011ce444a4/v-1007_handlingsplan-mot-spilleproblemer-2019-2021-.pdf

Ministry of Culture. (2021). *Lov om pengespill (pengespilloven) (Prop. 220 L. (2020-2021), Proposal from the Government for the new gambling act (Resolutions to the Storting)*. Oslo, Norway Retrieved from https://www.regjeringen.no/contentassets/f895d0afb711490c87335a6def4c91df/no/pdfs/prp202020210220000dddpdfs.pdf

Ministry of Culture and Church Affairs. (2005). *Regjeringens handlingsplan mot pengespillproblemer The governments action plan against gambling problems*. Oslo, Norway Retrieved from https://www.regjeringen.no/globalassets/upload/kilde/kkd/pla/2005/0001/ddd/pdfv/256181-handlingplan_-spilleproblemer-190405.rtf.pdf

Ministry of Culture and Church Affairs. (2009). *Handlingsplan mot spillproblemer (2009-2011) Action plan against gaming and gambling problems (2009-2011)*. Oslo, Norway Retrieved from https://www.regjeringen.no/globalassets/upload/kkd/pengespill-og-lotteri/handlingsplan_spillavhengig_2009.pdf

Ministry of Culture and Equalitiy. (2022). *Handlingsplan mot spilleproblemer 2022–2025 (Action plan against gaming and gambling problems 2022-2025)* Oslo, Norway Retrieved from https://www.regjeringen.no/no/dokumenter/handlingsplan-mot-spilleproblemer-2022-2025/id2902612/

Ministry of Culture and Equality. (2016–2017). *Meld. St. 12, Alt å vinne , ein ansvarleg og aktiv pengespelpolitikk 2016, white paper about a responible and activ gambling poliy in 2016, Minstry of Culture* Retrieved from https://www.regjeringen.no/contentassets/1d7855fb977943b6b748f0694f697148/nn-no/pdfs/stm201620170012000dddpdfs.pdf

Nikkinen, J., Egerer, M., & Marionneau, V. (2018). Introduction: Gambling regulations and the use of gambling revenues in European welfare states. In *European welfare states. Gambling policies in European welfare states: Current challenges and future prospects* (pp. 1-14): Palgrave Macmillan.

Norwegian Gambling Authority. (2023). Retrieved from https://lottstift.no/rapportar-og-publikasjonar/

Norwegian Media Authority. (2023). Retrieved from https://www.medietilsynet.no

Nower, L., Blaszczynski, A., & Anthony, W. L. (2022). Clarifying gambling subtypes: The revised pathways model of problem gambling. *Addiction, 117*(7), 2000-2008.

Olsen, F., Abelsen, B., & Olsen, J. A. (2012). Improving response rate and quality of survey data with a scratch lottery ticket incentive. *BMC Medical Research Methodology, 12*, 1-6.

Pallant, J. (2016). *SPSS survival manual : a step by step guide to data analysis using IBM SPSS*: Sixth edition. Maidenhead : Open University Press/McGraw-Hill, 2016.

Pallesen, S., Hanss, D., Mentzoni, R. A., Molde, H., & Morken, A. M. (2014). *Omfang av penge- og*

dataspillproblemer i Norge 2013. Retrieved from Bergen:

Pallesen, S., Mentzoni, R. A., Morken, A. M., Engebø, J., Kaur, P., & Erevik, E. K. (2021). Changes Over Time and Predictors of Online Gambling in Three Norwegian Population Studies 2013–2019. *Frontiers in Psychiatry, 12*(390). doi:10.3389/fpsyt.2021.597615

Pallesen, S., Mentzoni, R. A., Torsheim, T., Erevik, E., Molde, H., & Morken, A. M. (2020). *Omfang av Penge- og dataspillproblemer i Norge 2019*. Bergen: Universitetet i Bergen, Institutt for samfunnspsykologi.

Pallesen, S., Molde, H., Mentzoni, R. A., Hanss, D., & Morken, A. M. (2016a). *Endring av penge- og dataspillproblemer i Norge 2013-2015*. Bergen: Universitetet i Bergen, Institutt for samfunnspsykologi.

Pallesen, S., Molde, H., Mentzoni, R. A., Hanss, D., & Morken, A. M. (2016b). *Omfang av penge- og dataspillproblemer i Norge 2015.* Bergen: Universitetet i Bergen

Parke, J., Parke, A., Rigbye, J., Suhonen, N., & Williams, L. V. (2012). The eCOGRA global online gambler report. *Routledge international handbook of internet gambling*, 140-160.

Pengespilloven (2022) § 2. *Lov om pengespill LOV-2022-03-18-12 The gambling act*. Retrieved from https://lovdata.no/LTI/lov/2022-03-18-12

Petry, N. M., Ginley, M. K., & Rash, C. J. (2017). A systematic review of treatments for problem gambling. *Psychology of Addictive Behaviors, 31*(8), 951.

Phillips, G. W., & Jiang, T. (2016). Measurement error and equating error in power analysis. *Practical Assessment, Research, and Evaluation, 21*(1), 9.

Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: a critical review of the literature and recommended remedies. *Journal of applied psychology, 88*(5), 879.

Potenza, M. N., Balodis, I. M., Derevensky, J., Grant, J. E., Petry, N. M., Verdejo-Garcia, A., & Yip, S. W. (2019). Gambling disorder. *Nature reviews Disease primers, 5*(1), 51.

Price, A., Hilbrecht, M., & Billi, R. (2021). Charting a path towards a public health approach for gambling harm prevention. *Journal of Public Health, 29*(1), 37-53. doi:10.1007/s10389-020-01437-2

Prop L 44. (2002-2003). *Om lov om endringer i pengespill- og lotterilovgivningen 2003, white paper about law on changes in the gambling and lottery legislation in 2003, Ministry of Culture*. Retrieved from https://www.regjeringen.no/no/dokumenter/otprp-nr-44-2002-2003-/id172752/

Radermacher, H., Dickins, M., Anderson, C., & Feldman, S. (2017). Perceptions of Gambling in Tamil and Chinese Communities in Australia: The Role of Saving Face in Perpetuating Gambling Stigma and Hindering Help Seeking. In (pp. 77-99). Toronto.

Raphael, K. (1987). Recall bias: a proposal for assessment and control. *International Journal of Epidemiology, 16*(2), 167-170.

Rash, C. J., & Petry, N. M. (2014). Psychological treatments for gambling disorder. *Psychology research and behavior management*, 285-295.

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

Revheim, T., & Buvik, K. (2009). Opportunity structure for gambling and problem gambling among employees in the transport industry. *International Journal of Mental Health and Addiction, 7*(1), 217-228.

Rizeanu, S. (2012). Proposal for a cognitive model to the treatment of pathological gambling. *Procedia-Social and Behavioral Sciences, 33*, 742-746.

Rolison, J. J., Hanoch, Y., Wood, S., & Liu, P.-J. (2014). Risk-Taking Differences Across the Adult Life Span: A Question of Age and Domain. *The Journals of Gerontology: Series B, 69*(6), 870-880. doi:10.1093/geronb/gbt081

Romild, U., Svensson, J., & Volberg, R. (2016). A gender perspective on gambling clusters in Sweden using longitudinal data. *Nordic Studies on Alcohol and Drugs, 33*(1), 43-60. doi:10.1515/nsad-2016-0004

Rose, G. (1981). Strategy of prevention: lessons from cardiovascular disease. *British medical journal (Clinical research ed.), 282*(6279), 1847.

Rose, G. (2001). Sick individuals and sick populations. *International Journal of Epidemiology, 30*(3), 427-432. doi:10.1093/ije/30.3.427

Rose, G., & Day, S. (1990). The population mean predicts the number of deviant individuals. *British Medical Journal, 301*(6759), 1031-1034.

Rose, G., Khaw, K.-T., & Marmot, M. (2008). *Rose's strategy of preventive medicine: the complete original text*: Oxford University Press.

Rossow, I. (2019). The total consumption model applied to gambling: Empirical validity and implications for gambling policy. *Nordic Studies on Alcohol and Drugs, 36*(2), 66-76. doi:10.1177/1455072518794016

Rossow, I., & Hansen, M. B. (2016). Gambling and gambling policy in Norway—an exceptional case. *Addiction, 111*(4), 593-598. doi:10.1111/add.13172

Sagoe, D., Griffiths, M. D., Erevik, E. K., Høyland, T., Leino, T., Lande, I. A., . . . Pallesen, S. (2021). Internet-based treatment of gambling problems: A systematic review and meta-analysis of randomized controlled trials. *Journal of behavioral addictions, 10*(3), 546-565.

Salmond, S. S. (2008). Evaluating the reliability and validity of measurement instruments. *Orthopaedic Nursing, 27*(1), 28-30.

Schmidt, F. L., Le, H., & Ilies, R. (2003). Beyond alpha: An empirical examination of the effects of different sources of measurement error on reliability estimates for measures of individual-differences constructs. *Psychological methods, 8*(2), 206.

Shaffer, H. J., Blaszczynski, A., & Ladouceur, R. (2020a). Considering the public health and Reno models: Strategic and tactical approaches for dealing with gambling-related harms. *International Journal of Mental Health and Addiction, 18*(3), 806-818.

Shaffer, H. J., Blaszczynski, A., & Ladouceur, R. (2020b). Gambling control and public health: let's be honest. *International Journal of Mental Health and Addiction, 18*(3), 819-824.

Shaffer, H. J., Ladouceur, R., Blaszczynski, A., & Whyte, K. (2016). Extending the RENO model: Clinical and ethical applications. *American Journal of Orthopsychiatry, 86*(3), 297-309. doi:10.1037/ort0000123

Shonin, E., Van Gordon, W., & Griffiths, M. D. (2014). Are there risks associated with using mindfulness for the treatment of psychopathology? *Clinical Practice, 11*(4), 389-392.

Sletten, M. A., Soest, T. v., Frøyland, L. R., Torgersen, L., & Hansen, M. (2010). Uskyldig moro? In: Oslo Metropolitan University - OsloMet: NOVA.

Slutske, W. S. (2006). Natural recovery and treatment-seeking in pathological gambling: Results of two US national surveys. *American Journal of Psychiatry, 163*(2), 297-302.

Staksrud, E., Kolstad, I., Bang, K., Bomann-Larsen, L., Fretheim, K., Granaas, R., . . . Johnsen, R. (2021). *Forskningsetiske retningslinjer for samfunnsvitenskap og humaniora* De nasjonale forskningsetiske komiteene.

Statistics Norway. (2021). *Utdanning og lønnsnivå hos innvandrere, (Education and income level for immigrants).* Retrieved from https://www.ssb.no/arbeid-og-lonn/artikler-og-publikasjoner/utdanning-og-lonnsniva-hos-innvandrere

Stinchfield, R. (2002). Reliability, validity, and classification accuracy of the South Oaks Gambling Screen (SOGS). *Addictive behaviors, 27*(1), 1-19.

Stortinget. (2022). Vedtak til lov om pengespill (pengespilloven). *The Norwegian Parliament's decision to the Gambling Act (The Gambling Act.)*. Retrieved from https://www.stortinget.no/no/Saker-og-publikasjoner/Vedtak/Beslutninger/Lovvedtak/2021-2022/vedtak-202122-039/

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

Sulkunen, P., Babor, T. F., Ornberg, J. C., Egerer, M., Hellman, M., Livingstone, C., . . . Room, R. (2018). *Setting limits: Gambling, science and public policy*: Oxford University Press.

Suurvali, H., Hodgins, D., Toneatto, T., & Cunningham, J. (2008). Treatment Seeking Among Ontario Problem Gamblers: Results of a Population Survey. *Psychiatr Serv, 59*(11), 1343-1346. doi:10.1176/ps.2008.59.11.1343

Suurvali, H., Hodgins, D. C., & Cunningham, J. A. (2009). Motivators for Resolving or Seeking Help for Gambling Problems: A Review of the Empirical Literature. *Journal of Gambling Studies, 26*(1), 1-33. doi:10.1007/s10899-009-9151-y

Svetieva, E., & Walker, M. (2008). Inconsistency between concept and measurement: the Canadian Problem Gambling Index (CPGI). *Journal of Gambling Issues, 22*(1), 157-173.

Toneatto, T. (2008). A cognitive-behavioral analysis of Gamblers Anonymous. *Journal of Gambling Issues*(21), 68-79.

van Schalkwyk, M. C., Cassidy, R., McKee, M., & Petticrew, M. (2019). Gambling control: in support of a public health response to gambling. *Lancet (London, England), 393*(10182), 1680-1681.

van Schalkwyk, M. C., Petticrew, M., Cassidy, R., Adams, P., McKee, M., Reynolds, J., & Orford, J. (2021). A public health approach to gambling regulation: countering powerful influences. *The Lancet Public Health, 6*(8), e614-e619.

Velasco, V., Scattola, P., Gavazzeni, L., Marchesi, L., Nita, I. E., & Giudici, G. (2021). Prevention and Harm Reduction Interventions for Adult Gambling at the Local Level: An Umbrella Review of Empirical Evidence. *International Journal of Environmental Research and Public Health, 18*(18), 9484. Retrieved from https://www.mdpi.com/1660-4601/18/18/9484

Wardle, H., Reith, G., Langham, E., & Rogers, R. (2019). Gambling and public health: we need policy action to prevent harm', BMJ, 365, l1807. In.

Williams, B. M., Browne, M., Rockloff, M., Stuart, G., & Smith, B. P. (2021). Protective Action and Risky Beliefs: The Relationship Between Religion and Gambling Fallacies. *Journal of Gambling Studies*. doi:10.1007/s10899-021-10028-z

Williams, R. J., & Volberg, R. A. (2010). *Best practices in the population assessment of problem gambling. Report prepared for the Ontario Problem Gambling Research Centre*. Retrieved from Guelph, Ontario, CANADA:

Williams, R. J., & Volberg, R. A. (2014). The classification accuracy of four problem gambling assessment instruments in population research. *International Gambling Studies, 14*(1), 15-28. doi:10.1080/14459795.2013.839731

Wilson, A. N., Salas-Wright, C. P., Vaughn, M. G., & Maynard, B. R. (2015). Gambling prevalence rates among immigrants: A multigenerational examination. *Addictive Behaviors, 42*, 79-85. doi:https://doi.org/10.1016/j.addbeh.2014.11.003

Winkler, P., Bejdová, M., Csémy, L., & Weissová, A. (2017). Social Costs of Gambling in the Czech Republic 2012. *Journal of Gambling Studies, 33*(4), 1293-1310. doi:10.1007/s10899-016-9660-4

World Health Organization. (1978). *International classification of diseases:[9th] ninth revision, basic tabulation list with alphabetic index*: World Health Organization.

Wynne, H. (2003). Introducing the Canadian problem gambling index. *Edmonton, AB: Wynne Resources*.

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

Øren, A., & Leistad, L. (2010). *Endringer i den norske befolkningens pengespillvaner og påvirkning av spilleautomatforbudet* Retrieved from Trondheim: https://www.sintef.no/globalassets/upload/teknologi_samfunn/sintef_rapport_spill_2009.pdf/

Öztaş, A. H., & Işiksal, S. (2005). Memory recall errors in retrospective surveys: A reverse record check study. *Quality and Quantity, 38*, 475-493.

Appendix

Study 1, 2 and 3

I

Title page

Title:
Predictors of gamblers beliefs about responsible gambling measures

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Compliance with ethical standards

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Conflict of Interest:

All authors declare that they have no conflict of interest.
However, it should be noted that the first author (Jonny Engebø) works as a senior adviser with The Norwegian Gaming Authority where one of his major tasks is related to regulation and responsible gambling. He is also a PhD candidate with the University of Bergen. In addition, Engebø is a board member of GREF (Gaming Regulators European Forum and he is also co-chair of a GREF working group in responsible gambling. Further he is a member of the executive committee of EASG (The European Association for the Study of Gambling).

Ethical approval:
All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The study was approved by the Regional Committee for Medical and Health Research Ethics, Western Norway (2013/120).

Abstract
Responsible gambling (RG) measures are methods aimed at reducing and preventing negative consequences associated with gambling. Some RG measures are set by authorities or gambling operators while others are available as features for gamblers to use themselves (e.g. budget tools where personal monetary limits are set prior to gambling). The present study is based on a general gambler population and investigates how RG measures with some specific RG features are assessed by the gamblers. The data was collected in 2013 and 2015. The samples were drawn from the Norwegian Population Registry. In total 9,129 gamblers participated. Gamblers were asked to state to which degree they agreed that ten specific RG measures help or would help them controlling their gambling. Overall, between 35% and 42% neither agreed nor disagreed, but among those with an opinion, most agreed. A multiple regression analysis identified eleven variables as significant predictors of positive beliefs about RG measures: Female gender, young age, playing random games only, being a moderate risk or problem gambler, reporting high impact from gambling advertisements as well as the personality traits agreeableness, openness and neuroticism. Playing low risk games only, reporting a high amount of spending on gambling and the personality trait extraversion were inversely related to positive beliefs about RG measures. The total explained variance was however only 7.1%. Positive beliefs about RG measures can relate to needs for external based countermeasures to minimize or reduce problems. Negative views may reflect a wish to play without obstacles, take risks or to trust in self-control.

Keywords
Responsible gambling, Gambling problems, Pre-commitment, Prevention, Harm reduction, Gambling

Introduction
Responsible gambling (RG) measures can be defined as "policies and practices designed to reduce and prevent potential negative consequences associated with gambling" (Blaszczynski, Ledouceur & Shaffer, 2004, p. 308). Common measures/tools used to enforce RG are for instance exclusion from gambling (e.g. self- or operator initiated), and limitations (e.g. on volume, time, frequency and loss) (Haefeli, Lischer & Schwarz, 2011).

RG measures are regarded as an integrated part of the responsibility of the gambler and the gambling industry, aiming at costumers' protection and harm reduction. This should be distinguished from treatment which typically comprises a set of techniques administered by health professionals with the aim of improving the state of patients who already are suffering from serious gambling-related harm (Blaszczynski, et al., 2004).

Over the last years, responsible gambling (RG) measures have been introduced to the gambling markets as means to prevent gambling problems or to reduce negative consequences of existing problems. For some measures, features are developed where gamblers can regulate their own gambling behaviour. Many RG measures require personal identification and are thus primarily available for online gambling and seldom applicable to land-based gambling. Some measures and restrictions can be set by authorities or gambling operators (e.g. mandatory spending limits), whereas others can be applied by the gamblers themselves (e.g. self-exclusion) (Auer, Littler, & Griffiths, 2015). The specifics of implemented measures can vary across jurisdictions and between operators. In the present paper these measures are abbreviated "RG measures" when used generally and for measures set by authorities or operators. In addition, "RG features" or "RG tools" are used when referring to specific features offered for individual gamblers for their own use.

Participators in games are referred to as *gamblers*. This is line in with a proposed definition of gambling as *"staking money or something of material value on an event having an uncertain outcome in the hope of winning additional money and/or material goods"* (Williams, Volberg, Stevens, Williams, & Arthur, 2017, p. 11).

This article addresses how gamblers believe RG measures will help them to control their gambling consumption. Knowledge about how gamblers believe that RG measures will help them is important for both gambling operators and regulators. How RG tools provided by gambling operators are used by gamblers are likely to depend on how the gamblers assess such tools. The knowledge about how RG measures are viewed can contribute to the success of the RG measures offered by operators and the use by the gamblers. Knowledge of the gamblers' views can also help operators or regulators to differentiate between whether or not a RG tool (e.g. budget tool) should be mandatory or voluntary.

RG measures set by authorities or operators can normally not be altered by the gamblers. One example can be maximum stakes in certain games. Another example is maximal loss limits, which requires a form for registered

play where the gamblers' identity is known to the game operator and where player data is continuously registered and stored. Because of the technical requirements associated with player account data, registered play is mostly relevant for online gambling. However, in a few countries, such as Norway, registered play is also mandatory when gambling on land-based machines (Auer et al., 2015), i.e. video lottery terminals (VLTs). There are also other land based-games in Norway which are offered as registered play only. This applies for number games, pools, sports betting and horse racing sold from retailers.

RG measures may include information provided to the gamblers about their gambling behaviour, such as time used and money spent. Information is sometimes conveyed in the form of pop-up messages during a gambling session. Pop-up information may disrupt the gambling and make the gamblers conscious of their gambling behaviour (Gainsbury, 2012). Information can also be provided in terms of statements from the gambling operator about losses over certain periods of time. Furthermore, based on analysis of individual player data, gambling companies can provide gamblers with personalized information about how their gambling behaviour develops over time (Auer et al., 2015). Measures where gamblers receive personalized type of feedback require registered play. Gamblers can also obtain information from self-assessment tests where, based on their responses, they receive information about their current problem status (Wood & Griffiths, 2015). Based on the feedback, they can choose to take actions, e.g. set restrictions upon themselves.

"Pre- commitment" (Williams, West, & Simpson, 2012) is a type of RG measure that enable the gamblers to adjust how much time or money they can spend gambling, e.g. per day or month. Gamblers can also exclude themselves from gambling temporary or more permanent. Exclusions can be set to prevent problem gamblers from gambling. Exclusions can also help at-risk or problem gamblers to control their gambling behaviour by staying away from certain games for a specified period of time (Hayer & Meyer, 2011). Such pre-commitment features will stop the gamblers from gambling when a time- or monetary limit is reached, whereas gamblers who have excluded themselves will be prohibited from gambling altogether. To be effective, these tools require registered play where the operators' systems automatically will act if a limit is reached or an excluded gambler attempts to log in.

Although RG measures have been implemented by several gambling operators worldwide there are still limited empirical research on their effectiveness (Auer, Reiestad, & Griffiths, in press; Ladouceur et al., 2017). However, a review of 29 articles (1999-2015) indicated some evidence of the effectiveness of the RG measures, but also pointed to several limitations of the research (Ladouceur et al., 2017).

In a more recent study, a sample of gamblers with Norsk Tipping (the Norwegian state-owned gambling monopolist), were surveyed after the operator had introduced a mandatory loss limit across the whole game portfolio. The results showed that 78% were positive to the maximum loss limit, and among those who reached this limit 73% did not continue gambling with other companies. Another 10% had not gambled at all since they were stopped (Auer et al., in press).

Recently, several studies addressing how gamblers evaluate RG measures have been published. Some studies are restricted to users of slot machines, mostly with a focus on RG measures which do not require registered play (Blaszczynski, Gainsbury, & Karlov, 2014; Ladouceur, Blaszczynski, & Lalande, 2012; Ladouceur & Sévigny, 2009; Monaghan & Blaszczynski, 2010). One example is an Australian study where 299 slot machine gamblers evaluated the effectiveness of five proposed RG features: A responsible gambling message, a bank meter where the gambler could keep the winnings until the game was terminated, an alarm clock enabling gamblers to set time with reminder, demo mode play where the player could play without money, and finally a donation feature where residual amounts could be donated to good causes rather than for the gambler to use these to continue playing. The results showed that 26% of the gamblers believed that these RG features would prevent recreational gamblers from develop a gambling problem (Blaszczynski et al., 2014).

A more extensive study examined personal RG strategies in a sample of 1,797 lottery gamblers recruited from UK National Lottery's customers. In addition to lottery draw games, they also played scratch cards, sports betting, bingo, slot machines, casino card games and casino table games. Games were played both land-based and online. The gamblers were asked which of five personal strategies they used to prevent not spending more money than intended: Set spending limits, set time limits, work out what they could afford to lose, only take certain amount of cash out to play and leave ATM cards at home. Results showed that the vast majority used one

or more strategies. To set a spending limit before beginning to play was most common and 90% reported they did so mostly or always. Online gamblers were asked if it was easier to keep their spending limits when they played online. For lottery draw games, slightly over 50% of the respondents said it was easier to keep the limits when lottery tickets were bought online compared to when it was bought from a shop. For all other games, the most frequent response was that it was neither easier nor harder to keep the spending limit when games were played online. Irrespective of type of game, more respondents stated that it was generally easier than harder to stick to the spending limit (Wood & Griffiths, 2015).

A large study of 10,838 online gamblers recruited from 96 countries and over 100 online websites, investigated the gamblers' perception of the value of RG features. The data was collected in 2006 from gamblers who played online casino and/or online poker. Most of the respondents lived in North America and United Kingdom. The gamblers were asked if they found the following five RG features useful: Self-set spending limits, self-set time limits, self-exclusion, regular financial statements and self-assessment test. The majority of the gamblers, and particularly those who chased losses, were under the age of 35 or females, endorsed the utility of the RG features. Those who played internet casino games were also more likely to perceive three of the RG features as more useful compared to the online poker players (Gainsbury, Parke, & Suhonen, 2013).

In a recent study, 2,352 respondents registered as gamblers with the largest Norwegian operator were surveyed after the operator implemented a mandatory global loss limit (NOK 20,000 / ~ 2,500 US $ per month) across the game portfolio (comprising lottery, casino, sports betting and VLTs) where all games, except paper-based scratch cards, are played registered. When playing online games of medium or high risk (measured through the assessment tool Gamgard) or land based VLTs, the gamblers must set personal loss limits (Auer, Reiestad, & Griffiths, in press). The sample was divided into three groups according to PlayScan, a player tracking system that classify the gamblers as green (low risk), yellow (medium risk) or red (high risk for problem gambling). Among the studied topics was attitude, beliefs about personal relevance and whether the limit would help the respondent to obtain an overview and control over their losses. In all, 79% of the sample had a positive attitude towards the global loss limit and the green gamblers were most often positive (82% of green, 75% of yellow and 67% of red gamblers). A total of 25% agreed (in part or entirely) that the limit was relevant to them, and the yellow and red gamblers agreed most often (18% of green, 41% of yellow and 41% of red gamblers). When asked whether the loss limit would help them to maintain overview and control the losses, 40% of the green, 56% of the yellow and 56% or the red gamblers agreed (in part or entirely). The gamblers were also asked about reasons for setting personal loss limits. One of the response alternatives was to achieve better control over their losses. A total of 29% of respondents who agreed to this reason for setting personal loss limits were red gamblers whilst red gamblers only comprised 19% of the total sample (Auer et al., in press).

Jon Elster describes in his book "Ulysses Unbond" (2000) general reasons and devices for pre-commitment where, among others, passions and addictions are listed. The knowledge that humans under influence of passions may deviate from their intentions or decisions creates incentives for pre-commitment. Elster describes low willpower as one of the ways where passion can lead to behaviour different from originally intended. He regards addiction as an example of lack of willpower where pre-commitment can be more reliable than will itself. One way to overcome passions or addictions is thus to eliminate options or "throw away the key" (Elster, 2000). From this perspective it becomes important to distinguish between "personal/internal" RG strategies and "external" RG measures. The internal strategies will be in the gamblers mind whilst external RG measures will be set in RG features by the gambler before gambling take place as a fortification of the original intention to e.g. not play for more than a certain amount of money or they are set by the gambling operator.

Many factors have been identified as risk factors for problem gambling or gambling addiction. If such factors relate to beliefs about RG measures is however mostly unknown. Several studies have showed that males and younger gamblers more often have gambling problems than females and older persons (Johansson, Grant, Kim, Odlaug, & Götestam, 2009). Ethnicity can also be a risk factor. A study in the United States showed that the prevalence rate of disordered gambling were lowest for white Americans (Alegria et al., 2009). Some of the games or how they are distributed also seem to act as risk factors for problematic gambling behaviour. Among game characteristics assumed to increase the risk of problems are event frequency (time from the stake is set to

the outcome is clear and a new stake can be set) and availability (distance from home) (Gamgard, 2018; Meyer, Fiebig, Häfeli, & Mörsen, 2011). Gambling expenses are also related to gambling problems. Problem gamblers spend more money and time gambling than other gamblers (Williams & Wood, 2004; Yani-de-Soriano, Javed, & Yousafzai, 2012). Furthermore, gambling advertisements seem to have greater impact on risk and problem gamblers than those without such problems and has been reported to cause relapse (Binde, 2008; Hanss, Mentzoni, Griffiths, & Pallesen, 2015). The five-factor model for personality (Boyle, Matthews, & Saklofske, 2008) is a reliable and valid personality trait model and has previously been used in the analysis of gambling problems. The five factors being neuroticism, extraversion, openness, agreeableness and conscientiousness. Higher scores on neuroticism and lower scores on conscientiousness have been associated with problem gambling (Bagby et al., 2007; Brunborg, Hanss, Mentzoni, Molde, & Pallesen, 2016; MacLaren, Best, Dixon, & Harrigan, 2011). Neuroticism includes being nervous and prone to worry whereas conscientiousness reflects being hardworking and disciplined (Boyle et al., 2008).

To the best of our knowledge, no previous study on gamblers beliefs about RG measures has been based on random and representative samples drawn from national population registries. The present study analysed the beliefs about RG measures among gamblers in a complete gambling market, both land-based and online. This study investigates the beliefs about RG measures and if beliefs could be explained by risk factors such as demography, gambling behaviour, personality traits and self-reported impact from gambling advertisement.

The following research questions were addressed:

1. What are the beliefs among gamblers about how RG measures can help to control their gambling?

2. Which variables contribute to explain how the beliefs vary between gamblers?

Method

Participants and procedure

Sample. This study is based on quantitative survey data collected in two Norwegian prevalence studies conducted at the University of Bergen. Data were collected in 2013 and 2015. In total, 38,000 persons (24,000 in 2013 and 14,000 in 2015, gross sample) aged 16 through 74 years were randomly selected form the National Population Registry of Norway and invited to participate in postal surveys. For both years in total 15,566 valid answers (net sample) were received. After elimination of persons with wrong addresses, illness, deaths, etc., an overall response rate of 42.6 % was achieved (43.6 % in 2013 and 40.8 % in 2015). Up to two reminders were sent both times. Data were weighted for age, gender and place of residence (county) in Norway. The questionnaires in 2015 and 2013 had completely identical questions for our purpose, and data from both years were thus collapsed into one dataset, in total containing responses from 9,129 gamblers.

In the weighted net sample, a total of 58.7 % had gambled the last 12 months, 54.8 % for women (n = 7,624) and 62.4 % for men (n=7,934). Within specific age groups the gambling rate was lowest for those 16-25 years: 39.2 % (n = 2,780). The other age groups had higher rates: 26-35 years 60.2 % (n = 2,809), 36-45 years 61.4 % (n = 3,035), 46-55 years 63.7 % (n = 2,836), 56-65 years 66.7 % (n = 2,451) and 66-74 years 63.4 % (n = 1,646). Among the gamblers 54.2 % were male and the average age was 45.3 year, SD=15.22 (n=9,129).

Procedure. The gamblers were categorised according to whether they had played low risk games only or if they had played games with higher risk (i.e. medium or high). Gamgard (an assessment tool) was used to categorize the games in terms of risk for gambling problems. Gamgard scores the risk in games as *very low*, *low, medium, high* or *very high.* With this tool, ten game characteristics are considered with regards to a particular games' potential contribution to developing gambling problems, e.g. event frequency (time taken to buy a game, get the result, and buy the game again) and accessibility (how easily available a game is) (Gamgard, 2018). The assessment tool also takes into consideration four RG features that reduce the risk, e.g. monetary budget tools (Gamres, 2018). These four RG features were not considered in the present assessment. In all 26.5% had played low risk games only (*very low* or *low*), whereas 73.5% had played at least one medium- or high-risk game (*medium, high* or *very high*). All the games are listed below. Number games and pools were categorized as low

risk games and all other games as higher risk (medium or high). As different games within one game category can have different risks, and since the questionnaire did not differentiate between all games within one category (e.g. for horse racing), the game type was consequently categorized as medium/high risk. The gamblers were categorised in terms of whether they had played random games only, or at least one skill game. Skill games imply games where the gamblers can improve their winner chances based on skills (i.e. pools, betting, horse racing, online poker and private games such as poker among friends). The non-skill or random games comprised number games, bingo and bingo machines, scratch cards, online casino, video lottery terminals (VLTs), and games on ships (slots and table games). Online casino and games on ships were categorised as random because the questions about these games did not differentiate between skill and non-skill games. A total of 60.4% of the gamblers had participated in random games only, whereas 39.6% had participated in at least one game involving skill. The gamblers were also divided into two groups based on money spent. This was done to identify the gamblers who were most involved in at least one game type. Those who had spent more than 5000 NOK (~ 700 US $) on at least one game type within the last 12 months were categorised as high spenders (comprising 11.0% of the gamblers), whereas those who had not gambled for more than 5000 NOK on at least one a game type (89.0% of the gamblers) were categorised as low spenders. The gamblers were asked how often they gambled on four electronic devices: Stationary computer, lap-top, tablet or mobile phone. For each device, the response alternatives ranged from never to daily. In the present study an online gambler was defined as someone who had gambled at least once using at least one of the four devices. In total 27.0% were categorised as online gamblers, whereas 73.0% were categorised as land-based only gamblers.

Instruments

Gambling participation. The respondents were asked if they during the last twelve months had participated in games (yes or no). The question contained a definition of games described as games with monetary stakes where results from an event or a draw could lead to monetary prizes.

Demographics. The respondents were asked about *gender* (female, male), *age* (exact age) and *place of birth* (eight alternatives: Norway, the other Nordic countries, the rest of Europe or one of the other five continents).

Games played. The respondents were asked if they had *participated in the following games:* Number games, pools, betting, horse racing, bingo, bingo machines, scratch cards, private games (e.g. poker games with friends), online casino, video lottery terminals (VLTs), games on ships (slots and table games) and online poker. In addition to the Norwegian regulated games, the respondents were also asked if they had played games offered on foreign websites. The respondents confirmed participation by answering for each game the alternative for expenditure which was nearest to their gambling yearly spending (none/not gambled, *NOK 1-1,000, NOK 1,001-5,000, NOK 5,001-10,000, NOK-10,001-25,000* and *more than NOK 25,000)*. The questions were only answered by those who initially had confirmed that they had gambled the last 12 months. Those who had gambled were also asked if they had gambled online. From the collected data four dichotomous variables were constructed: Low risk games only vs. medium/high risk game participation, random games only vs. skill game participation, game spending (low vs. high) and online gambling (no vs. yes).

Canadian Problem Gambling Index (CPGI). The CPGI was used to assess the extent of *gambling problems* in the Norwegian population. The CPGI consists of nine items related to gambling the last twelve months. Five of these items measure problematic gambling behaviour and four measures consequences (e.g. "*Have you needed to gamble with larger amounts of money to get the same feeling of excitement?"* and "*Has gambling caused you any health problems, including stress or anxiety?")*. The nine items are scored with a scale ranging from 0 (*never*) through 3 (*always*). The composite score thus varies from 0 to 27. Based on the composite score the respondents are divided into four groups: Non-problem gamblers (total score 0), low risk gamblers (composite score 1 and 2), moderate risk gamblers (composite score 3 through 7) and problem gamblers (composite score 8 or higher) (Ferris & Wynne, 2001). In the present paper the gamblers were divided into two groups: No problem/low risk gamblers and moderate risk/problem gambler. The prevalence of moderate risk or problem gamblers was 5.2% (n=9,066). Cronbach's alpha for the CPGI in the present study was .89. Cronbach's alpha values above .70 are considered acceptable and values above .80 are preferable (Pallant, 2016).

Mini-International Personality Item Pool (MINI-IPIP). The MINI-IPIP consists of 20 items that measure the main dimensions of the five-factor model for personality (neuroticism, extraversion, openness, agreeableness and conscientiousness). Each dimension is assessed by four items (Donnellan, Oswald, Baird, & Lucas, 2006). The

respondents provide their answer on a scale ranging from 1 (*very inaccurate*) through 5 (*very accurate*). Neuroticism (N) is a factor where being *sad* and *scared* will be at the high end of the factor in contrast to *calm* and *stable* at the other end. The factor Extraversion (E) reflects being *warm*, *outgoing and cheerful* in contrast to being *reserved*, *solitary and somber*. Openness to experience (O) describes being *imaginative, curious and having exploratory* tendencies in contrast to being *rigid, practical and traditional*. Agreeableness (A) reflects being *generous, honest and modest* in contrast to *selfishness, aggression and arrogance*. Conscientiousness (C) reflects being *hardworking, purposeful and disciplined* in contrast to be *laid back, unambitious and weak willed* (Boyle et al., 2008). Cronbach's alpha among the gamblers for the sub-scales neuroticism, extraversion, openness, agreeableness and conscientiousness were .67, .79, .66, .71 and .67, respectively. Lower alpha values are common to find when there are few items in a scale (Pallant, 2016).

Impacts from gambling advertising. In all, nine items on how gambling advertising had an impact on the gamblers were included. Five of the items were adopted from the Effects of Gambling Advertising Questionnaire (EGAQ) (Derevensky, Gupta, & Messerlian, 2007). The items are scored from 1 (*strongly disagree*) through 4 (*strongly agree*). In addition, four new items were added. Two of these were related to knowledge about gambling opportunities ("*Gambling advertisement has increased my knowledge of gambling options" and "Gambling advertisement has increased my knowledge of gambling providers").* One item measured change in behaviour due to gambling advertisement (*"I play with higher risk (use more money) because of gambling advertisements")* and one related to attitude ("*I think more positively about gambling because of gambling advertisements") (Hanss et al., 2015).* A total composite score was created by adding the score on each item divided by the number of items. These questions were only answered by those who had gambled during the last 12 months. Cronbach's alpha for the nine items was .76.

Responsible gambling measures. Ten items measured the gamblers' beliefs about RG measures and how they think that these mechanisms would help them regulating their own gambling consumption. Many of the items were based on existing RG features, e.g. prize money direct to gamblers bank account and not directly available for further gambling (Mentzoni, 2013). The questions were also based on an article that explored the perception of the value of potential RG measures (Gainsbury et al., 2013). All the ten items covered mechanisms that are presently available in parts of the Norwegian gambling market. In the questionnaire, the gamblers were asked to which degree they agreed that these characteristics help or would help them regulating their own gambling consumption. There were five response alternatives for each item: *Totally disagree, disagree, neither agree nor disagree, agree and totally agree*. See table 2. A total score ranging from 1 (*totally disagree*) through 5 (*totally agree*) was calculated by adding the scores from each item, divided by ten. A high score indicates a more positive belief about RG measures than a lower score. The mean total composite score was 2.98 (*SD* =1.12) and Cronbach's alpha was .96. The items were subjected to an exploratory factor analysis (principle component) showing support for a one-factor solution based on Kaisers' criterion. The factor explained 74.7% of the variance and the factor loadings varied between .75 (item a) and .90 (item f, g and h). It was only respondents who had gambled the last 12 months who were asked how they believed the RG measures would help them to control their gambling. Hence the data is restricted to gamblers only. Table 2 lists the items and presents the results across the two surveys (2013 and 2015).

Table 1 shows the distribution or mean for the different study variables.

- Insert table 1 about here –

Statistics

The dependent variable comprised the gamblers beliefs about RG measures based on the composite score of the ten RG items. The results from all questions are presented in terms of frequencies or mean and standard deviation. We investigated the correlation between all study variables. A rough guideline to interpretation of correlations suggests small correlations when *r*=.10 to .29, medium correlations when *r*=.30 to .49 and large correlations from *r*=.50 to 1.00 (Cohen, 1988). Finally, the data was analysed with a multiple regression analysis. Missing data was deleted pairwise. Independent variables comprised gender (women=0, men =1), age, place of birth (outside Norway=0, Norway=1), game risk (middle/high=0, low=1), game type (at least one skill game=0, random only=1), game spending (low=0, high=1), online gambling (no=0, yes=1), being a moderate risk/problem gambler (no=0, yes=1), extraversion, agreeableness, conscientiousness, neuroticism, openness to experience, and self-reported impact from gambling advertisement. Preliminary analyses were conducted to ensure no violation of the assumption of normality, linearity, multicollinearity and homoscedasticity.

- Insert table 2 about here -

Results

Table 2 shows that gamblers often did not have a strong opinion about the regulation mechanisms and between 35% to 42% neither disagreed or agreed to that the mechanisms would help them regulate their gambling consumption. When comparing the frequencies for all 10 items, those with an opinion (who agreed or totally agreed compared to those who disagreed or totally disagreed), more often agreed than disagreed. However, when comparing those who only responded *totally agree* with those who responded *totally disagree* there were more gamblers who totally disagreed. A one-way repeated ANOVA was used to identify the most valued regulation mechanisms. Overall, there was a significant difference in terms of how the mechanisms were valued ($F_{9,65194}$=183.1, p<.001; Greenhouse-Geisser correction). Bonferroni-corrected post hoc tests revealed that the most valued mechanisms were item g, "*Prior to gambling, I can set a loss limit in the game",* which was valued significantly higher than all other items (p<0.001). Item c, "*Continuous feedback from the game regarding my losses",* was valued significantly higher than all other items than f and g (p<0.001-0.005). Item f, "*The game has predefined limit for losses",* was valued significantly higher than all other items except item a, c, and g (p<0.001). In the further analyses, only the total average score summarized across all ten mechanisms was analysed. In the following the gamblers view will be expressed as positive or as a positive evaluation when gamblers agreed that the RG measures will help them. When gamblers disagreed, the view will be expressed as negative.

- Insert table 3 about here -

Table 3 shows that the view on responsible gambling measure had significant zero-order correlations with many of the independent variables, however no significant correlation with *Game type (random only or at least one skill game), Gambled online/land-based* and *Extraversion* were found. The strongest zero-order correlations with beliefs about RG measures was found for *Age* (r=-.19) and for *Self-reported impact from gambling advertisement* (r=.15).

The results from the regression analysis are shown in table 4. The predictors explained a total of 7.1 % of the variation of the dependent variable *"Beliefs about RG measures"*.

- Insert table 4 about here -

Table 4 shows that 11 of the independent variables were significant predictors of beliefs about RG measures whereas three independent variables did not reach significance (*Place of birth*, *Gambled online/land-based* and *Conscientiousness).* The total regression model was significant (R^2=.071, $F_{14,8261}$=44.901, p<.001).

When looking at the standardized beta coefficients, the strongest predictors were *age* and *self-reported impact from gambling advertisement*. Older gamblers evaluated the mechanisms less positive and gamblers who self-reported strong impact from gambling advertisement assessed the mechanisms more positive. *Gender* had also an impact, where female gamblers had more positive beliefs than males.

High spenders had a more negative belief than low spenders. *Moderate risk or problem gamblers* had more positive beliefs than non-problem/low-risk gamblers. Those playing *low risk games only* had a more negative belief than those playing at least one moderate/high risk game. *Playing random games only* was positively associated with beliefs about RG measures.

Four of the five personality factors turned out significant. Three (agreeableness, openness to experience and neuroticism) were positively associated with beliefs about RG measures whilst one (extraversion) was negatively associated with the belief.

Discussion

The results show that gamblers in general often do not have a strong opinion about RG measures. However, among those with an opinion, more were positive rather than negative. The multiple regression analysis showed that 11 of the 14 independent variables had a significant impact on how RG measures were valued among gamblers. In total, the predictors explained 7.1% of the variation. This means that the predictors altogether did

not have a very strong explanatory power.

The previous mentioned study by Gainsbury et al. (2013) also showed that the majority of the gamblers were positive to RG measures and valued them as useful.

In the present study the beliefs about RG measures correlated significantly, but not strongly, with most of the independent variables. The strongest correlations were found for age and self-reported impact from gambling advertisement.

The results from the regression analysis showed that men were more negative than women in their view on RG measures. Support for our findings that women are more positive to RG measures is found in a study comprising 657 students in California. That study showed that men take more risks and that women judge the negative consequences of gambling as more likely to occur and as more severe (Harris, Jenkins, & Glaser, 2006). This finding is also in line with a meta-analysis showing that men in general take more risks than women (Byrnes, Miller, & Schafer, 1999). More positivity from female gamblers towards RG measures was also seen in the large study of online casino and poker players (Gainsbury et al., 2013).

Our data showed that older gamblers were less positive to RG measures than younger ones. This is also in line with the results from Gainsbury et al. (2013). Young age is a significant risk factor for problem gambling (Johansson et al., 2009), which can be explained with more impulsivity and risk-taking among the younger. From a social neuroscience perspective, risk taking declines from adolescence towards adulthood because of changes in the brain's impulse control system (Steinberg, 2008). This notion is in line with a study of 528 participants in the age of 18 to 93 years, that mainly showed tendencies of reduced risk-taking with age (Rolison, Hanoch, Wood, & Liu, 2014). It is suggested that RG measures are more often viewed as helpful by younger gamblers because the measures are perceived as external help to control impulsivity.

Our analysis shows that gamblers who played low risk games only were less positive to RG measure than those who played games with medium or high risk. A plausible explanation for the low risk gamblers' belief is that they play games where the risk for problematic behaviour is low, and therefore seldom or never experience a personal need for RG measures.

Gamblers who played random games only were more likely to be positive towards RG measures than those who played at least one skill game. This is partly in line with Gainsbury et al. (2013) where those who played internet casino games, compared to the online poker players, were more likely to perceive three of the RG features as more useful. Playing games with elements of skill can be related to "illusion of control", implying that the gamblers feel they can trust their skills in gambling situations when also chance is involved, which can lead to inappropriate confidence (Johansson et al., 2009). If gamblers of skill games more often feel they have control over their gambling and the outcome, they might also regard external RG measures as less useful and needed.

The gamblers with high spending were more likely to be negative to the RG measures compared to those with lower spending. It can be argued that the former group may perceive RG measures as tools that will inhibit their gambling too much, and therefore they might oppose RG measures. On the other hand, moderate risk or problem gamblers tended to be positive to the RG measures. In the latter group there will be gamblers who experience problematic gambling behaviour and consequences and they may as such regard RG measures as helpful to reduce their problems and negative consequences of gambling. This is in line with Auer et al. (in press) showing that the gamblers who according to a player tracking system have medium or high risk for problem gambling, more often are self-aware and know that loss limits are useful to them.

Four of the five personality traits showed a significant association with how RG measures were valued. Gamblers with higher score on extraversion were less positive to RG measures. In general, extraverted people like to be stimulated and their behaviour are often driven by external rewards which is in line with MRI studies supporting differences between introverts and extroverts when it comes to the sensitivity of the brain's reward systems (Hirsh, 2010). Accordingly, extraverted are assumed to regard RG measures as an obstacle for stimulation and rewards, which may explain why this trait were inversely associated with beliefs about RG measures.

The personality trait agreeableness was a positive predictor of how RG measures were assessed. In a Norwegian study with 218 students, agreeableness was significantly and negatively associated with four behavioural addictions (internet addiction, exercise addiction, mobile phone addiction, and compulsive buying), thus high scores on agreeableness was considered to be a protective factor against developing addictions (Andreassen et al., 2013). Positive views on RG measures is in line with this and RG measures will assumingly act as a protection against interpersonal problems and conflicts created from gambling. This notion would be in agreement with the nature of those with high scores on agreeableness.

Neuroticism showed a positive association with beliefs about RG measures. Those scoring high on this trait may be inclined to look out for threats. A study of students showed that neuroticism was significantly and positively associated with four behavioural addictions (internet addiction, exercise addiction, compulsive buying and study addiction). A suggested explanation was that neuroticism is a risk factor for excessive behaviour and related to being prepared, or to be on top of things (Andreassen et al., 2013). From this perspective a positive belief about RG measures can be expected among those with high scores on neuroticism as these measures contribute to, or satisfy, a need for predictability and external regulation to reduce risks and uncertainties.

The last personality trait with a significant impact on the assessment of RG measures was openness to experience. Higher scores predicted more positive views. Openness to experience describes being curious and exploratory in contrast to being traditional (Boyle et al., 2008). Since many of the assessed RG measures are relatively new in gambling markets (Auer et al., 2015), it can be argued that gamblers with higher score on this personality trait consequently will have a positive outlook on new methods for regulating gambling.

Some traits (e.g. agreeableness) were positively associated with attitudes towards RG measures whilst at the same time negatively associated with having problems with gambling (risk or problem gambling). Still, at risk and problem gamblers were more positive towards RG measures than gamblers without problems. This may seem as inconsistent findings but reflect that these factors (traits and gambling problem status) independently were associated with attitudes towards RG measures. As all data in the present study were based on self-report, it would be of interest to investigate these relationships using objective data on the use of RG measures.

The final variable that significantly affected how RG measures were viewed was self-reported impact from gambling advertisement. The more the gamblers said they were affected by such marketing, the more positive they were to the RG measures. Studies have showed that marketing makes it harder for problem gamblers to stick to their previous decisions to reduce or stop gambling (Binde, 2008; Hing, Cherney, Blaszczynski, Gainsbury, & Lubman, 2014). The gamblers who self-report high impact from gambling adverts know they are sensitive to external stimuli, and therefore it can be proposed that they accordingly recognize a need for external control.

Many of the factors in the present study found to be positively associated with beliefs about RG measures. This can be explained as a reflection of a need for external regulation of own behaviour and inclinations. Accordingly, younger gamblers may endorse external regulation in order to control impulsivity and gamblers with high scores on agreeableness or neuroticism may embrace external measures helping them by providing protection and predictability. Hence, for some the pre-commitment will be more reliable than the will itself (Elster, 2000).

In a study describing the development of the *Positive Play Scale* (PPS) (Wood, Wohl, Tabri, & Philander, 2017) a four-item subscale for pre-commitment was identified (*"I only gambled with MONEY that I could afford to lose", "I considered the amount of MONEY I was willing to lose BEFORE I gambled"* and two corresponding items for time consumption). The higher score, the more pre-commitment. In a sample of 412 gamblers, the score on the subscale correlated significantly and negatively with the PGSI score and the personality trait neuroticism. A positive correlation was found towards the trait conscientiousness. This present study found significant, but weaker, correlations between the beliefs in RG measures and the same variables, albeit in the opposite direction. In this regard it should be noted that the PPS subscale was based on items which measured behaviour and pre-commitment in terms of personal strategies. The present study however measured gamblers beliefs about external RG measures only. Thus, the contradictory findings emphasize the importance of distinguishing between internal/personal RG strategies and external RG measures.

To pre-commit or to use a strategy, internally or externally, for self-control is not only a measure used related to gambling. In the book "Ulysses Unbound", Jon Elster describes several reasons for pre-commitment. One reason

is passion described in a broad sense as emotions or cravings, which may cause people to deviate from plans laid in cooler moments. Elster outlines four ways where passions can cause the behaviour to differ from initial intentions. "*They may do so by distorting cognition (inducing false believes about consequences), by clouding cognition (blotting out awareness of consequences), by inducing weakness of will (options with worse perceived consequence over options with better consequences), or by inducing myopia (changing the decision weights attached to the consequences)"* (Elster, 2000, p. 8).

The aforementioned ways passion can lead one astray are relevant for gambling. A passionate gambler's emotions can affect how the outcome of gambling is perceived e.g. the chances of winning. Passion can be so strong that negative consequences are out of sight, and a game might be played for longer than first intended. When playing a game, the gambler can perceive the consequences of the gambling differently to when not gambling. Eliminating options and creating delays are among the devices Elster presents as countermeasures. Passions can be so strong that they must be neutralized by avoiding the situations where emotions are triggered. Delays can also be useful, both for passions and for cravings related to addictive substances. To be effective the delays must be set in advance and before a passion induced situation emerges (Elster, 2000).

Avoidance and delays as strategies for pre-commitment are in line with RG measures featured in the present study. Through RG features, gamblers can avoid gambling situations by excluding themselves from games temporarily or more permanent. Gamblers can also set personal limits for spendings so that they cannot continue playing once a limit is reached, and this RG feature can be facilitated in such a way that if a gambler want to exceed a spending limit there is a delay before the new and wider limit is activated (Auer et al., 2015). A feature where winnings are transferred directly into a bank account, instead of being instant available for gambling, also creates a delay. For individuals with addiction problems, Elster describes one strategy as "throwing away the key" when a person makes the addictive substance physically unavailable. Another strategy is to "give away the key" to others and let others help to protect the addict from him or herself (Elster, 2000). When it comes to RG measures, a decision to restrict oneself from gambling lies with the gambler. The gambler should then expect the gambling operator to refuse the gambler's eventual wishes to eliminate constrains that are set.

There are both obstacles and objections to pre-commitment strategies. Two of these are described in the present study. Pre-commitment might not be available, and when activated it can represent loss of flexibility (Elster, 2000). In gambling markets RG measures are more easily available for online gambling and less available in the land-based marked (Auer et al., 2015).

Our analysis did identify groups of gamblers (e.g. males, extroverts, high spenders with no reported gambling problems) who are more likely to assess RG measures negatively. *Pre-commitment, even when desirable, may not be feasible or effective; when feasible and effective, it might not be desirable (Elster, 2000, p. 77).*

The notion and practice of harm reduction have for long been noted within the field of drug addiction. One example is the introduction of educational and needles exchange programs in the 1980s which proved effective in terms of reducing HIV risk behaviours associated with injecting drugs (Cross, Saunders & Bartelli, 1998).

Practical implications

Based on the current findings, we suggest it is important to distinguish between internal RG strategies and external RG measures, the latter being studied here. Different groups of gamblers can have different views on RG measures. Different factors may be related to the beliefs about internal strategies and external RG measures. Further research should accordingly study the factors that can explain both the views and the use of internal RG strategies as well as external RG measures. Some gamblers will believe that it is sufficient to have an internal intention to gamble responsible, whilst others might find it useful, and maybe necessary, to have their intentions for responsible gambling fortified with external RG measures. Knowledge about the different views and factors related to these views are important for operators and regulators. Such knowledge can be used in decisions on how to market and present RG measures for the gamblers in such ways that relevant groups of gamblers find the RG features useful.

Strengths and limitations

To the best of our knowledge the present study is the first where gamblers' beliefs about RG measures are analysed based on a sample representing the general population of gamblers in a country (as they were drawn from a national population registry). The present study is also the first where the views about external RG

measures are analysed against personality traits. Even if the sample size is relatively large, it was considered too small to warrant separate analysis of smaller groups of gamblers (e.g. among gamblers playing specific games).

The assessment of RG measures can also be influenced by cultural differences. In a study of focus groups in Canada, Germany, Sweden, UK and USA it was reported that players preferred RG features as a personal choice and not as a mandatory requirement (Parke, Parke, Rigbye, Suhonen, & Williams, 2012). The present study has shown that among Norwegian gamblers with an opinion about the RG measures, most agree that mandatory measures will help them to control their gambling consumption. In this regard Auer et al. (in press) mention cultural differences as one of the possible reasons behind the large percentage of Norwegian gamblers with a positive attitude towards mandatory loss limits. Another possible explanation is that the Norwegian gamblers generally are familiar with external RG measures (Auer et al., in press). This implies that the current findings cannot be generalized to other cultures without reservations, thus cross-cultural studies on this topic are warranted.

The present paper comprises gambler's subjective views on the use of RG measures. Although this arguably is of interest to gambling operators and regulators, it should still be acknowledged that no records of actual/objective use of RG measures were included in the study. Thus, future studies should investigate peoples view on actual RG measures, including behavioural tracking data showing real-life use of such measures and factors (e.g. demographic and personality) associated with their usage.

The fact that the independent variables together only explained 7.1% of the variance in beliefs about RG measures may reflect that the dependent variable (beliefs about RG measures) was purely subjective and that the respondents reflected a heterogeneous population of gamblers. Still we believe that the small proportion of explained variance may also reflect that some relevant independent variables were not included in the survey, alas not included in the model.

Only respondents who had gambled during the 12 months were asked about their views on RG measures. This may be regarded a limitation. Thus, future studies should also assess the general view of non-gamblers on RG measures.

Conclusions

Gamblers with an opinion about RG measures, agree more often than they disagree that the RG measures will help them to control their gambling consumption. The three RG features that most gamblers assessed positively were budget tools where they can set loss limits prior to gambling, continuous feedback on their losses and predefined limits for losses. Eleven variables were identified as significant predictors for how RG measures were assessed. Younger gamblers and those who say they are affected by gambling adverts were more positive to RG measures than their counterparts. Female gamblers were more positive than men. When it comes to gambling behaviour, the gamblers who played games with low risk only, those who played skill games and those who gambled with the highest spending were more often negative. Gamblers with a problematic gambling behaviour were more positive. Four of the personality traits in the five-factor model for personality were significant predictors. Three of them (agreeableness, neuroticism and openness to experience) were positively associated with positive view on RG measures. Extraversion showed the reversed pattern. We suggest the positivity to the RG measures for some are related to the need for predictability, security, stability and external help to keep self-control and reduce problems. The negative view on the RG measures seems to be related to a wish to play without obstacles, take risks or a strong believe in self-control without any need of external RG regulation.

Compliance with Ethical Standards

Conflict of interest

All authors declare that they have no conflict of interest.

However, it should be noted that the first author (Jonny Engebø) works as a senior adviser with The Norwegian Gaming Authority where one of his major tasks is related to regulation and responsible gambling. He is also a PhD candidate with the University of Bergen. In addition, Engebø is a board member of GREF (Gaming

Regulators European Forum and he is also co-chair of a GREF working group in responsible gambling. Further he is a member of the executive committee of EASG (The European Association for the Study of Gambling).

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The study was approved by the Regional Committee for Medical and Health Research Ethics, Western Norway (2013/120).

References

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

Andreassen, C. S., Griffiths, M. D., Gjertsen, S. R., Krossbakken, E., Kvam, S., & Pallesen, S. (2013). The relationships between behavioral addictions and the five-factor model of personality. *Journal of Behavioral Addictions, 2*(2), 90-99.

Auer, M., Littler, A., & Griffiths, M. D. (2015). Legal aspects of responsible gaming pre-commitment and personal feedback initiatives. *Gaming Law Review and Economics, 6*, 444-456.

Auer, M., Reiestad, S. H., & Griffiths, M. D. (in press). Global limit setting as a responsible gambling tool: What do players think? *International Journal of Mental Health and Addiction.*

Bagby, R. M., Vachon, D. D., Bulmash, E. L., Toneatto, T., Quilty, L. C., & Costa, P. T. (2007). Pathological gambling and the five-factor model of personality. *Personality and Individual Differences, 43*(4), 873-880.

Binde, P. (2008). Exploring the impact of gambling advertising: An interview study of problem gamblers. *International Journal of Mental Health and Addiction, 7*(4), 541-554.

Blaszczynski, A., Gainsbury, S. M., & Karlov, L. (2014). Blue Gum Gaming Machine: An evaluation of responsible gambling features. *Journal of Gambling Studies, 30*(3), 697-712.

Blaszczynski, A., Ladouceur, R., & Shaffer, H. J. (2004). A science-based framework for responsible gambling: The Reno model. *Journal of Gambling Studies,* 20, 301-317.

Boyle, G. J., Matthews, G., & Saklofske, D. H. (2008). *The SAGE handbook of personality theory and assessment: Volume 1 - Personality theories and models*. In Vol. 1. (pp. 1-30). Retrieved on March 15, 2018, from http://sk.sagepub.com/reference/hdbk_personalitytheory1

Brunborg, G. S., Hanss, D., Mentzoni, R. A., Molde, H., & Pallesen, S. (2016). Problem gambling and the five-factor model of personality: A large population-based study. *Addiction, 111*(8), 1428-1435.

Byrnes, J. P., Miller, D. C., & Schafer, W. D. (1999). Gender differences in risk taking: A meta-analysis. *Psychological Bulletin, 125*(3), 367-383.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. Florence: Taylor and Francis.

Cross, J. E., Saunders, C. M., & Bartelli, D. (1998). The effectiveness of educational and needle exchange programs: A meta-analysis of HIV prevention strategies for injecting drug users. Quality & Quantity, 32(2), 165-180.

Derevensky, J. L., Gupta, R., & Messerlian, C. (2007). *The Effects of Gambling Advertising Questionnaire (EGAQ)*. Montreal: McGill University.

Donnellan, M. B., Oswald, F. L., Baird, B. M., & Lucas, R. E. (2006). The Mini-IPIP Scales: Tiny-yet-effective measures of the Big Five Factors of Personality. *Psychological Assessment, 18*(2), 192-203.

Elster, J. (2000). *Ulysses unbound: Studies in rationality, precommitment, and constraints*. Cambridge: Cambridge University Press.

Ferris, J., & Wynne, H. (2001). *The Canadian Problem Gambling Index. Final report.* Ottawa: Canadian Centre on Substance Abuse.

Gainsbury, S. M. (2012). *Internet gambling: Current research findings and implications*. New York: Springer

Gainsbury, S. M., Parke, J., & Suhonen, N. (2013). Consumer attitudes towards Internet gambling: Perceptions of responsible gambling policies, consumer protection, and regulation of online gambling sites. *Computers in Human Behavior, 29*(1), 235-245.

Gamgard. (2018). Welcome to Gamgard. Retrieved on March 15, 2018, from www.gamgard.com

Gamres. (2018). Gamgard Version 3.0 has launched! Retrieved on March 15, 2018, from http://gamres.org/gamgard-version-3-0-launched-2/

Haefeli, J., Lischer, S., Schwarz, J. (2011). Early detection items and responsible gambling features for online gambling. *International Gambling Studies,* 11 (3), 273-288.

Hanss, D., Mentzoni, R. A., Griffiths, M. D., & Pallesen, S. (2015). The impact of gambling advertising: Problem gamblers report stronger impacts on involvement, knowledge, and awareness than recreational gamblers. *Psychology of Addictive Behaviors, 29*(2), 483-491.

Harris, C. R., Jenkins, M., & Glaser, D. (2006). Gender differences in risk assessment: Why do Women Take Fewer Risks than Men? *Judgment and Decision Making, 1*(1), 48-63.

Hayer, T., & Meyer, G. (2011). Self-exclusion as a harm minimization strategy: Evidence for the casino sector from selected European countries. *Journal of Gambling Studies, 27*(4), 685-700.

Hing, N., Cherney, L., Blaszczynski, A., Gainsbury, S. M., & Lubman, D. I. (2014). Do advertising and promotions for online gambling increase gambling consumption? An exploratory study. *International Gambling Studies, 14*(3), 394-409.

Hirsh, J. (2010). *Decision-making and self-regulation from a social-personality neuroscience perspective.* ProQuest Dissertations Publishing.

Johansson, A., Grant, J. E., Kim, S. W., Odlaug, B. L., & Götestam, K. G. (2009). Risk factors for problematic gambling: A critical literature review. *Journal of Gambling Studies, 25*(1), 67-92.

Ladouceur, R., Shaffer, P., Blaszczynski, A., & Shaffer, H. J. (2017). Responsible gambling: a synthesis of the empirical evidence. *Addiction Research & Theory*, 25(3), 225-235.

Ladouceur, R., Blaszczynski, A., & Lalande, D. R. (2012). Pre-commitment in gambling: a review of the empirical evidence. *International Gambling Studies, 12*(2), 215-230.

Ladouceur, R., & Sévigny, S. (2009). Electronic gambling machines: Influence of a clock, a cash display, and a precommitment on gambling time. *Journal of Gambling Issues, 23*, 31-41.

MacLaren, V. V., Best, L. A., Dixon, M. J., & Harrigan, K. A. (2011). Problem gambling and the five factor model in university students. *Personality and Individual Differences, 50*(3), 335-338.

Mentzoni, R. A. (2013). *Structural characteristics in gambling (Doctoral thesis, University of Bergen, Bergen, Norway)*. Retrieved on March 15, 2018, from Bergen: http://bora.uib.no/handle/1956/6542

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

Monaghan, S., & Blaszczynski, A. (2010). Impact of mode of display and message content of responsible gambling signs for electronic gaming machines on regular gamblers. *Journal of Gambling Studies, 26*(1), 67-88.

Pallant, J. (2016). *SPSS survival manual: A step by step guide to data analysis using IBM SPSS* (6th ed.): Maidenhead, UK: Open University Press/McGraw-Hill

Parke, J., Parke, A., Rigbye, J., Suhonen, N., & Williams, L. V. (2012). The eCOGRA global online gambler report. In R.J. Williams, R.T. Wood & J. Parke (eds.), *Routledge international handbook of internet gambling* (pp. 140-160). Oxford, UK: Routdledge

Rolison, J. J., Hanoch, Y., Wood, S., & Liu, P.-J. (2014). Risk-taking differences across the adult life span: A question of age and domain. *The Journals of Gerontology: Series B, 69*(6), 870-880.

Steinberg, L. (2008). A social neuroscience perspective on adolescent risk-taking. *Developmental Review: DR, 28*(1), 78-106.

Williams, R. J., Volberg, R. A., Stevens, R. M. G., Williams, L. A., & Arthur, J. N. (2017). *The definition, dimensionalization, and assessment of gambling participation*. Report prepared for the Canadian Consortium for Gambling Research. February 1, 2017.

Williams, R. J., West, B. L., & Simpson, R. I. (2012). *Prevention of problem gambling: A comprehensive review of the evidence, and identified best practices*. Report prepared for the Ontario Problem Gambling Research Centre and the Ontario Ministry of Health and Long Term Care. October 1, 2012.

Williams, R. J., & Wood, R. T. (2004). The proportion of gaming revenue derived from problem gamblers: Examining the issues in a Canadian context. *Analyses of Social Issues and Public Policy, 4*(1), 33-45.

Wood, R. T. A., & Griffiths, M. D. (2015). Understanding positive play: An exploration of playing experiences and responsible gambling practices. *Journal of Gambling Studies, 31*(4), 1715-1734.

Wood, R. T. A., Wohl, M. J. A., Tabri, N., & Philander, K. (2017). Measuring responsible gambling amongst players: Development of the Positive Play Scale. *Frontiers in Psychology, 8*, article 227.

Yani-de-Soriano, M., Javed, U., & Yousafzai, S. (2012). Can an industry be socially responsible if its products

harm consumers? The case of online gambling. *Journal of Business Ethics, 110*(4), 481-497.

Table 1. Descriptive statistics. Percentages or mean and standard deviation (SD) of the studied variables among the gamblers (*N*=8,588-9,129).

Variable	Percentage	Mean (*SD*)
Gender		
Women	45.8%	
Men	54.2%	
Age (16-74)		45.26 (15.22)
Place of birth		
Europe. North America. Oceania	5.5%	
Africa. Asia. South or Central America	2.4%	
Norway	92.1%	
Participated in games with low or higher risk		
Played higher risk games (medium and high)	73.5%	
Played low risk games only	26.5%	
Participated in random or skill games		
Played both random and skill games or skill only	39.6%	
Played random games only	60.4%	
Game spending		
Low	89.0%	
High	11.0%	
Gambled online		
No	73.0%	
Yes	27.0%	
PGSI		
Non-problem gambling (PGSI 0)	81.8%	
Low-risk gambling (PGSI 1-2)	13.0%	
Moderate risk gambling (3-7)	4.0%	
Problem gambling (8+)	1.2%	
Moderate risk of problem gamblers (PGSI 3+)	5.2%	
Personality Traits		
Extraversion		13.99 (3.46)
Agreeableness		16.57 (2.72)
Conscientiousness		15.84 (2.97)
Neuroticism		10.00 (3.33)
Openness		13.78 (3.21)
Self-reported effect from gambling marketing		1.91 (0.56)
Total score – Beliefs about RG measures		2.98 (1.12)

Table 2. Descriptive statistics. Percentages, mean and standard deviation (*SD*) for the ten items used to construct the total score for the Beliefs about RG measures (*N*=8,791- 8,859).

The following factors help me or would help me to regulate my gambling consumption:	Totally disagree % (1)	Disagree % (2)	Neither disagree nor agree % (3)	Agree % (4)	Totally agree % (5)	Mean	*SD*
a. Prizes go direct to my bank account	21.1	5.6	38.8	18.7	15.8	3.03	1.311
b. Upper limit for stakes	22.5	6.8	36.3	18.8	15.6	2.98	1.334
c. Continuous feedback from the game on my losses	20.7	5.7	35.4	21.8	16.6	3.08	1.326
d. Continuous feedback from the game on my time spent gambling	21.9	7.3	42.1	16.6	12.0	2.89	1.259
e. Upper limit for prize size	25.4	9.5	38.6	14.9	11.5	2.78	1.294
f. The game has predefined limit for losses	20.5	5.7	36.8	20.5	16.4	3.07	1.318
g. Prior to gambling. I can set a loss limit in the game	19.2	5.2	35.2	22.9	17.6	3.14	1.316
h. Prior to gambling. I can set a time limit in the game	20.9	7.0	41.6	17.6	12.9	2.95	1.263
i. I can tell the game to ban me for a certain period	21.7	6.6	39.8	17.4	14.6	2.97	1.299
j. Through the game I can take a self-test and get feedback if I have gambling problems	21.5	6.2	42.0	16.2	14.1	2.95	1.283

The characteristics a, b, e and f are measures were the gamblers have no options to change the parameters, and the measures are set by authorities or gambling operators. C, d and j are measures where the gamblers get feedback about their gambling behaviour. G, h and i are tools where the gamblers, prior to gambling, can set limits for how much time or money they want to use for gambling or exclude themselves from gambling. Tools where the gamblers can set limitations for money and time consumption can be mandatory or voluntary to use.

Table 3. Pearson product-moment correlation coefficients, point-biserial correlation coefficients and Phi coefficients between all variables (*N*=8,276-9,129).

		Beliefs about RG measures	1	2	3	4	5	6	7	8	9	10	11	12	13
1	Gender (women 0, men 1)	-.070***													
2	Age	-.187***	-.065***												
3	Place of birth (outside Norway 0, Norway 1)	-.036**	-.004	.072***											
4	Game risk (at least one medium/high 0, low only 1)	-.087***	-.057***	.298***	.018										
5	Game type (at least one skill game 0, random only 1)	.007	-.298***	.124***	.007	.369***									
6	Game spending (low 0, high 1)	-.099***	.133***	.107***	.013	-.031**	-.136***								
7	Gambled online (no 0, yes 1)	.018	.245***	-.237***	-.022*	-.123***	-.308***	.136***							
8	Moderate risk/problem gambler (no 0, yes 1)	.043***	.099***	-.121***	-.126***	-.115***	-.170***	.212***	.196***						
9	Extraversion	.012	-.048***	-.089***	.004	-.035**	-.030**	-.040***	-.044***	-.030**					
10	Agreableness	.076***	-.312***	-.028**	.067***	-.001	.105***	-.066***	-.105***	-.107***	.343***				
11	Conscientiousness	-.046***	-.176***	.169***	.023*	.122***	.101***	-.028**	-.087***	-.145***	.132***	.202***			
12	Nevrotisisme	.075***	-.157***	-.078***	-.107***	-.047***	.022*	-.010	-.024*	.100***	-.151***	-.046***	-.192***		
13	Openness to experience	.079***	.090***	-.218***	-.063***	-.096***	-.034**	-.048***	.060***	.020	.259***	.200***	-.047***	-.013	
14	Self-reported impact from gambling advertisement (scale 1 – 4, disagree to agree)	.152***	.134***	-.248***	-.042***	-.178***	-.210***	.057***	.219***	.200***	.020	-.069***	-.148***	.111***	.067***

* $p<.05$, ** $p<.01$, *** $p<.001$

Table 4. Regression Analysis Summary for Demographic, Gambling and Personality Variables Predicting Beliefs about RG Measures (*N*=8,275).

	Unstandardized Coefficient		Standardized Coefficient		
Predictors	Beta	Std. Error	Beta	*t*	*p*
Gender (women 0, men 1)	-.134	.028	-.059	-4.844	.000
Age	-.010	.001	-.132	-10.928	.000
Place of birth (outside Norway 0, Norway 1)	-.064	.045	-.015	-1.430	.153
Game risk (at least one medium/ high 0, low only 1,)	-.088	.030	-.035	-2.901	.004
Game type (at least one skill game 0, random only 1)	.066	.028	.029	2.312	.021
Game spending (low 0, high 1)	-.288	.040	-.081	-7.224	.000
Gambled online (no 0, yes 1)	-.035	.030	-.014	-1.177	.239
Moderate risk/problem gambler (no 0, yes 1)	.135	.058	.027	2.345	.019
Extraversion	-.011	.004	-.033	-2.823	.005
Agreeableness	.027	.005	.065	5.307	.000
Conscientiousness	-.006	.004	-.015	-1.278	.201
Neuroticism	.010	.004	.030	2.632	.008
Openness to experience	.012	.004	.035	3.083	.002
Self-reported impact from gambling advertisement	.251	.023	.126	10.977	.000

Dependent variable: Beliefs about RG measures. R^2=.071, $F_{14,8261}$=44.901, p<.001

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Regulatory Measures' Effect on Gambling Participation: Experiences From Norway

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The purpose of gambling regulation can be to ensure revenue for the public, to prevent crime and gambling problems. One regulatory measure involves restriction of what games can be offered in a market. In this study, the effects of two regulatory market changes are investigated: First, a restriction of availability when slot machines were banned from the Norwegian market in 2007, and second the introduction of regulated online interactive games to the same market in 2014. Data collected from the general population in the period from 2005 through 2018, comprising 2,000 respondents every year, are used to investigate how participation in gambling changed over time. The respondents were asked if they took part in various games or lotteries. Logistic regression analyses were used to predict the proportion participating in five groups of games and if changes in participation coincided with major market changes. The first change was associated with a reduction in gambling on slot machines as well as a reduction in gambling participation overall. Following the slot machine ban, results show an increase in women participating in games offered in land-based bingo premises. A general increase in gambling on foreign websites was also seen, albeit much smaller than the reduction in slot machine gambling. The increases can partly be explained as substitution of one type of gambling with another. New regulated online interactive games were introduced in 2014. Despite the relatively large growth of such games internationally, Norway included, increased online gambling in general and an increased marketing of foreign gambling websites, the participation on foreign websites seemed stable. However, the overall participation in online interactive games increased. The introduction of the regulated alternative seems to have had a channelizing effect. Overall, the changes in gambling participation coinciding with two major regulatory changes can be explained by transformations of physical and social availability, and in terms of mechanisms outlined by the model of total consumption.

Keywords: channelization of gambling, gambling problems, gambling reforms, gambling regulation, prevention of gambling problems, substitution

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INTRODUCTION

Regulation of gambling serves several purposes. One is to ensure revenue for the public in terms of taxes or as income for good causes. Another is to prevent criminal actions related to gambling activities, whilst a third is to prevent gambling problems or to reduce negative consequences of gambling, for both individuals and societies (1).

Gambling accessibility can be regarded as physical, social and cognitive (2). Accordingly, gambling is prevented if a game is banned, hence no longer physically available, either land-based or online. If certain games are socially inacceptable, e.g., for family and friends, the threshold to participate is typically elevated (social accessibility). A high threshold for participation is also seen for games where gambling procedures or rules are difficult to comprehend (cognitive accessibility). In addition to accessibility, gambling is also affected by potential competing products. New gambling products may serve as substitutes for existing ones. Generally, "cannibalization" occurs when new products or services to a varying degree substitute existing products or services (3). From this it seems conceivable that removal of gambling products may lead to substitution by increased gambling on other gambling products.

Two major regulatory changes, relevant to accessibility and cannibalization, have taken place in Norway. The first concerned land-based gambling machines. In year 2001, the Norwegian gambling market had about 19,000 slot machines, operated by over 100 private operators with a wide distribution. The machines were available in open areas such as shopping centers, grocery stores and other public premises e.g., bus stations. At the time, public concerns about gambling addiction were growing. Coincidently, treatment providers reported an increase in people seeking help for gambling problems. As a response, the government decided to change the market for gambling machines to prevent gambling problems more efficiently, to enforce the age limit more strictly, and to prevent crime and fraud. Consequently, it was decided to allocate the state-owned operator, Norsk Tipping, a monopoly to operate gambling machines (4). This decision was however taken to court by the private operators. The case went through all three levels of the Norwegian court system and was also treated by the European EFTA court. Before the final verdict, note acceptors were banned from 1st of July 2006, hence only payment by coins was possible. The final verdict in the Norwegian supreme court ruled in favor of the government, and the removal of slot machines took place at the end of June 2007. The new machines, which were introduced mainly from 2009, were considered less harmful. These machines, interactive video terminals (IVTs), called Multix, were connected to a central server. A player card, and hence registered play, was required to gamble on these terminals. The mandatory player card enabled tools for prevention of problem gambling by enforcing an upper loss limit and other features where the gamblers could set further restrictions as well as self-exclude. In addition, the number of new gambling terminals was considerably lower and reduced to about one fifth of the former slot machine market (5).

A few studies investigated the effect of this regulatory change. Large school surveys among Norwegian teenagers aged 13–19 showed a significant decrease in participation at all levels (e.g., frequent gamblers, excessive gamblers) of gambling from before to after the ban of note acceptors (6). Indicators of problem gambling measured by SOGS-RA (7) and Lie/Bet (8) also showed a significant decrease from 2005 to 2006 (9). Changes in terms of gambling participation and indicators of gambling problems for teenagers has also been studied across a wider time interval. From 2002 to 2010 the overall gambling participation among teenagers was reduced from 78.5 to 64.3%. That study pointed to the slot machine reform as the main reason for the reduction. The same study also showed a reduction in problem gambling during the same period (10). In the adult population of former slot machine gamblers, 18 years and older, data for a panel study were collected twice in 2007, before and after the slot machine ban (N = 1,293). A significant reduction in overall gambling participation, gambling frequency and gambling problems was found (11). Another longitudinal study of adult participants collecting data before and after the ban, showed reduced gambling for half of the frequent slot machine gamblers, as they either reduced or completely ceased gambling (12).

Over the years, Norwegian gamblers have become engaged in interactive games on foreign web sites offered by operators without a Norwegian license. In order to channelize these gamblers to the Norwegian regulated market (13), Norsk Tipping introduced online interactive games in 2014. This represented the second regulatory change addressed in the present study. The online games offered encompass casino games (i.e., slot machines and table games except from poker), scratch games and bingo games. From the launch these games have been equipped with several responsible gambling (RG) tools, among others mandatory use of budget tools where gamblers must set personal loss limits. Also, an upper loss limit (maximal loss) is enforced (14). One panel study investigated the effect of the introduction of online interactive games by collecting data from a Norwegian sample (N = 5,809) aged 16–74 years in 2013, with follow-up data collection in 2015. Relatively few Norwegians gambled on online bingo or online casino in 2013. Of those who did, half did not gamble on such games in 2015. Half of those who still gambled on such games, gambled on the new regulated games. Hence, that study found some support for channelization from foreign websites to the new regulated internet-based casino games (15).

The total consumption model postulates an association between excessive or harmful consumption and total consumption in populations of gamblers. The model was originally derived from alcohol studies, but there are also studies showing that the model is valid for the gambling field (16). From this model one can expect that a reduction in the total amount of gambling in a market also will reduce the level of problem gambling (1). Thus, the model is relevant to understand the effects of regulatory changes toward gambling.

Previous research has addressed if the regulatory changes in the slot machine market, including the ban of note acceptors in 2006, led to changes in gambling behavior and gambling problems. However, there is a dearth of studies investigating the effect of introducing regulated interactive online games in 2014.

Further, no study has been conducted covering the whole period of both changes, using the same type of data with samples from the entire population of gamblers. Consequently, the aim of this paper was to examine if and how gambling behavior changed after the two regulatory changes. This was done using data from regularly conducted surveys on gambling activity.

Specifically, the following research questions are addressed in the present study: (1) Can regulatory changes for specific games or game categories lead to changes in the participation of similar games? and (2) Can changes for some specific games lead to changes in the total consumption of gambling?

MATERIALS AND METHODS

Data used for this study were collected by surveying samples from the Norwegian population during 2005 through 2018. These data are used to predict if and to what extent participation in gambling activity has changed over the period. Data used to analyze gambling behavior were collected through semi-annual surveys, administered by an external research company on behalf of the Norwegian Gaming Authority. The surveys were based on phone interviews, landline and mobile. As the main goal of these surveys was to monitor developments in the gambling market, most survey questions have been unchanged during the whole period. This enables merging of all the raw data into one large datafile with about 28,000 respondents.

Except for new questions due to changes in the gambling market, there have not been any changes concerning the format, survey description, inclusion/exclusion criteria of participants or other aspects of the surveys. Due to procurement rules, a total of three analysis agencies have conducted the surveys, without changing the method, questions, or procedures. However, because mobile phones gradually have taken over for land-line phones, the proportion of mobile phone respondents has increased over the years. In the first survey (June 2005) used for this study, mobile phone users amounted to 29.1%. In the last survey (December 2018), 94.3% answered with mobile phones. The samples for land-line phone numbers were randomly selected from a database of land-line phone customers. The samples for mobile phone numbers were randomly selected from series of mobile phone numbers kept by The Norwegian Communication Authority.

Over the years response rates in surveys in general has decreased, also for phone-based surveys. This can be illustrated with an American example where *the contact rate* in a typical survey from Pew Research Centre decreased from 90% in 1997 to 62% in 2012, with a decline also in *the cooperation rate* (contacted persons who agreed to participate), from 43 to 14% over the same period. From this, *the overall response rate* is reduced from 36% in 1997 to 9% in 2012 (17). For most of the years, the exact response rates for the survey data in the present study are not reported, but the contact rates for the survey in June 2010 and an identical survey in June 2020 were accordingly 56% and 32%, whereas the cooperation rates were 19 and 13%, respectively. Hence the *overall response* rate was 10 and 4% when the persons never reached are taken into consideration. The survey in 2020 has a similar cooperation rate to the typical rate mentioned above in 2012. The overall response rate is however lower. The data used in the present study are weighed for age, gender, and place of residence (county) to match the demography of the adult Norwegian population. The data are used to explore predicted changes in gambling over time.

TABLE 1 | Descriptive statistics of study variables ($N = 28,251$).

Variable	Percentage	*n*
Epochs		
1st (2005–2007)	22.1	6,243
2nd (2008–2013)	42.5	12,008
3rd (2014–2018)	35.4	10,000
Gender		
Female	50.3	14,217
Male	49.7	14,034
Age		
15–17 yrs.	4.0	1,140
18–24 yrs.	11.2	3,164
25–39 yrs.	24.7	6,984
40–59 yrs.	33.4	9,444
60 yrs. and older	26.6	7,519
Gambled on one or more game types		
No	23.7	6,700
Yes	76.3	21,551
Gambled on slot machines (to 2007) / IVT Multix (from 2009)		
No	94.7	26,742
Yes	5.3	1,509
Gambled in land-based bingo premises		
No	98.0	27,689
Yes	2.0	562
Gambled on foreign web sites		
No	95.8	27,066
Yes	4.2	1,185
Gambled on online interactive games, not poker		
No	97.2	27,455
Yes	2.8	796

Data from every year from 2005 through 2018. n = 2,000–2,168 for each year. Mean/standard deviation (SD) for age: 45.94/(18.36).

Participants

Twice yearly, in June and December, a random sample of 1,000 Norwegians, aged 15 years or older, answered questions on which money games they have taken part in the last 12 months. See **Table 1** for details about sample characteristics.

Procedure

In the study, gamblers have been categorized into different groups in order to address the research questions. One variable is general (gambled, on one or more game types vs. not gambled at all). In addition, four other specific gambling categories/variables are applied: (1) if gambled or not on land-based slot machines or IVTs, (2) if gambled or not on games in land-based bingo premises, (3) if gambled or not on foreign websites and finally, (4)

if gambled or not on interactive online games (excluding online poker). The four specific categories have games with similar characteristics or include games such as the ones which were banned in 2007 (slot machines) or introduced in 2014 (online interactive games).

Except for trial licenses granted to two small operators which ceased in 2005, the foreign operators were alone to offer the latter type of games until 2014, when online interactive games were introduced to the regulated market by the Norwegian monopolist. This last variable reflects participation in online interactive games both before and after 2014. With logistic regression analysis, the data were used to predict participation in different games or game types.

Instruments

Gambling Participation

The respondents were asked if they had gambled or not for each available money game or lottery in the Norwegian market, inclusive games offered by foreign operators. If the respondents endorsed minimum one game or lottery, e.g., betting, casino games or number games, they were categorized as gamblers under the general variable, gambled or not. Because of their relatively low "gambling factor," two types of lotteries, small raffles without money prizes and a bottle recycling lottery, were not included in the variable. Gambling onboard ships in traffic between Norwegian and foreign harbors was first included in the survey from 2011 and is here included in in the general gambling variable. Number games are the most popular form for gambling in Norway, having the highest participation rate. As an example, and according to a national prevalence study in 2015, 77% of gamblers had participated in number games e.g., Lotto at least once during the last 12 months (18).

For the more specific variables the first was constructed for gambling or not on land-based slot machines or IVTs outside bingo premises. To be allocated to the first category, the gamblers had to confirm gambling on land-based slot machines, which were banned in 2007, the last 12 months in the survey period from 2005 through 2007 or on IVTs, from when these were introduced in 2009. The second specific variable is gambling or not on available games in land-based bingo premises where the respondents in order to be allocated to the first category had to confirm participation in at least one such game (i.e., traditional bingo, bingo machines, side games and slot machines or IVTs located in bingo premises). The third specific variable is gambling or not on games offered online by foreign operators. Games offered online by foreign operators comprise mostly of casino games, poker and sport betting, but also bingo, scratch games and horse racing. From the survey, gamblers who confirmed gambling online with other companies than Norwegian companies were allocated to the first category on this variable. The fourth and last specific variable concerned gambling or not on online interactive games regardless of whether this was offered by Norwegian or foreign operators. To be categorized as a gambler under this variable, the respondents had to confirm participating in online bingo, online slot machines or online table games (not poker), online scratch games or similar.

Demographic

For this study we use data for gender and age. The total weighed sample was 50.3% female and 49.7 male ($N = 28{,}251$). Divided by age, 4.0% under 18 years, 11.2% in the age group 18–24 years, 24.7% in the group 25–39 years, 33.4% in the group 40–59 years and 26.6% 60 years or older ($N = 28{,}251$).

Time

There are two time-variables. The first concerns year and continues from year 0 (2005) through year 13 (2018) where each level comprises 1 year. The second time variable is categorical and reflects three epochs, Epoch 1 (from 2005 through 2007), Epoch 2 (from 2008 through 2013) and Epoch 3 (from 2014 through 2018). In the analyses, the second (Epoch 2) is set as the contrast to both Epoch 1 and 3.

Statistics

In the statistical analyses, five different dichotomized (no = 0, yes = 1) dependent variables, each reflecting participation in the following gambling activities were included: Gambled or not on: (1) one or more available games, (2) land-based slot machines or ITVs Multix, (3) games in land-based bingo premises, (4) games offered from foreign web sites and, (5) online interactive games, but not poker. The descriptive statistics of the study variables are presented in terms of frequencies or mean and standard deviation. The data were further analyzed with logistic regression analyses adjusted for different variables. Independent variables comprised year (2005 = 0, 2006 = 1, …. 2018 = 13), epoch (2005–2007, 2008–2013 and 2014–2018, where 2008–2013 comprised the reference), gender (female = 0, male = 1) and age. In the first block, all independent variables were entered simultaneously, however without interaction terms. In the second block the interactions between year and epoch, and in the third block also the interaction between year and age, year and gender, epoch and age, and epoch and gender were added. Nagelkerke R-square was used to assess the explained variation of the different regression models. We have investigated potential multicollinearity between Time (year) and Epoch 1, 2, 3. All variance inflation factors (VIF) came out below 10, which is regarded as a threshold for problematic collinearity (19). The logistic regression analyses' predictions in gambling participation are presented in **Table 2** and **Figures 1, 2**.

RESULTS

Tables 1, **2** show that many have gambled at least once during the last year. Data which are not presented in these tables show that for the specific groups, a large majority of gamblers also participate within other games or game groups, varying from 92.5% for slot machines (participating in other games) and IVTs Multix ($n = 1{,}509$) to 98.7% ($n = 796$) for the online interactive games.

For two of the five variables examined, a reduction in participation from 2005 through 2018 was found: For gambling in total, the mean predicted probability was 82.1% for the first epoch (2005–2007), 76.3% for the second epoch (2008–2013) and 72.7% in the third epoch (2014–2018), respectively. The clearest

TABLE 2 | Predicted probabilities (0–1), mean and standard deviation (*SD*) of participation in gambling per time epoch ($N = 28,251$, $n = 6,243–12,008$).

	Epoch	Gambled (one or more of all games)	Slots and IVTs Multix	Bingo premises (land based)	Foreign web sites	Online interactive, not poker
Mean	1 (2005–2007)	0.821	0.187	0.017	0.036	0.007
	2 (2008–2013)	0.763	0.015	0.023	0.042	0.016
	3 (2014–2018)	0.727	0.016	0.018	0.045	0.056
	Total	0.763	0.053	0.020	0.042	0.028
SD	1 (2005–2007)	0.025	0.140	0.007	0.046	0.006
	2 (2008–2013)	0.012	0.013	0.008	0.054	0.017
	3 (2014–2018)	0.018	0.012	0.006	0.061	0.045
	Total	0.039	0.097	0.008	0.055	0.036

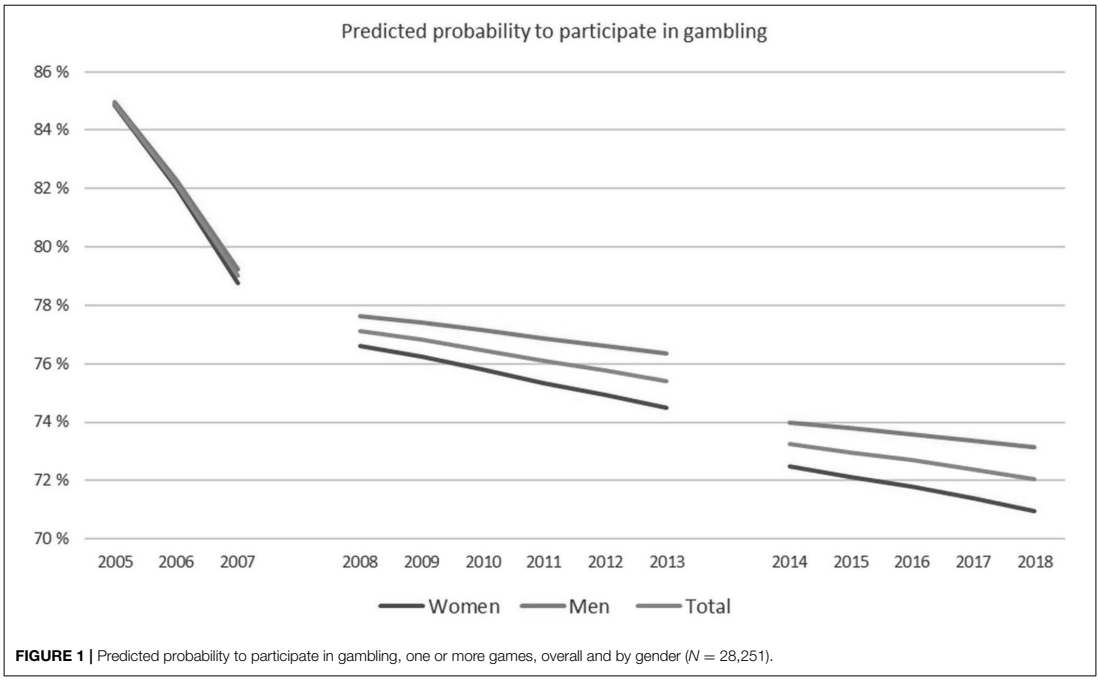

FIGURE 1 | Predicted probability to participate in gambling, one or more games, overall and by gender ($N = 28,251$).

reduction is for land-based slot machines and IVTs Multix. Here the mean predicted participation was 18.7% in the first epoch, and 1.5% and 1.6% in the two later epochs.

Gambling on foreign web sites and gambling on interactive games increased predicted participation and were for the three epochs, 3.6, 4.2, 4.5% and 0.7, 1.6, and 5.6%, respectively. The increase was strongest for online interactive games. The variable gambling in land-based bingo premises shows the lowest overall participation with predicted mean for the three epochs was 1.7, 2.3, and 1.8% respectively.

Logistic regression analysis was used to determine which effects the variables for time, gender and age had on the participation in gambling and changes between epochs. The analysis for each gambling variable was run in three blocks: In the first block, the impact of epoch, year, age, and gender was analyzed without including any interaction. In the second block, interactions between epochs and year were added. In the third block, interactions between both epochs and year by age and gender were added.

For two of the variables, gambling in total and gambling in land-based bingo premises, the analysis explained only 1.3 and 1.7% of the variation, respectively. For the other three variables, gambling on slot machines and IVTs Multix, foreign web sites and online interactive games the models explained far more of the variance, 31.5, 19.8, and 15.5%, respectively. Most of the explained variance was found in the first block.

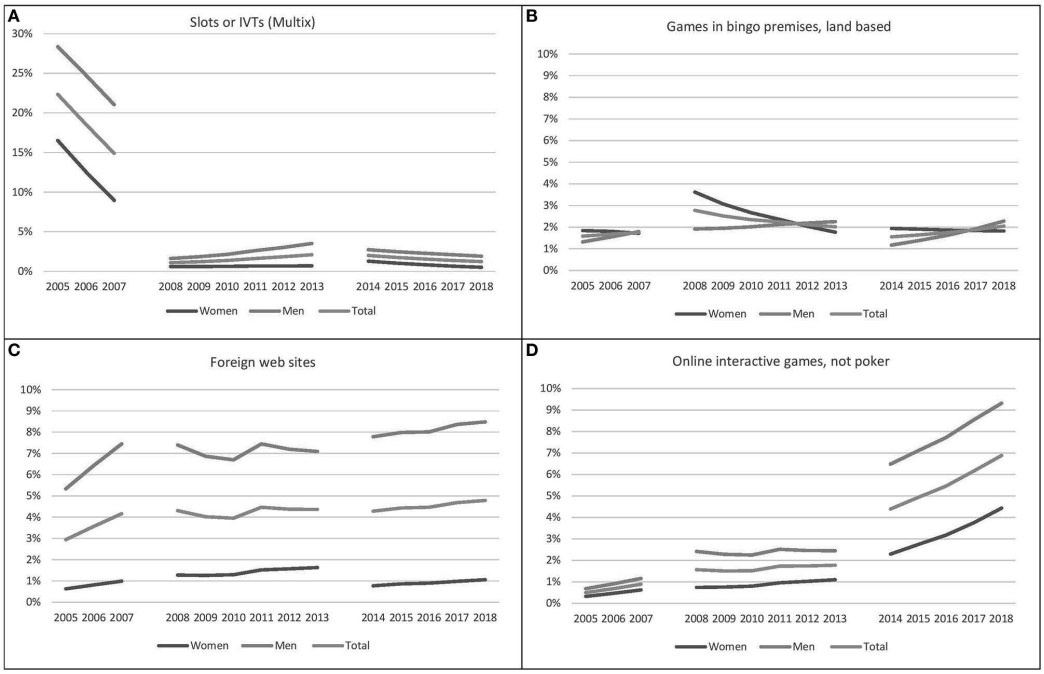

FIGURE 2 | (A–D) Predicted participation in specific groups of games ($N = 28,251$). Panel **(A)** shows predicted participation on slot machines and IVTs (Multix), total and by gender, in three epochs (Epoch 1 from 2005 through 2007, Epoch 2 from 2008 through 2013 and Epoch 3 from 2014 through 2018). Panel **(B)** shows predicted participation on games in bingo premises, land-based, total and by gender, in three epochs (Epoch 1 from 2005 through 2007, Epoch 2 from 2008 through 2013 and Epoch 3 from 2014 through 2018). Panel **(C)** shows predicted participation on foreign websites, total and by gender, in three epochs (Epoch 1 from 2005 through 2007, Epoch 2 from 2008 through 2013 and Epoch 3 from 2014 through 2018). Panel **(D)** shows predicted participation in online interactive games, not poker, total and by gender, in three epochs (Epoch 1 from 2005 through 2007, Epoch 2 from 2008 through 2013 and Epoch 3 from 2014 through 2018).

Table 4 shows that age and gender have a significant effect on all five variables after the first block. For gambling in total, participation increased with age, but for gambling on the four other specific gambling categories, participation decreased with age. For all game types but one, participation was higher for men. For bingo in land-based premises, participation was higher for women. The increased participation in overall gambling by age, most likely reflects a higher prevalence of older gamblers participating in number games. A prevalence study from 2015 showed that among the total amount of gamblers, 77% had participated in number games e.g., Lotto at least once during the last 12 months, and that participation rate for these games increased strongly with age (18).

After the first block, gambling in total participation was reduced from Epoch 1 to Epoch 2 (contrast). It was also reduced by year. For slot machines or IVTs Multix a significant decrease in predicted participation from Epoch 1 to Epoch 2 was found, whereas an increase was found from Epoch 2 to Epoch 3. Also, a reduction by year was found. For games in land-based bingo premises, an increase in predicted participation from Epoch 1 to Epoch 2 was found. The predicted participation on foreign websites was neither affected by year nor epoch. For online interactive games, an increased predicted participation per year was found and a lower participation in Epoch 1 compared to Epoch 2 as well as a higher participation rate in Epoch 3 compared to Epoch 2, and for the variable, the above-mentioned associations turned out non-significant when interactions were included. However, **Table 3** shows that most of the variation is explained by the model without interactions.

As **Figure 1** shows, the overall predicted gambling participation was reduced over the years and there was a significant drop from Epoch 1 to Epoch 2. The epochs by year interaction shows that the reduction by year was strongest in Epoch 1.

For gambling on land-based slot machines / IVTs Multix there was also a reduction in participation. This is shown with a steep drop from Epoch 1 to Epoch 2. There was in addition a minor increase from Epoch 2 to Epoch 3. The epoch by year interaction shows there were reductions in participation by year in both Epoch 1 and Epoch 3, but not in Epoch 2. Younger people gambled more often on slot machines and IVTs Multix. As illustrated in **Figure 2**, the year by gender interaction showed

TABLE 3 | Accumulated explained variation (Nagelkerke R Square) and significance per block.

	Gambled (one or more of all games)	Slots or IVTs Multix	Bingo in bingo premises, land-based	Foreign web sites	Online interactive, not poker
	Nagelkerke/*p*	Nagelkerke/*p*	Nagelkerke/*p*	Nagelkerke/*p*	Nagelkerke/*p*
Block 1	0.011/0.000	0.307/0.000	0.013/0.000	0.196/0.000	0.153/0.000
Block 2	0.012/0.000	0.310/0.000	0.014/0.075	0.196/0.056	0.154/0.086
Block 3	0.013/0.131	0.315/0.000	0.017/0.041	0.198/0.013	0.155/0.101
Total	0.013/0.000	0.315/0.000	0.017/0.000	0.198/0.000	0.155/0.000

TABLE 4 | Logistic regression analyses of five gambling variables in the Norwegian gambling market year 2005–2018.

		Gambled (one or more of all games)		Slots and IVTs Multix		Bingo in bingo premises		Foreign web sites		Online interactive, not poker	
		B	***S.E.***	***B***	***S.E.***	***B***	***S.E.***	***B***	***S.E.***	***B***	***S.E.***
Block 1	Year	−0.028	0.010**	−0.084	0.027**	0.020	0.029	0.022	0.021	0.092	0.025***
	Epoch 1	0.229	0.059***	2.380	0.142***	−0.459	0.173**	−0.182	0.129	−0.522	0.208*
	Epoch 3	−0.037	0.061	0.461	0.184*	−0.173	0.185	−0.089	0.134	0.772	0.160***
	Age	0.002	0.001*	−0.044	0.002***	−0.017	0.002***	−0.059	0.002***	−0.044	0.002***
	Gender (f = 0. m = 1)	0.076	0.028**	0.911	0.061***	−0.194	0.086*	1.960	0.087***	0.910	0.080***
Block 3	Year	−0.013	0.029	−0.072	0.090	−0.218	0.082**	−0.024	0.073	0.067	0.079
	Epoch 1	0.723	0.183***	3.933	0.532***	−1.171	0.497*	−1.324	0.462**	−1,119	0.659
	Epoch 3	−0.251	0.250	3.378	0.808***	−0.595	0.788	−0.901	0.635	−0.761	0.656
	Age	0.003	0.003	−0.041	0.011***	−0.024	0.010*	−0.074	0.010***	−0.057	0.011***
	Gender (f = 0. m = 1)	0.038	0.114	0.532	0.386	−1.240	0.336***	1.964	0.350***	1,364	0.354***
	Epoch 1 by Year	−0.180	0.042***	−0.359	0.062***	0.139	0.126	0.218	0.091*	0.286	0.195
	Epoch3 by Year	0.004	0.020	−0.246	0.073**	0.135	0.065*	0.037	0.045	0.101	0.053
	Year by Age	0.000	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.000	0.002
	Year by Gender	0.008	0.019	0.138	0.060*	0.185	0.058**	−0.053	0.058	−0.071	0.055
	Epoch 1 by Age	−0.006	0.003	−0.012	0.010	−0.001	0.010	0.019	0.009*	0.012	0.014
	Epoch3 by Age	0.003	0.003	−0.015	0.010	−0.009	0.011	−0.007	0.010	0.016	0.011
	Epoch 1 by Gender	−0.029	0.116	0.202	0.348	0.875	0.345*	0.212	0.359	−0.654	0.438
	Epoch 3 by Gender	−0.031	0.122	−1.035	0.393**	−0.952	0.390*	0.914	0.378*	0.351	0.361

*Results for the first and third block, before and after interactions between variables were included. Epoch 2 is the contrast to Epoch 1 and 3. (N = 28,251). *p < 0.05, **p < 0.01, ***p< 0.001.*

a steeper reduction by year for males than females. The epoch by gender interaction is indicative of a similar decrease for both genders in Epoch 1, but that the predicted probability to gamble increases for male and not for female gamblers in Epoch 2.

For games in land-based bingo premises, there was a significant overall decrease by year and a significant lower participation in the first epoch compared to the second. Further, and as illustrated in **Figure 2** and **Table 4**, the model predicted higher probability to gamble amongst women and younger subjects, compared to men and older ones. The epoch by year interaction shows the participation decreased by year in the second epoch but increased in the third epoch. Gender also interacted significantly with year and the epochs. The share of male gamblers increased, and the share of female gamblers decreased by year. The epoch by gender interaction showed a steeper increase for women than males from Epoch 1 to 2 whereas the opposite development was found from Epoch 2 to Epoch 3.

The participation on foreign websites increased slightly over the years. The strongest increase was seen in Epoch 1. In Epoch 2, yearly change was not statistically significant. However, there was a significant lower participation in Epoch 1 compared to Epoch 2. Younger persons and males had a higher predicted probability to gamble on such websites. The epochs by year interaction showed that the increase by year was steeper in Epoch 1 than Epoch 2. The epoch by age interaction reflects that the effect of age on participation increased from Epoch 1 to Epoch 2. The epoch by gender interaction suggested a slight reduction in gambling participation from Epoch 2 to Epoch 3 for females, whereas an increase was found for males.

Also, for gambling on interactive online games an increase in participation was detected from Epoch 1 to Epoch 2. Men and

young subjects had a higher predicted probability to gamble on online interactive games than women and older subjects. **Table 4** (block 1) show a significant increase from Epoch 2 to Epoch 3 on interactive online games.

DISCUSSION

In general, the total predicted participation in gambling decreased over the years. Also, from Epoch 1 to Epoch 2 a significant reduction was found. The same was true for slot machine gambling, although here an increase from Epoch 2 to Epoch 3 was found. The introduction of new interactive games in 2014 did not lead to an increase in the overall gambling participation as most of these gamblers already participated in other games.

The reduction in overall gambling participation reported here coincides with changes in two of the other Nordic countries. Survey data from The Public Health Agency of Sweden show a reduction in gambling participation from 2005 to 2018. However, the reduction in Sweden[1] seems to be more gradual than the Norwegian which clearly was steepest from 2005 through 2007. In Denmark, a reduction in gambling participation from 2005 to 2016 is reported (20). Data from the two other Nordic countries show increases in the similar period. In Finland, an increase from 2007 to 2015 followed by stabilization from 2015 to 2019 has been reported (21). In Iceland, which experienced an economic crisis in 2008, an increase from 2005 and 2007 to 2011 was found (22). New Zealand is an example of another country with decreased general gambling participation in the same period (23).

For the general participation, the Norwegian reduction is steeper in the first epoch than in the second. The first epoch covers the regulatory changes for the slot machines. Since the gamblers who played on slot machines very often also gambled on other games, the reduction in overall gambling must have other explanations than that people no longer gambled on slot machines. One reason can be that the reduction is a general trend which is also seen in other countries without the same regulatory changes. Another explanation is that some of the slot machine gamblers stopped gambling altogether due to the slot machine reform.

In 2005, the revenue (GGR) from slot machines accounted for 45% of the total in the Norwegian market[2]. The current regression analysis predicted that between 20 and 25% of the population had gambled at least once on slot machines in 2005. The overall gambling prevalence the same year was 85% and a large majority of gamblers on slot machines also played other games, thus illustrating that the slot machines' contribution to the total revenue was high compared to other games.

The total consumption theory emphasizes an association between excessive or harmful consumption and the total consumption in a population (16). The revenue figures for slot machines show that this was a game with relatively high revenue, and as such a game type with more excessive gambling. From the total consumption theory one can expect that a reduction in the total amount of gambling in a market also will reduce the level of problem gambling (1). Figures from the national helpline for problem gamblers can serve as indicators for how gambling problems develop. In the period of regulatory changes for slot machines the reduction in calls was nearly 70%, from 2,100 in 2005 to 657 in 2008[2] which is a relatively larger drop than the reduction in the total revenue (GGR) of 33% (from NOK 11.7 billion in 2005 to NOK 7.9 billion in 2008).[2] The reduction in problem gambling at that time was also seen in results from prevalence studies. A prevalence study conducted in 2013 compared the results with previous Norwegian studies using the same instrument (Problem Gambling Severity Index; PGSI) (24), and suggested a reduction in gambling problems, especially related to the low-risk gambler and the problem gambler categories (25). The prevalence rates for moderate risk and problem gamblers (PGSI 3+) were as follows: 5.5% (2005), 4.3% (2007), 3.6% (2008), 4.4 % (2010), and 3.0% (2013). It should be mentioned that the reported prevalence rates (PGSI 3+) for the two subsequently studies were 3.2% (2015) and 4.5% (2019), respectively, (26). Notably, the survey populations and the data collection procedures were not identical for all these studies (2005–2019), thus comparisons should be done with caution.

The findings support the total consumption model (1) in two ways. The first concerns the finding that the slot machine ban also led to a decrease in other forms of gambling. This was also seen in the panel study which found a significant reduction in the overall gambling participation for slot machine gamblers after the ban in 2007 (11). The steep drop in gamblers seeking help from the national helpline for problem gamblers compared to the reduction of the gambling revenue supports at least indirectly the association between excessive or harmful gambling and total gambling consumption. A similar association was shown in UK when the average gambling expenditures were doubled with the introduction of a national lottery, and the proportion of households where gambling expenditure was excessive increased four-fold (27).

When studying specific games or groups of games, the development of participation varies from the participation in general. At the same time as the regulatory restrictions on slot machines were introduced, the analysis shows a dramatical drop in the prevalence of slot machine gamblers through the first epoch. The reduction coincides firstly with the ban on note acceptors in 2006 and then the ban on the slot machines in 2007. For games in land-based bingo premises, which initially had a very low participation rate, the results predicted a significant increase in the female participation from the first to the second epoch.

Online gambling indicates an increase in the participation on foreign websites from Epoch 1 to Epoch 2 when all interactions were added to the model. The increase by year in Epoch 1 is significantly higher than the change by year in Epoch 2. Also, at the general level the participation in gambling on foreign websites was higher in Epoch 2 than Epoch 1. For gambling on interactive online games, the participation was lower in Epoch 1 than in

[1]The Public Health Agency of Sweden. Available online at: https://www.folkhalsomyndigheten.se/folkhalsorapportering-statistik/statistikdatabaser/folkhalsodata-och-folkhalsostudio/ (accessed February 15, 2021).

[2]The Norwegian Gaming Authority. Available online at: www.lottstift.no (accessed February 15, 2021).

Epoch 2. There was also predicted a significant increase from the second to the third epoch for the interactive games when the interaction terms were not taken into consideration.

Changes in participation which coincide with regulatory changes can be explained with change in accessibility. With the ban on slot machines, this form of gambling became inaccessible and hence a large drop in participation was predicted. The lower participation rate for the gambling machines (IVTs Multix) which replaced the former slot machines results from lower accessibility, e.g., fewer machines, stricter regulation for placement and the requirement of player identification. A suggested explanation to the increase in participation for games in bingo premises is that games with similar characteristics as the old slot machines remained in such premises. The predicted increase is however smaller than the reduction for slot machines. For online gambling, the introduction of regulated online interactive games and market trends are likely plausible explanations for the increase from Epoch 2 to 3. The increase is significant when the interaction terms were not added to the model, then also year was positively associated with participation. Still, it should not completely be ruled out that stricter regulation for the land-based slot machines through Epoch 1, partly led to more participation on online interactive games. For gambling on foreign web sites, the analysis further predicted a steeper increase by year in Epoch 1 than in Epoch 2. Similar to games in land-based bingo premises, the increase for online gambling is much weaker compared to the reduction for slot machines.

Only foreign operators offered online games such as slot machines or other interactive games through Epoch 2. However, in the beginning of Epoch 3 (2014), Norwegian interactive online games were introduced as a regulated alternative. From the analysis, there is no predicted reduction in the overall participation with the foreign operators that coincides with the introduction of national regulated online interactive games. However, the introduction of the regulated interactive games, together with regulatory measures aimed toward foreign operators, may have prevented a growth in the participation on foreign operators' websites. Two gambling market consultant companies estimated a large growth for the online interactive games, casino and bingo, poker not included. The estimated increase in revenue for Europe from 2013 to 2018 was 65 and 93%[3,4]. Nationally, three subsequent prevalence studies in Norway, with data from 2013, 2015, and 2019 show an increase in online gambling. Subsumed across all games, the prevalence of online gambling, at least once during the last year, has increased by each study, involving 25.8% (2013), 29.2% (2015) and 58.3% (2019) of the gamblers, respectively (18, 26). The strongest increase took place between 2015 and 2019. This was especially pronounced for mobile phones, by which online gambling increased from 17.0 to 48.7% (26). Further, the foreign operators significantly increased their spending on TV-marketing aimed for the Norwegian population in the third epoch[5]. Despite these trends and market efforts, an increase was not found in the present study's prediction of gambling participation on foreign websites. Coincidentally regulatory measures restricting the foreign operators most likely also prevented growth of gambling on the foreign websites (e.g., banning of marketing and payment services). These restrictive measures have been further developed after 2018. In 2019, the ban on payment services became more efficient and from 2021, the ban on marketing will also include the intermediaries of advertising broadcasted from abroad. DNS warning/blocking has not yet been implemented[2].

The increased participation rate for interactive online games from Epoch 2 to 3 can thus have at least two explanations: One is the general and international trend where such games seem to have increased in popularity and the shift to more gambling with electronic devices, especially mobile phones. The second explanation concerns increased physical and social availability of a regulated alternative to the foreign websites.

Looking at the participation on foreign websites, there is a relatively small, but significant change for gender where the female shares of gamblers on such sites decreased significantly from the second to the third epoch. A suggested interpretation for this change is that women, to a larger degree than men, have moved their gambling from foreign websites to the regulated Norwegian website. The regulated games introduced in 2014, were launched with several measures to prevent excessive gambling and reduce harm (e.g., stricter limits for stakes and maximum loss limits). This interpretation is in line with research showing that women are more positive to measures which prevent gambling problems and reduce negative consequences (28, 29). Another study has shown that women take less risks than men and judge the negative consequences of gambling as more likely to occur and as more severe (30). For some gamblers, national regulation of games with stricter measures to prevent problem gambling can thus appear more socially acceptable than the foreign operators' websites.

With their characteristics, the interactive online games (i.e., scratch games, bingo or casino games) have relatively higher risk for problem gambling. Among the characteristics recognized to increase the risk of problems are event frequency and availability[6] (31). Several of the characteristics are relevant for interactive online games. As previous mentioned, national prevalence data concerning problematic gambling (PGSI 3+) showed an increase from 2015 to 2019 (from 3.2 to 4.5%) (26). The authors mention increased participation in games with higher risk and increased use of mobile phones as gambling device as two of the possible causes for the increase in problematic gambling (26). The helpline had in 2019 a 12% higher rate of contacts compared to 2015[2] (764 and 680, respectively).

Practical Implications

The present study shows that regulatory measures which change accessibility to gambling opportunities impact gambling participation. Such changes may have a direct effect on problem gambling related to specific games, and indirectly through the mechanisms predicted by the total consumption model, where

[3]Global Betting & Gaming Consultants. Available online at: https://www.gbgc.com
[4]Gambling Capital. Available online at: https://h2gc.com
[5]The Norwegian Media Authority. Available online at: https://www.medietilsynet.no (accessed February 15, 2021).
[6]Gamgard. Available online at: www.gamgard.com (accessed February 15, 2021).

a reduction in overall gambling will reduce the prevalence of problem gambling.

Social accessibility should also be acknowledged as a relevant term in the regulation of gambling as this can affect participation. In line with international trends, and increased use of electronic devices for gambling, the participation in online interactive games has increased in Norway. This is however not visible for participation on foreign websites. Moreover, a reduction in the share of female gamblers on foreign website from Epoch 2 to Epoch 3 was found. One explanation can be that some of these prefer a regulated alternative equipped with several measures to reduce risk or harm. Another example which can illustrate social acceptance and hence accessibility is the reduction in gambling participation from 2005 through 2007 on slot machines. One explanation for a drop in 2006 is the ban on note acceptors which restricted the payment method to coins. Another explanation could be that the focus on gambling problems in society in general, which led to the ban on slot machines, also led to a reduced motivation or interest to gamble.

In addition to implications regarding availability, the mechanisms of the total consumption model should also be recognized where regulatory changes for one type of game could lead to changes for other games. Changes can also affect the level of extensive gambling or gambling problems.

Strengths and Limitations

To our knowledge, no previous study has used trend data for gambling covering all types of gambling participation within a jurisdiction over 14 years (2005–2018). With this it has been possible to analyze two regulatory changes based on the same data set. Other assets are the regularity of the surveys (conducted in June and December) preventing season as a confounder. The data also covered a minimum of 3 years before and after each regulatory market change, which thus partly compensate for the lack of control conditions/groups and comprises as such a quasi-experimental interrupted time-series design (32). However, it would have been a strength to compare Norwegian data with temporally similar data from other countries that did not implement the same regulatory changes. Nevertheless, we refer to comparable data on general trends from other Nordic countries. It should also be mentioned that each survey comprised at least 1,000 respondents which is considerable sample size.

One limitation of the present study is that survey data collected over telephone have low response rates. However, studies have showed that the response rate on its own is not a good predictor of non-response bias or low validity (33–35). Low response rate can be a disadvantage as regards representativeness. However, if results systematically under- or overestimate the prevalence of gambling participation it is still possible to study trends if the reasons for non-response do not change over time.

The fact that our study is mainly based on self-report and cross-sectional data is a noteworthy limitation. Ideally, panel data should have been used where the same respondents participated over time. This would however be difficult to achieve for such a wide timeframe as in the present study. Such an approach would also exclude analysis of new and young gamblers and old gamblers would naturally fall out of such panel.

It can be difficult to isolate the effects of various regulatory measures on gambling behavior. Among others, questions may be raised as to whether the change in gambling behavior was caused by the ban on note acceptors in 2006 or the ban on slot machines in 2007. The publicity and discussions at the time about slot machines could also have affected gambling behavior. Both the note acceptor ban, the slot machine ban and the later launch of new gambling terminals were part of the reform of the slot machine market. Conclusions about causality are also limited for the new and regulated online interactive games launched in 2014. Due to the design of the present study, it is not possible to determine how much of the change in behavior is caused by the launch of the games, the restrictive regulatory measures, a change in how people prefer to gamble or factors such as social acceptability.

In our view, our study suggest causality between market events and behavioral changes, but we cannot rule out other explanations for our findings. The analysis with highest explained variation is 31.5%. The study investigated if there were any changes in gambling behavior that coincide significantly in time with the two major regulatory changes in 2007 and 2014.

CONCLUSION

With the implementation of the ban on note acceptors in 2006 followed by the total ban on slot-machines in 2007 and the consequently reduction in gambling on these machines, a reduction in general gambling participation was also detected. Simultaneously, the data analysis predicted a certain increase in female participation in games in land-based bingo premises and a general increase in gambling on foreign websites following the ban. These increases were however much smaller than the reduction seen for slot machines. The actual increase in gambling in bingo premises and foreign web sites from Epoch 1 to 2 can still, at least partly, be explained as a substitution where some gamblers moved their gambling to arenas which offered similar games.

When new regulated interactive games were introduced in 2014, the overall participation in online interactive games increased, but the participation on foreign websites seemed stable. Despite the relatively large general growth for such games internationally, also in Norway, increased prevalence of online gambling and increased effort to market foreign gambling websites, the introduction of the regulated alternative seems to have had a channelizing effect. No increase in participation was visible for the foreign operators. This channelizing effect was relatively stronger for women than men.

Overall, the changes shown in our analysis coinciding with two major regulatory changes of the gambling marked in Norway can be explained by the transformations of physical and social availability, and in terms of mechanisms outlined by the model of total consumption.

DATA AVAILABILITY STATEMENT

Data are available on request. Requests to access the dataset should be directed to Jonny Engebø, jonny.engebo@lottstift.no.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent from the participants' legal guardian/next of kin was not required to participate in this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

JE has conducted the analysis and drafted the first version of the manuscript. All authors contributed to the interpretation of data, revised the work critically for important intellectual content, approved the final version to be published, and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

REFERENCES

1. Sulkunen P, Babor TF, Ornberg JC, Egerer M, Hellman M, Livingstone C, et al. *Setting Limits: Gambling, Science and Public Policy*. Oxford: Oxford University Press (2018). doi: 10.1093/oso/9780198817321.001.0001
2. Hing N, Haw J. The development of a multi-dimensional gambling accessibility scale. *J Gambl Stud.* (2009) 25:569–81. doi: 10.1007/s10899-009-9144-x
3. Marionneau V, Nikkinen J. Market cannibalization within and between gambling industries: a systematic review. *J Gambl Issues.* (2017) 1–35. doi: 10.4309/jgi.v0i37.3988
4. Prop L. *Om lov om Endringer i Pengespill- og Lotterilovgivningen 2003. White Paper about Law on Changes in the Gambling and Lottery Legislation.* Ministry of Culture (2003).
5. Rossow I, Hansen M. Gambling and gambling policy in Norway-an exceptional case. *Addiction.* (2016) 111:593–8. doi: 10.1111/add.13172
6. Hansen M, Rossow I. Does a reduction in the overall amount of gambling imply a reduction at all levels of gambling? *Addict Res Theory.* (2012) 20:145–52. doi: 10.3109/16066359.2011.605968
7. Winters KC, Stinchfield RD, Fulkerson J. Toward the development of an adolescent gambling problem severity scale. *J Gambl Stud.* (1993) 9:63–84. doi: 10.1007/BF01019925
8. Johnson EE, Hamer R, Nora RM, Tan B, Eisenstein N, Engelhart C. The Lie/Bet questionnaire for screening pathological gamblers. *Psychol Rep.* (1997) 80:83–8. doi: 10.2466/pr0.1997.80.1.83
9. Hansen M, Rossow I. Limited cash flow on slot machines: effects of prohibition of note acceptors on adolescent gambling behaviour. *Int J Ment Health Addict.* (2010) 8:70–81. doi: 10.1007/s11469-009-9196-2
10. Sletten MA, von Soest T, Frøyland LR, Torgersen L, Hansen M. *Uskyldig Moro? Pengespill og Dataspill Blant Norske Ungdommer [Innocent fun? Gambling and Computer Games Among Norwegian adolescents]*. Oslo Metropolitan University - OsloMet: NOVA (2010). doi: 10.7577/nova/rapporter/2010/18
11. Lund I. Gambling behaviour and the prevalence of gambling problems in adult EGM gamblers when EGMs are banned. A natural experiment. *J Gambl Stud.* (2009) 25:215–25. doi: 10.1007/s10899-009-9127-y
12. Øren A, Leistad L. *Endringer i den Norske Befolkningens Pengespillvaner og Påvirkning av Spilleautomatforbudet [Changes in the Norwegian Population's Gambling Habits and the Impact of the Slot Machine Ban]*. Trondheim: SINTEF Teknologi og samfunn (2010).
13. Ministry of Culture (Norway). Meld St. 12. *Alt å Vinne, ein Ansvarleg og Aktiv Pengespelpolitikk 2016. White Paper about a Responible and Active Gambling Policy in 2016.* Minstry of Culture (2016).
14. Auer M, Hopfgartner N, Griffiths MD. The effect of loss-limit reminders on gambling behavior: a real-world study of Norwegian gamblers. *J Behav Addict.* (2018) 7:1056–67. doi: 10.1556/2006.7.2018.106
15. Pallesen S, Molde H, Mentzoni RA, Hanss D, Morken AM. *Endring av Penge- og Dataspillproblemer i Norge 2013-2015 [Change of Gambling and Video Game Problems in Norway 2013-2015]*. Bergen: Universitetet i Bergen, Institutt for samfunnspsykologi (2016).
16. Rossow I. The total consumption model applied to gambling: empirical validity and implications for gambling policy. *Nordisk Alkohol Nark.* (2019) 36:66–76. doi: 10.1177/1455072518794016
17. Dillman DA, Smyth JD, Christian LM. *Internet, Phone, Mail, and Mixed-Mode Surveys: The Tailored Design Method.* New York, NY: John Wiley & Sons, Incorporated (2014).
18. Pallesen S, Molde H, Mentzoni RA, Hanss D, Morken AM. *Omfang av Penge- og Dataspillproblemer i Norge 2015. [The Prevalence of Problem Gambling and Problem Gaming in Norway 2015]*. Bergen: Universitetet i Bergen (2016).
19. Mason CH, Perreault WD. Collinearity, power, and interpretation of multiple regression analysis. *J Mark Res.* (1991) 28:268. doi: 10.2307/3172863
20. Fridberg T, Birkelund JF. *Pengespil og Spilleproblemer i Danmark 2005-2016 [Gambling and Gambling Problems in Denmark 2005-2016]*. Copenhagen: Det Nationale Forskningcenter for Velfærd (2016).
21. Salonen AH, Hagfors H, Lind K, Kontto J. *Gambling and Problem Gambling - Finnish Gambling 2019*. The Finnish Institute for Health and Welfare (THL) (2019).
22. Olason DT, Hayer T, Brosowski T, Meyer G. Gambling in the mist of economic crisis: results from three national prevalence studies from Iceland. *J Gambl Stud.* (2015) 31:759– 74. doi: 10.1007/s10899-015-9523-4
23. Abbott M. Gambling and gambling harm in New Zealand: a 28-year case study. *Int J Ment Health Addict.* (2017) 15:1221–41. doi 10.1007/s11469-017-9767-6
24. Ferris J, Wynne H. *The Canadian Problem Gambling Index*. Final report. Ottawa, ON: Canadian Centre on Substance Abuse.2001.
25. Pallesen S, Hanss D, Mentzoni RA, Molde H, Morken AM. *Omfang av Penge- og Dataspillproblemer i Norge 2013. [The Prevalence of Problem Gambling and Problem Gaming in Norway 2013]*. Bergen: Universitetet i Bergen (2014).
26. Pallesen S, Mentzoni RA, Torsheim T, Erevik E, Molde H, Morken AM. *Omfang av Penge- og Dataspillproblemer i Norge 2019. [The Prevalence of Problem Gambling and Problem Gaming in Norway 2019]*. Bergen: Universitetet i Bergen (2020).
27. Grun L, McKeigue P. Prevalence of excessive gambling before and after introduction of a national lottery in the United Kingdom: another example of the single distribution theory. *Addiction.* (2000) 95:959–66. doi: 10.1046/j.1360-0443.2000.95695912.x
28. Engebø J, Torsheim T, Mentzoni RA, Molde H, Pallesen S. Predictors of gamblers beliefs about responsible gambling measures. *J Gambl Stud.* (2019) 35:1375–96. doi: 10.1007/s10899-019-09835-2
29. Gainsbury SM, Parke J, Suhonen N. Consumer attitudes towards Internet gambling: perceptions of responsible gambling policies, consumer protection, and regulation of online gambling sites. *Comput Human Behav.* (2013) 29:235–45. doi: 10.1016/j.chb.2012.08.010
30. Harris CR, Jenkins M, Glaser D. Gender differences in risk assessment: why do women take fewer risks than men? *Judgm Decis Mak.* (2006) 1:48–63. doi: 10.1037/e511092014-212
31. Meyer G, Fiebig M, Häfeli J, Mörsen C. Development of an assessment tool to evaluate the risk potential of different gambling types. *Int Gambl Stud.* (2011) 11:221–36. doi: 10.1080/14459795.2011.584890

32. Campbell DT. Reforms as experiments. *Am Psychol.* (1969) 24:409–29. doi: 10.1037/h0027982
33. Hendra R, Hill A. Rethinking response rates: new evidence of little relationship between survey response rates and nonresponse bias. *Eval. Rev.* (2018) 43:307–30. doi: 10.1177/0193841X18807719
34. Morton SMB, Bandara DK, Robinson EM, Carr PEA. In the 21st Century, what is an acceptable response rate? *Aust N Z J Public Health.* (2012) 36:106–8. doi: 10.1111/j.1753-6405.2012.00854.x
35. Wright G. An empirical examination of the relationship between nonresponse rate and nonresponse bias. *Stat J IAOS.* (2015) 31:305–15. doi: 10.3233/sji-140844

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Gamblers' use of measures to prevent gambling problems and reduce harm

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In this study, the use of measures to control gambling were investigated. Data from gamblers (N = 5,878) participating in a cross-sectional survey in 2019 based on random sampling from the Norwegian Population Registry, were analysed. The survey included questions about use of eight measures, which comprised the dependent variables. Questions about sociodemographics, gambling behaviour, gambling problems, self-reported impact from gambling advertisement and beliefs in measures to control gambling comprised the predictor variables. Logistic regression analyses were employed to identify significant predictors. Use of measures varied, ranging from 0.8% (contacting help services) to 23.2% (pre-commitment to affordable loss limits). All predictors had at least one significant association with the actual use of measures. Being a moderate risk or problem gambler was the most consistent predictor and was associated with the use of all eight measures. Being born outside Norway in a western or non-western country was associated with use of seven of the eight measures, whereas gambled online and participated in low-risk game only (inversely) were associated with use of six measures. Gender, age, game spending and beliefs in the usefulness of measures were associated with use of four measures. Participation in random games only was inversely associated with use of three measures. Self-reported impact from gambling advertisement was only (inversely) associated with self-testing for gambling problems. Several mechanisms responsible for the associations between predictors and the dependent variables are suggested, e.g., younger gamblers and moderate risk or problem gamblers may use these measures as they may acknowledge personal susceptibilities for developing gambling problems, such as impaired impulse control. Online gambling on the other hand was associated with use of various measures as the latter more often are integrated in online than offline gambling. Notably, the beliefs in measures as helpful was a significant predictor of use of four of the measures, which illustrates that positive views on the use of measures are not consistently associated with actual use of all the measures. Characteristics of the gamblers (e.g., place of birth, moderate risk or problem gambler), the game itself and the online distribution seem to be the most consistent predictors.

KEYWORDS

gambling problems, pre-commitment, prevention, harm reduction, responsible gambling, gambling, gamblers' protection

Introduction

Gamblers have different measures they can use to control their own gambling and to reduce negative consequences. Most often such features are available at online gambling sites where gamblers e.g., can set restrictions on time and money spent on gambling. Among other measures, gamblers can also download an overview of their gambling expenditures. Such measures are often referred to as responsible gambling tools (RG) (1). In addition, gambling operators can have their own restrictions, e.g., maximum stake size, maximum loss limits and mandatory player breaks e.g., after 1 h continuously gambling. Further, gambling operators can monitor gambling behaviour and from that communicate with the gamblers. To receive help for gambling problems, gamblers can also contact help services as helplines, health personnel, other treatment providers and support groups. Some may also transfer control of their economy to others in order to prevent further problems or control gambling (2–4), typically implying a private agreement between the gambler and a trusted family member, a friend or a formally appointed guardian.

Several studies have investigated the use of tools to control gambling consumption. Most of them have investigated the use within online gambling environments and excluded land-based gambling. The emphasis on online gambling environments probably reflects that those tools often are based on registered play and hence more relevant for online gambling. One study, based on an online survey of 564 customers of Australian internet gambling sites found that among those who were aware of tools, most had accessed activity statements (88.4%), but fewer had used budget tools (24.5%) or taken timeouts (8.1%) (5). In another Australian study, account data of 39,853 gamblers wagering on sports and races were examined. In that study tools as deposit limits and timeouts are named Consumer Protection Tools (CPT). Most gamblers, 83%, did not use any CPT tools, deposit limits (15.8%), timeouts (0.55–1.57%) and self-exclusion (0.16–0.57%) (6).

In a study among Swedish gamblers who voluntary used the monitoring system Playscan, the gamblers could use several RG tools. In all, 26% had at that time used Playscan and of those 56% had set spending limits, 40% had taken a self-diagnostic problem gambling test and 17% had used a tool for self-exclusion (7).

A randomised control trial investigated the use of a deposit limit tool among gamblers on online slots who registered with a gambling company in Åland, (an autonomous island in Finland). For the gamblers who received a prompt/message about setting deposit limits at registration, before the first deposit or after the first deposit, the percentages of limit setters were 45.0, 38.8, and 21.9%, respectively. For the control group the percentage of limit setters was 6.5% (8).

Some studies have investigated the use of loyalty programs (9). Because loyalty schemes collect player data, such data can be used to prevent gambling problems. This could have been relevant for the land-based gambling e.g., in gambling arcades or casinos. A qualitative study among Finnish gamblers revealed mixed perceptions about a loyal customer program, which also offered gambling control tools. It was questioned if the program prevented gambling problems or actually increased consumption. The gambling control tools were regarded as useful but would not necessarily help problem gamblers (10). Studies in Australia have showed consistent positive associations between loyalty card use and risk gambling for venue-based gamblers (11).

Among those who suffer from gambling problems, few actually seek help (12, 13), and severe harm has often been experienced before contacting help (14).

This article addresses the question if gamblers use measures to control their gambling consumption. Knowledge of how gamblers use such measures or help is important for both gambling operators, help providers and regulators. Such knowledge for example helps to consider if some measures or features (e.g., budget tools) should be mandatory, and if help services should be more known and available for those who need help.

A Norwegian study with data from 2013, 2015 and 2019 showed that gamblers over the years have strengthened their beliefs in measures which can help them to control their gambling behaviour (15). In Norway, it is mandatory to set loss limits equal to or below maximum loss limits in some games. For many gamblers, these limits can still be set higher than what is affordable. In the present study, one of the variables measured if the set limits are low enough to be affordable.

A study analysing the data from 2013 and 2015 identified eleven variables as significant predictors of positive beliefs for the same measures: Female gender, young age, playing random games only, being a moderate risk or problem gambler, reporting high impact from gambling advertisements as well as the personality traits agreeableness, openness and neuroticism. Inversely, playing low risk games only, reporting a high amount of spending on gambling and the personality trait extraversion were related to less positive beliefs. Three variables showed no significant association with beliefs about RG measures: Place of birth (Norway or not), gambled online or not and the personality trait conscientiousness (3). Nine of the abovementioned variables were included in the present study. The five personality trait variables were not included.

This present study is the only one known to us which include a sample representative of the entire population of gamblers (i.e., participation in all types of available games, with both land-based and online distribution).

The present study has two research questions: (1) To what extent do the gamblers use measures to help them to control

their gambling behaviour and (2) what can predict use of such measures when controlling for other relevant predictors / independent variables?

Materials and methods

Participants and sample

The present study is based on quantitative survey data stemming from a Norwegian prevalence study conducted by the University of Bergen (15). The data collection took place during the autumn of 2019. In total, 30,000 persons (gross sample) aged 16 through 74 years were randomly selected from the National Population Registry of Norway and invited to participate. Through a letter sent by postal mail, the invitation was first to respond to a web-based survey. With up to two reminders, it was also possible to participate by returning an enclosed paper-based questionnaire. In total 9,248 valid answers (net sample) were received. After eliminating persons with wrong addresses, illness, deaths, etc., an overall response rate of 32.7% was achieved. The response rate for similar postal surveys has been reduced since 2013 (43.6%) and 2015 (40.8%) (15). To reduce over- or under-representation among groups of gamblers, the data were weighted for age, gender and place of residence (county) in Norway.

In the weighted net sample, a total of 63.6% had gambled the last 12 months, 60.2% of the women (n = 4,742) and 67.1% of men (n = 4,506). Within specific age groups the gambling rate was lowest for those 16–25 years: 50.1% (n = 1,730). The other age groups had higher rates, 26–35 years: 64.1% (n = 1,806), 36–45 years: 66.7% (n = 1,644), 46–55 years: 68.2% (n = 1,628), 56–65 years: 67.4% (n = 1,401), and 66–74 years: 67.7% (n = 1,039). Among the gamblers 51.5% were male. In all, 0.7% of the gamblers were 16–17 years, 14.0% were 18–25, 73.3% were 26–65 years and 12.0% were 66–74 years, respectively. The mean age was 44.3 year, SD = 15.9 (N = 5,878).

Procedure

The gamblers were categorised according to whether they had played low risk games only or if they had played games with higher risk (i.e., medium or high). Gamgard (an assessment tool) was used for this categorisation and divides games into very low, low, medium, high or very high risk, respectively. With this tool, ten game characteristics are considered with regards to a particular games' potential contribution to developing gambling problems, e.g., event frequency (time taken to buy a game, time from placing bet to the outcome, and time to buy the game again) and accessibility (how easily available a game is)[1]. The assessment tool also takes into consideration four RG features that moderate the risk, e.g., monetary budget tools[2]. These four RG features were not considered in the present assessment. In all 24.0% had played low risk games only (very low or low), whereas 76.0% had played at least one medium- or high-risk game (medium, high or very high). All the games are mentioned below (instrument section; games played and in Table 3). Number games, pools and a deposit bottle lottery were categorised as low risk games and all other games as higher risk (medium or high). As different games within one game category can have different risks, and since the questionnaire did not differentiate between all games within one category (e.g., for horse racing), the game type was consequently categorised as medium/high risk.

The gamblers were also categorised in terms of whether they had played at least one skill based game or random games only. Skill games imply games where the gamblers can improve their winner chances based on skills (i.e., pools, betting, horse racing, online poker and private games such as poker among friends). The non-skill or random games comprised number games, deposit bottle lottery, bingo and bingo machines, scratch cards, online casino, video lottery terminals (VLTs), and games on ships (slots and table games). Online casino and games on ships were categorised as random because the questions about these games did not differentiate between skill and non-skill games. A total of 64.5% of the gamblers had participated in random games only, whereas 35.5% had participated in at least one game involving skills.

To identify the gamblers who were most involved in at least one game type, the gamblers were also divided into two groups based on money spent. Those who had spent more than 5,000 NOK (∼500 €) on at least one game type within the last 12 months were categorised as high spenders (comprising 11.1% of the gamblers), whereas those who had gambled for 5,000 NOK or less on every game (88.9% of the gamblers) were categorised as low spenders.

The gamblers were asked how often they gambled on four electronic devices: Stationary computer, lap-top, tablet or mobile phone. For each device, the response alternatives ranged from never to daily. In the present study an online gambler was defined as someone who had gambled online at least once during the 12 last months using at least one of the four devices. In total 58.4% were categorised as online gamblers, whereas 41.6% were categorised as land-based gamblers only.

Instruments

Gambling participation

The respondents were asked if they during the last 12 months had participated in games (yes or no). The question

1 Gamgard, www.gamgard.com (Accessed April 27, 2022).

2 Gamres, www.gamres.org (Accessed April 27, 2022).

contained a definition of games described as games with monetary stakes where results from an event or a draw could lead to monetary prizes.

Demographic

Because the sample was drawn from the National Population Registry, data on gender and age for each participant were provided from the registry. The respondents were asked about place of birth (eight alternatives: Norway, the other Nordic countries, the rest of Europe or one of the other five continents). Data on place of birth were used for making a dummy coded variable with three levels (born in Norway, born outside Norway either in Europe, North-America or Oceania (western countries), born in Africa, Asia, South or Central America (non-western countries). For the analyses, data for age was divided into four categories, 16–17, 18–25, 26–65, and 66–74 years, respectively.

Games played

The respondents were asked if they had participated in the following games: Number games, pools, betting, horse racing, bingo, bingo machines, scratch games, private games (e.g., poker games with friends), online casino, video lottery terminals (VLTs), games on ships (slots and table games), online poker and deposit bottle lottery. In addition to the Norwegian regulated games, the respondents were also asked if they had played games offered on foreign websites. The respondents confirmed participation by answering for each game the alternative for expenditure which was nearest to their gambling yearly spending (none/not gambled, NOK 1–1,000, NOK 1,001–5,000, NOK 5,001–10,000, NOK-10,001–25,000 and more than NOK 25,000) (1 NOK $\sim$ 0.1 €). The questions were only answered by those who initially had confirmed that they had gambled the last 12 months. Those who had gambled were also asked if they had gambled online. From the collected data four dichotomous variables were constructed: Low risk games only vs. medium/high risk game participation, random games only vs. skill game participation, game spending (low vs. high) and online gambling (no vs. yes).

Canadian Problem Gambling Index (CPGI)

The CPGI was used to assess the extent of gambling problems. The CPGI consists of nine items related to gambling the last 12 months. Five of these items measure problematic gambling behaviour and four measures consequences (e.g., "Have you needed to gamble with larger amounts of money to get the same feeling of excitement?" and "Has gambling caused you any health problems, including stress or anxiety?"). The nine items are scored on a scale ranging from 0 (never) through 3 (always). The composite score thus varies from 0 to 27. Based on the composite score the respondents are divided into four groups: Non-problem gamblers (composite score 0), low risk gamblers (composite score 1 and 2), moderate risk gamblers (composite score 3 through 7) and problem gamblers (composite score 8 or higher) (16). In the analyses, the gamblers were divided into two groups: No problem/low risk gamblers and moderate risk/problem gambler. The prevalence of moderate risk or problem gamblers was 7.0% (n = 5,850). Cronbach's alpha for the CPGI in the present study was 0.91. Cronbach's alpha values above 0.70 are considered acceptable and values above 0.80 are preferable (17).

Impacts from gambling advertising

In all, nine items on how gambling advertising had an impact on the gamblers were included. Five of the items were adopted from the Effects of Gambling Advertising Questionnaire (EGAQ) (18). The items are scored from 1 (strongly disagree) through 4 (strongly agree). In addition, four items were added. Two of these were related to knowledge about gambling opportunities ("Gambling advertisement has increased my knowledge of gambling options" and "Gambling advertisement has increased my knowledge of gambling providers"). One item measured change in behaviour due to gambling advertisement ("I play with higher risk (use more money) because of gambling advertisements") and one related to attitude ("I think more positively about gambling because of gambling advertisements") (19). A total composite score was created by adding the score on each item divided by the number of items. These items were only answered by those who had gambled during the last 12 months. The mean total composite score was 2.02 (SD = 0.58, N = 5,764). Cronbach's alpha for the nine items was 0.82. For the analysis, the composite score was divided by median or nearest value into two groups, lower composite score and higher composite score.

Gamblers' belief in measures to control gambling behaviour

Ten items measured the gamblers' beliefs about measures in terms of how they think that these measures would help them to regulate their own gambling consumption. Many of the items were based on existing RG features, e.g., prize money direct to gamblers bank account and not directly available for further gambling (20). The questions were also based on an article that explored the perception of the value of potential RG measures (21). All the ten items covered mechanisms that are presently available in parts of the Norwegian gambling market (3). In the questionnaire, the gamblers were asked to which degree they agreed that these characteristics help or would help them regulating their own gambling consumption. There were five response alternatives for each item: Totally disagree = 1, disagree = 2, neither agree nor disagree = 3, agree = 4, and totally agree = 5. The mean total composite score was 3.37

(SD = 1.00, N = 5,771) and Cronbach's alpha was 0.95. For the analysis, the composite score was divided by median or nearest value into two groups, lower composite score and higher composite score.

Gamblers' use of measures to regulate their gambling behaviour

Six items measured if the gamblers had used external tools or features in the games to regulate their gambling, e.g., if the gambler had set amount limits in games low enough to not gamble more than one could afford or set a temporary brake in one or more games. One additional item measured if the gamblers had contacted help services for help because of one's own gambling problems and one assessed if the gambler had let others control his/her finances because of gambling problems. For each of the eight items the respondents could answer the following: "No", "yes—during the last year" and "yes—but a longer time ago". In the analyses, the two confirming categories were merged into one, thus the variables were dichotomized (never used the measure vs. used measures at least once). Table 1 shows the distribution or mean for the study variables.

Statistics

Results from all questions are presented in terms of frequencies or means with standard deviations. A cross-tabulation was conducted where the usage of measures was investigated separately against each independent variable. The results are presented in terms of percentages, chi-square values and phi or Cramer's V (effect sizes). Both the phi values and Cramer's V values indicate how strong effect the predictors have on the dependent variable. For the phi values, 0.1 is regarded as a low effect, 0.3 as a medium effect and 0.5 as a strong effect, respectively. For Cramer's V (with three degrees of freedom), 0.06 is regarded as a small effect, 0.17 as a medium effect and 0.29 as a strong effect, respectively (22).

The eight measures of gambling regulating behaviour comprised the dependent (dichotomized) variables. They were analysed separately with logistic regression analyses due to their substantial content specificity. Missing data was deleted pairwise. Independent variables comprised gender (women = 0, men = 1), age (16–17 year = 1, 18–25 year = 2, 26–65 year = 3 and 66–74 years = 4, where the latter comprised the contrast variable), dummy coding of place of birth (outside Norway in a western country = 1, Norway and non-western countries = 0; outside Norway in a non-western country = 1, Norway and other western countries = 0), game risk (middle/high = 0, low = 1), game type (at least one skill game = 0, random only = 1), game spending (low = 0, high = 1), online gambling (no = 0, yes = 1), being a moderate risk/problem gambler (no = 0, yes = 1), scores for self-reported impact from

TABLE 1 Percentages or mean and standard deviation (SD) of the studied variables among the gamblers (N = 5,677–5,878).

	Percentage	Mean (SD)
Gender		
Women	48.5	
Men	51.5	
Age (16–74)		44.27 (15.90)
16–17 years	0.7	
18–25 years	14.0	
26–65 years	73.3	
66–74 years	12.0	
Place of birth		
Europe, North America, Oceania	7.5	
Africa, Asia, South or Central America	3.4	
Norway	89.1	
Participated in games with low or higher risk		
Played higher risk games (medium or high)	76.0	
Played low risk games only	24.0	
Participated in random or skill games		
Played both random and skill games or skill only	35.5	
Played random games only	64.5	
Game spending		
Low	88.9	
High	11.1	
Gambled online		
No	41.6	
Yes	58.4	
CPGI		
Non-problem gambling (CPGI 0)	79.0	
Low-risk gambling (CPGI 1–2)	13.9	
Moderate risk gambling (3–7)	4.9	
Problem gambling (8+)	2.1	
Moderate risk of problem gamblers (CPGI 3+)	7.0	
Impact from gambling advertisement		2.02 (0.58)
Lower composite score—under median or nearest	49.5	
Higher composite score—over median or nearest	50.5	
Beliefs about RG measures		3.37 (1.00)
Lower composite score—under median or nearest	50.1	
Higher composite score—over median or nearest	49.9	
Use of measures to control gambling[a]		
Pre-committed to affordable amounts	23.2	

(Continued)

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TABLE 1 Continued

	Percentage	Mean (*SD*)
Set temporary player break(s) in one or more games	5.5	
Set a permanent exclusion in one or more games	2.8	
Self-tested to cheque for gambling problems	4.9	
Downloaded an overview of gambling expenses.	3.4	
Set a time-limit to restrict the gambling	3.4	
Contacted helpline, support groups or treatment	0.8	
Let others control the economy	1.0	

[a]Percentage who confirmed the use of such measures during the last year or earlier.

gambling advertisement (lower composite score = 0, higher composite score = 1) and scores for beliefs about RG measures (lower composite score = 0, higher composite score = 1). Preliminary analyses were conducted to ensure no violation of the assumption of multicollinearity. All variance inflation factors (VIF) had a value below 2.5. This is lower than 10.0 which is regarded as a threshold for problematic collinearity (23). Another and more conservative threshold suggestive of problematic collinearity is 2.5 (24).

TABLE 2 Percentage (including 95% confidence interval) for the eight items measuring self-regulation and help seeking for gambling problems ($N = 5{,}733–5{,}761$).

	Percentage confirmed	95% *CI*	
		Lower	Upper
a. Pre-committed to affordable amounts	23.2	22.2	24.3
b. Set temporary player break(s) in one or more games	5.5	4.9	6.1
c. Set a permanent exclusion in one or more games	2.8	2.4	3.2
d. Taken a self-test to see if I might have a gambling problem	4.9	4.4	5.5
e. Downloaded an economical overview of my gambling	3.4	2.9	3.8
f. Set a time limit to restrict gambling longer than I have intended	3.4	2.9	3.9
g. Contacted helpline, support groups or treatment providers for help	0.8	0.6	1.0
h. Let others control my economy because of my gambling	1.0	0.8	1.3

Results

Table 2 presents the eight items including the percentages endorsing and the corresponding 95% confidence intervals, it further shows that among the measures, the most used tool was being pre-committed to affordable amounts (23.2%). Fewer have confirmed the use of the other seven measures, which ranged from having set temporary break(s) in one or more games (5.5%) to having contacted helpline, support groups or treatment providers for help (0.8%).

Table 3 presents the prevalence of participation in different games or groups of games. The table also includes information about how games are distributed, and which games are grouped as random games and low risk games.

Table 4 presents the prevalence of problem gambling according to the four Canadian Problem Gambling Index categories, broken down by gender and age groups. The prevalence of problem gambling was highest for men, and for the younger age groups. The prevalence rate for those 16 to 17 years was the highest, however it should be noted that the sample size for this age group was small ($n = 41$), thus this estimate should be interpreted with caution.

Table 5 shows percentages of gamblers in all groups who have used the different measures to prevent gambling problems. All predictors had at least four significant associations with the dependent variables. Highest phi (and strongest effect sizes; medium) was found for being a moderate risk or problem gambler setting temporary breaks in games (0.33) and letting others control their economy (0.31). Online gambling had a medium strong effect size for having pre-committed to affordable amounts (0.36). Highest Cramer's V (and strongest effect size; small) was found for age and having pre-committed to affordable amounts (0.12). Because of the significant associations found in the cross-table analyses, it was decided to include all independent variables (predictors) in logistic regression analyses.

The results from the regression analysis are shown in Table 6. Measured by Nagelkerke R Square, the eleven predictors in total explained between 19.6% (setting a time limit which restricts the gambling) and 40.9% (letting others control the gamblers economy) of the variance.

For all, but one dependent variable, there were several significant predictors. Male gender was associated with increased probabilities of using four of the measures (set temporary player breaks, set a permanent exclusion, taken a self-test for gambling problem and downloaded an economical overview). Compared to the contrast group (age 66–74), younger age (18–25 years) was related to higher probability of using four of the measures

TABLE 3 Gamblers' participation in different games ($N = 5{,}784–5{,}835$).

Games[a]	Distributed land-based (L) or online (O)	Random games	Low risk games	Participation percentage
Number games (e.g., Lotto)	L and O	√	√	72.4
Scratch games, incl. from foreign websites	L and O	√		62.3
Bottle deposit lottery	L	√	√	38.5
Betting, incl. from foreign websites	L and O			18.4
Pools	L and O		√	14.1
Horseracing	L and O			10.9
Online casino games—incl. from foreign websites[b]	O	√		7.7
Private games (e.g., poker among friends)	L			7.7
Games on ships in international route traffic[b]	L (ships)	√		7.1
Online poker, offered from foreign websites only	O			5.5
Video lottery terminals (VLTs) in e.g., kiosks	L	√		4.0
Bingo games (main games) in bingo premises	L	√		3.7
Bingo machines (side games) in bingo premises	L	√		0.9
VLTs in bingo premises	L	√		1.0
Online bingo, incl. from foreign websites	O	√		3.0

[a]4.6% (N = 5,745) answered also for an option other games. These games are not specified and not categorised. Therefore, not included.
[b]Most of the games offered are random (e.g., slots, roulette).

TABLE 4 Percentage of gamblers in each Canadian Problem Gambling Index category, by gender and age.

	Women	Men	16–17 years	18–25 years	26–65 years	66–74 years
Normal gambler	84.6	73.8	58.5	62.1	80.8	89.0
Low risk gambler	11.2	16.4	14.6	24.8	12.8	8.3
Moderate risk gambler	2.8	6.9	14.6	10.3	4.3	1.7
Problem gambler	1.4	2.9	12.2	2.8	2.1	1.0
Total[a,b]	100.0	100.0	100.0	100.0	100.0	100.0
n	2,840	3,010	41	818	4,290	702
Moderate risk and problem gambler[c,d]	4.1	9.8	26.8	13.1	6.4	2.7

[a]For gender: Chi-Square (χ^2) = 115.9, df = 3, $p < 0.001$.
[b]For age: Chi-Square (χ^2) = 231.7, df = 9, $p < 0.001$.
[c]For gender: Chi-Square (χ^2) = 70.4, df = 1, $p < 0.001$.
[d]For age: Chi-Square (χ^2) = 93.0, df = 3, $p < 0.001$.

(pre-commitment to affordable amounts, set temporary player breaks, taken a self-test for gambling problems and set a time limit which restricts gambling). Also, the age group 26–65 had a higher probability to take a self-test for gambling problems. Being born outside Norway, in another western or in a non-western country was associated with increased probability of having used in total all the eight measures. Having gambled with low risk games only was associated with lower probability

TABLE 5 Gamblers who use the measures to prevent gambling problems. Percentage, chi-square ($\chi 2$) and phi (ϕ) and Cramer's V(ϕ_c) ($N = 5{,}572–5{,}762$).

Predictors	Pre-committed to affordable amounts	Set temporary player break(s)	Set a permanent exclusion	Taken a self-test for gambling problems	Downloaded an economical overview	Set a time limit—restricts gambling	Contacted help services for help	Let others control the economy
Gender[a]	$\chi^2 = 75.7^e$.	$\chi^2 = 45.1^e$.	$\chi^2 = 35.5^e$.	$\chi^2 = 61.3^e$.	$\chi^2 = 65.2^e$.	$\chi^2 = 17.3^e$.	$\chi^2 = 10.3^e$.	$\chi^2 = 17.1^e$.
	$\phi = 0.115$	$\phi = 0.089$	$\phi = 0.080$	$\phi = 0.104$	$\phi = 0.107$	$\phi = 0.056$	$\phi = 0.044$	$\phi = 0.056$
Female = 0	18.2%	3.4%	1.4%	2.6%	1.4%	2.4%	0.4%	0.4%
Male = 1	28.0%	7.5%	4.1%	7.1%	5.2%	4.4%	1.2%	1.6%
Age[b]	$\chi^2 = 87.7^e$.	$\chi^2 = 47.7^e$.	$\chi^2 = 10.7^c$.	$\chi^2 = 30.1^e$.	$\chi^2 = 6.3^f$.	$\chi^2 = 49.0^e$.	$\chi^2 = 26.2^e$.	$\chi^2 = 39.1^e$.
	$\phi_c = 0.123$	$\phi_c = 0.091$	$\phi_c = 0.043$	$\phi_c = 0.072$	$\phi_c = 0.033$	$\phi_c = 0.092$	$\phi_c = 0.067$	$\phi_c = 0.082$
16–17 years	17.5%	15.4%	7.7%	5.1%	5.0%	7.7%	5.1%	10.3%
18–25 years	32.9%	9.9%	4.1%	6.4%	3.8%	7.1%	2.0%	1.5%
26–65 years	23.2%	5.1%	2.6%	5.3%	3.5%	3.0%	0.6%	0.9%
66–74 years	12.3%	2.8%	2.1%	0.7%	1.8%	1.0%	0.4%	0.3%
Country of birth[a]	$\chi^2 = 5.3^c$.	$\chi^2 = 20.3^e$.	$\chi^2 = 18.6^e$.	$\chi^2 = 7.5^d$.	$\chi^2 = 6.8^d$.	$\chi^2 = 4.2^c$.	$\chi^2 = 8.4^d$.	$\chi^2 = 4.8^c$.
	$\phi = 0.031$	$\phi = 0.061$	$\phi = 0.059$	$\phi = 0.038$	$\phi = 0.037$	$\phi = 0.029$	$\phi = 0.042$	$\phi = 0.032$
Western. not Norway = 1	27.9%	10.5%	6.2%	7.9%	5.7%	5.3%	2.1%	2.1%
Non-western or Norway = 0	22.8%	5.1%	2.5%	4.7%	3.2%	3.2%	0.7%	0.9%
Country of birth[a]	$\chi^2 = 9.2^d$.	$\chi^2 = 110.2^e$.	$\chi^2 = 36.8^e$.	$\chi^2 = 48.5^e$.	$\chi^2 = 39.1^e$.	$\chi^2 = 107.6^e$.	$\chi^2 = 100.0^e$.	$\chi^2 = 106.1^e$.
	$\phi = 0.041$	$\phi = 0.141$	$\phi = 0.084$	$\phi = 0.0.95$	$\phi = 0.086$	$\phi = 0.140$	$\phi = 0.138$	$\phi = 0.141$
Non-western. not Norway = 1	32.6%	23.1%	10.3%	16.1%	11.8%	17.2%	7.5%	8.6%
Western or Norway = 0	22.8%	4.9%	2.5%	4.6%	3.1%	2.9%	0.6%	0.7%
Low-risk games only[a]	$\chi^2 = 232.8^e$	$\chi^2 = 58.0^e$.	$\chi^2 = 24.4^e$.	$\chi^2 = 42.1^e$.	$\chi^2 = 39.7^e$.	$\chi^2 = 40.3^e$.	$\chi^2 = 5.1^c$.	$\chi^2 = 10.3^e$.
	$\phi = -0.203$	$\phi = -0.102$	$\phi = -0.067$	$\phi = -0.087$	$\phi = -0.085$	$\phi = -0.085$	$\phi = -0.032$	$\phi = -0.045$
No = 0 (only or also med/high risk)	28.2%	6.9%	3.4%	6.1%	4.3%	4.3%	1.0%	1.3%
Yes = 1	8.1%	1.4%	0.8%	1.6%	0.7%	0.7%	0.3%	0.2%
Participated in random games only[a]	$\chi^2 = 297.1^e$.	$\chi^2 = 100.0^e$.	$\chi^2 = 62.9^e$.	$\chi^2 = 106.3^e$.	$\chi^2 = 163.6^e$.	$\chi^2 = 58.3^e$.	$\chi^2 = 26.8^e$.	$\chi^2 = 53.4^e$.
	$\phi = -0.229$	$\phi = -0.133$	$\phi = -0.106$	$\phi = -0.137$	$\phi = -0.170$	$\phi = -0.102$	$\phi = -0.071$	$\phi = -0.099$

(Continued)

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TABLE 5 Continued

Predictors	Pre-committed to affordable amounts	Set temporary player break(s)	Set a permanent exclusion	Taken a self-test for gambling problems	Downloaded an economical overview	Set a time limit—restricts gambling	Contacted help services for help	Let others control the economy
No (only or also skill games) = 0	36.3%	9.7%	5.2%	9.0%	7.5%	5.9%	1.6%	2.3%
Yes = 1	16.1 %	3.3%	1.5%	2.7%	1.1%	2.0%	0.3%	0.3%
Game spending[a]	$\chi^2 = 92.9^{e}$.	$\chi^2 = 113.6^{e}$.	$\chi^2 = 135.2^{e}$.	$\chi^2 = 45.0^{e}$.	$\chi^2 = 67.5^{e}$.	$\chi^2 = 28.3^{e}$.	$\chi^2 = 40.8^{e}$.	$\chi^2 = 112.9^{e}$.
	$\phi = 0.130$	$\phi = 0.144$	$\phi = 0.157$	$\phi = 0.091$	$\phi = 0.111$	$\phi = 0.073$	$\phi = 0.089$	$\phi = 0.145$
Low = 0	21.4%	4.4%	1.9%	4.4%	2.7%	3.0%	0.5%	0.5%
High = 1	38.8%	14.9%	10.1%	10.7%	9.1%	7.2%	3.0%	5.1%
Gambled online[a]	$\chi^2 = 734.6^{e}$.	$\chi^2 = 127.9^{e}$.	$\chi^2 = 42.1^{e}$.	$\chi^2 = 138.8^{e}$.	$\chi^2 = 100.9^{e}$.	$\chi^2 = 79.9^{e}$.	$\chi^2 = 14.4^{e}$.	$\chi^2 = 20.5^{e}$.
	$\phi = 0.358$	$\phi = 0.150$	$\phi = 0.087$	$\phi = 0.156$	$\phi = 0.134$	$\phi = 0.119$	$\phi = 0.052$	$\phi = 0.061$
No = 0	5.3%	1.5%	1.1%	0.9%	0.5%	0.8%	0.3%	0.3%
Yes = 1	36.0%	8.4%	4.0%	7.8%	5.4%	5.2%	1.2%	1.5%
Moderate risk or problem gamblers[a]	$\chi^2 = 182.8^{e}$.	$\chi^2 = 615.3^{e}$.	$\chi^2 = 427.5^{e}$.	$\chi^2 = 287.5^{e}$.	$\chi^2 = 202.5^{e}$.	$\chi^2 = 277.1^{e}$.	$\chi^2 = 290.6^{e}$.	$\chi^2 = 531.7^{e}$.
	$\phi = 0.179$	$\phi = 0.329$	$\phi = 0.275$	$\phi = 0.225$	$\phi = 0.190$	$\phi = 0.222$	$\phi = 0.229$	$\phi = 0.308$
No = 0	21.2%	3.5%	1.6%	3.6%	2.4%	2.3%	0.2%	0.2%
Yes = 1	51.0%	33.2%	19.4%	22.9%	15.9%	18.1%	8.3%	12.3%
Self-report. impact. gamb. adv.[a]	$\chi^2 = 75.5^{e}$.	$\chi^2 = 36.4^{e}$.	$\chi^2 = 11.7^{e}$.	$\chi^2 = 9.6^{d}$.	$\chi^2 = 16.4^{e}$.	$\chi^2 = 35.0^{e}$.	$\chi^2 = 17.8^{e}$.	$\chi^2 = 27.6^{e}$.
	$\phi = 0.116$	$\phi = 0.081$	$\phi = 0.047$	$\phi = 0.042$	$\phi = 0.055$	$\phi = 0.080$	$\phi = 0.058$	$\phi = 0.072$
Lower composite score = 0	18.3%	3.6%	2.0%	4.0%	2.3%	1.9%	0.3%	0.3%
Higher composite score = 1	28.1%	7.3%	3.5%	5.8%	4.3%	4.8%	1.3%	1.6%
Beliefs in RG measures[a]	$\chi^2 = 70.5^{e}$.	$\chi^2 = 9.3^{d}$.	$\chi^2 = 2.6^{f}$.	$\chi^2 = 4.7^{c}$.	$\chi^2 = 0.6^{f}$.	$\chi^2 = 16.2^{e}$.	$\chi^2 = 0.8^{f}$.	$\chi^2 = 1.4^{f}$.
	$\phi = 0.112$	$\phi = 0.041$	$\phi = 0.023$	$\phi = 0.030$	$\phi = 0.004$	$\phi = 0.054$	$\phi = 0.014$	$\phi = 0.018$
Lower composite score = 0	18.6%	4.6%	2.4%	4.3%	3.3%	2.5%	0.7%	0.8%
Higher composite score = 1	28.0%	6.5%	3.2%	5.6%	3.5%	4.4%	0.9%	1.2%

[a]df = 1.
[b]df = 3 and Cramer's V (ϕ_c).
[c]$p < 05$, [d]$p < 0.01$, [e]$p < 0.001$, [f]Non-significant.

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TABLE 6 Logistic regression analyses. Summary for predicting the use of eight different measures to control gambling (N = 5,365–5,377).

Predictors	Pre-committed to affordable amounts		Set temporary player break(s)		Set a permanent exclusion		Taken a self-test for gambling problem		Downloaded an economical overview		Set a time limit which restricts the gambling		Contacted help services for help		Let others control the economy	
	OR	95% *CI*[a]	*OR*	95% *CI*[a]	*OR*	95% *CI*[a]	*OR*	95% *CI*[a]	*OR*	95% *CI*[a]	*OR*	95% *CI*[a]	*OR*	95% *CI*[a]	*OR*	95% *CI*[a]
Gender (female = 0. male = 1)	1.10	(0.94–1.29)	**1.38**	**(1.03–1.86)**	**1.69**	**(1.11–2.58)**	**1.75**	**(1.29–2.37)**	**1.89**	**(1.26–2.81)**	1.09	(0.77–1.55)	1.19	(0.54–2.61)	1.24	(0.58–2.62)
Age (16–17)[c]	0.81	(0.29–2.21)	2.64	(0.74–9.51)	1.41	(0.31–6.35)	2.38	(0.38–14.84)	0.82	(0.14–4.89)	2.91	(0.58–14.50)	3.30	(0.23–47.83)	n.a.[b]	n.a.
Age (18–25)[c]	**1.86**	**(1.32–2.61)**	**2.30**	**(1.17–4.50)**	1.32	(0.59–2.97)	**4.38**	**(1.47–13.06)**	0.87	(0.39–1.95)	**3.72**	**(1.40–9.86)**	4.53	(0.60–34.26)	n.a.[b]	n.a.
Age (26–65)[c]	1.24	(0.92–1.67)	1.29	(0.69–2.41)	0.93	(0.46–1.91)	**5.24**	**(1.83–14.95)**	1.13	(0.55–2.31)	1.87	(0.73–4.79)	1.36	(0.19–9.70)	n.a.[b]	n.a.
Born outside Norway in a western country (no = 0. yes = 1)	**1.69**	**(1.29–2.21)**	**2.43**	**(1.64–3.60)**	**2.62**	**(1.59–4.32)**	**1.66**	**(1.09–2.52)**	**1.92**	**(1.17–3.14)**	**1.83**	**(1.10–3.04)**	**4.25**	**(1.76–10.29)**	1.83	(0.78–4.31)
Born outside Norway in a non-western country (no = 0. yes = 1)	1.40	(0.96–2.05)	**4.00**	**(2.53–6.34)**	**2.47**	**(1.33–4.59)**	**2.82**	**(1.73–4.58)**	**3.50**	**(2.01–6.09)**	**4.67**	**(2.86–7.62)**	**8.28**	**(3.67–18.70)**	**4.08**	**(1.84–9.04)**
Participated in low-risk games only (no = 0. yes = 1)	**0.29**	**(0.23–0.36)**	**0.36**	**(0.21–0.60)**	**0.47**	**(0.24–0.94)**	**0.46**	**(0.28–0.74)**	**0.42**	**(0.20–0.86)**	**0.32**	**(0.16–0.65)**	1.74	(0.53–5.73)	1.69	(0.45–6.27)
Participated in random games only (no = 0. yes = 1)	**0.85**	**(0.72–1.00)**	0.99	(0.73–1.34)	0.89	(0.58–1.37)	0.77	(0.57–1.04)	**0.35**	**(0.23–0.53)**	0.80	(0.56–1.16)	0.52	(0.21–1.25)	**0.34**	**(0.14–0.83)**
Game spending (low = 0. high = 1)	**1.68**	**(1.36–2.09)**	**2.04**	**(1.47–2.84)**	**2.96**	**(1.97–4.44)**	1.19	(0.84–1.68)	1.35	(0.92–1.98)	1.28	(0.84–1.97)	2.04	(0.96–4.34)	**2.60**	**(1.34–5.07)**
Gambled online (no = 0. yes = 1)	**9.68**	**(7.77–12.05)**	**4.87**	**(3.16–7.49)**	**2.35**	**(1.39–3.96)**	**6.14**	**(3.79–9.94)**	**6.81**	**(3.42–13.55)**	**4.13**	**(2.48–6.88)**	1.99	(0.67–5.91)	1.37	(0.47–3.96)
Moderate risk or problem gamblers (no = 0. yes = 1)	**1.44**	**(1.12–1.85)**	**4.98**	**(3.65–6.80)**	**5.70**	**(3.74–8.69)**	**3.64**	**(2.60–5.10)**	**2.69**	**(1.81–4.01)**	**3.10**	**(2.10–4.57)**	**8.77**	**(3.95–19.48)**	**19.86**	**(8.56–46.09)**

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TABLE 6 Continued

Predictors	Pre-committed to affordable amounts		Set temporary player break(s)		Set a permanent exclusion		Taken a self-test for gambling problem		Downloaded an economical overview		Set a time limit which restricts the gambling		Contacted help services for help		Let others control the economy	
	OR	95% *CI*[a]	*OR*	95% *CI*[a]	*OR*	95% *CI*[a]	*OR*	95% *CI*[a]	*OR*	95% *CI*[a]	*OR*	95% *CI*[a]	*OR*	95% *CI*[a]	*OR*	95% *CI*[a]
Self-report. impact. gamb. adv.	1.08	(0.93–1.25)	1.02	(0.77–1.34)	0.89	(0.60–1.31)	**0.74**	**(0.57–0.98)**	1.07	(0.76–1.49)	1.24	(0.88–1.75)	1.75	(0.73–4.19)	1.82	(0.77–4.33)
Lower composite score = 0																
Higher composite score = 1																
Beliefs in RG measures Lower composite score = 0	**1.76**	**(1.52–2.04)**	**1.39**	**(1.07–1.81)**	1.23	(0.86–1.77)	**1.32**	**(1.01–1.72)**	1.04	(0.76–1.43)	**1.61**	**(1.16–2.23)**	1.06	(0.55–2.05)	1.15	(0.62–2.16)
Higher composite score = 1																
Cox and Snell R Square	0.203		0.091		0.051		0.066		0.057		0.051		0.029		0.042	
Nagelkerke R Square	0.307		0.262		0.227		0.198		0.222		0.196		0.322		0.409	

[a]Significant relationships, $p \leq 0.05$, are shown in bold.
[b]Results not available due to small number of observations.
[c]Reference group is age group 66–74.

of having used six of the eight measures (pre-commitment to affordable amounts, set temporary player breaks, set a permanent exclusion, taken a self-test for gambling problem, downloaded an economical overview and set a time limit which restricts gambling). Having participated in random games only was associated with lower probabilities of having used three of the eight measures (pre-committed to affordable amounts, downloaded an economical overview and let others control the economy).

Being a high spender was associated with increased probability of having used four of the eight measures (pre-commitment to affordable amounts, set temporary player breaks, set a permanent exclusion and let others control the economy). Having gambled online was associated with increased probability of having used six of the eight measures (pre-commitment to affordable amounts, set temporary player breaks, set a permanent exclusion, taken a self-test for gambling problem, downloaded an economical overview and set a time limit which restricts gambling). Being a moderate risk gambler or a problem gambler was associated with an increased probability of having used all the eight measures (pre-committed to affordable amounts, set temporary player breaks, set a permanent exclusion, taken a self-test for gambling problem, downloaded an economical overview, set a time limit which restricts gambling, contacted help services for help and let others control the economy). Self-reported impact from gambling advertisements was only associated with a decreased probability of having taken a self-test for gambling problems. Finally, beliefs in real or potential help from RG-measures was associated with an increased probability of having used four of the eight measures (pre-commitment to affordable amounts, set temporary player breaks, taken a self-test for gambling problem, and set a time limit which restricts gambling).

The dependent variable associated with the fewest (three) predictors was contacting help services, whereas setting temporary player break and taken a self-test were the dependent variables associated with most (nine) predictors. All predictors showed significant relationships to at least one dependent variable.

Discussion

Generally, the measures in question were used by a relatively small proportion of the gamblers. This is in line with other studies, reporting that only a minority of gamblers actively use tools to regulate their gambling behaviours (e.g., to set money limits) (25). The most used measure was to set limits for affordable amounts.

All the predictors showed significant associations with the use of measures which can control or reduce harm from gambling. The significant associations for the different predictors ranged from one for self-reported impact from

gambling advertisement to eight for being a moderate risk or problem gambler.

Male gamblers reported to have used four of the measures (set temporary breaks, set a permanent exclusion, taken a self-test of gambling problems and downloaded an economical overview of gambling expenditures) more often than female gamblers. Although we previously have shown that women have more positive beliefs in the effect of external measures to control gambling (3), the present result shows that males used several of them more frequently. An explanation to this might be that men in general are more strongly involved in gambling. In line with this a Swedish study showed female preponderance in a group of "seldom gamblers" whereas the gender distribution was almost equal in the group of occasional gamblers. For the groups of habitual, social and heavy gamblers, the vast majorities were males (26). A Finnish study of people aged 18–29 showed that frequent gambling, playing several game types, online gambling and at risk-or problem gambling occurred more often among males than females (27). Because of the larger gambling involvement and the fact that men generally take more risks the women (28), a suggested explanation for the gender association with measures to control gambling is that men more often than women need and therefore also actually use these features or measures to control their gambling more frequently.

Younger age (18–25 years) was a significant predictor for the actual use of four measures (pre-commitment to setting loss limits, setting temporary breaks, taking a self-test for gambling problems and setting a time limit to restrict gambling). In addition, those 26–65 years self-tested more often than the reference group (66–74 years). This is in line with the aforementioned study (3) which showed that younger gamblers had stronger beliefs in measures to control gambling than older gamblers. Younger subjects have generally been found to take more risks than older subjects (29). Young age is also a risk factor for problem gambling (30). Based on this, it is conceivable that younger gamblers more often than older gambler see measures as useful to control their gambling.

Being born outside Norway, both in western and non-western countries were each significant predictors of seven of the measures, with the exception of pre-commitment to setting loss-limits (for being born outside Norway in a non-western country) and letting others control the economy (for being born outside Norway in a western country), as gamblers not born in Norway used the measures more often. This is in line with an Australian study where gamblers who spoke a language other than English had used a significantly greater number of consumer protection tools (5). In our data, there are no obvious and direct explanations to the findings. However, the findings may reflect cultural factors such as acculturation processes, cultural beliefs about gambling and stigmas associated with gambling behaviour and gambling problems (31–33), religious factors, such as participation in religious rituals (34) as well as financial factors such as lower income among immigrants than native born[3]. Further explanations can be that those born outside Norway to a larger extent than natives are exposed to gambling opportunities (e.g., available time, service occupations) (35), rendering them in a greater need of regulatory measures.

Gambling on low-risk games only was inversely associated with the use of six measures (pre-commitment to setting loss limits, setting temporary breaks, setting a permanent exclusion, taking a self-test for gambling problems, downloading of an economical overview of gambling expenditures and setting a time limit to restrict gambling). One explanation for this finding is that those gambling on low-risk games only, keep control and seldom need these external measures as there is a natural restriction inherent in the games themselves (36, 37). In accordance with this we have previously showed that those gambling on low-risk games only also more seldom have beliefs that measures will help them to control their gambling (3).

Participation in random games only was inversely associated with the use of three measures (pre-committed to affordable amounts, downloading of an economical overview of gambling expenditures and letting other control the economy). Hence, skill game gamblers used the three aforementioned measures more often than those who participated in random games only. Participation in skill games has been linked with "illusion of control" (30), where gamblers may be over-confident about their own skills when gambling. Illusion of control has further been associated with gambling persistence (38). Hence, those gambling non-random games may over time develop more problems, which eventually may force them to employ measures to control their gambling behaviour. In this study we specifically found that gamblers of skill games more often than others pre-committed to affordable amounts, downloaded an overview of gambling expenses and let others control their economy.

The gamblers with high spending were more likely to use four of the measures (pre-commitment to setting loss limits, setting temporary breaks, setting a permanent exclusion, and letting other control their economy). The same group of gamblers reported however fewer positive beliefs in such measures than low spenders (3). A suggested explanation in that study is that measures would restrict their gambling and it could thus be assumed that measures to control gambling behaviours therefore would be less welcomed by these gamblers. However, the result of the present study paints a different picture and suggests that when the spending become sufficiently high the actual use of measures to control gambling is deemed as a necessary evil among high spending gamblers.

Gamblers who had gambled online had significant higher use of six measures (pre-commitment to setting loss limits, setting temporary breaks, setting a permanent exclusion, taking

3 Statistics Norway. (2021). SSB analyse 2021/06 Utdanning og lønnsnivå hos innvandrere, [Education and income level for immigrants]. Retrieved from https://www.ssb.no/arbeid-og-lonn/artikler-og-publikasjoner/utdanning-og-lonnsniva-hos-innvandrere (Accessed April 27, 2022).

a self-test for gambling problems, downloading of an economical overview of gambling expenditures and setting a time limit to restrict gambling). These findings are expected as online gambling to a greater extent than land-based gambling enables enforcement of different measures to control and regulate gambling behaviour (2).

Moderate risk or problem gamblers used all the eight measures (pre-committed to affordable amounts, setting temporary breaks, setting a permanent exclusion, taking a self-test for gambling problems, downloading of an economical overview of gambling expenditures, setting a time limit to restrict gambling, contacting/seeking help and letting others control the economy) more frequently than those with milder or no problems. These findings are also expected since the former group has a stronger need for external measures to restrict/control their gambling (39).

In the study by Engebø et al., the gamblers who reported stronger impact from gambling advertisement assessed external measures as more helpful or potentially more helpful to control gambling than those reporting less impact from gambling advertisement (3). When it comes to actual use, the present study showed that experienced impact from gambling advertisement was associated with the use of one measure only—a decreased use of self-tests for gambling problems.

The last predictor investigated was the composite score for beliefs in RG measures. Actual use of four measures (pre-commitment to loss limits, setting temporary breaks, taking a self-test for gambling problems and setting a time limit to restrict gambling) had a higher probability when the belief was stronger for such measures. This illustrates that there for several measures is a positive association between beliefs in the usefulness of such measures and actual use.

Practical implications

Different groups of gamblers can have different views on measures to control their gambling and different characteristics of the gamblers as well as of the games may be related to actual use of the measures. The present study suggests that belief in the usefulness of RG measures is associated with actual use of such measures, although not consistently. Future research should accordingly identify factors that can in more detail explain the relationship between views of and actual use of external measures. The present study shows that moderate risk or problem gamblers use all the measures more often. Also, gamblers borns outside Norway use the measures more often than native born, although obvious explanations for this are not available or known. Knowledge about predictors of use and the views of external measures are important for operators and regulators as such knowledge may pinpoint who underuses such measures and who seems to need them the most. The results are also relevant for the discourse concerning whether or not measures to control or regulate gambling behaviour should be voluntarily or mandatory (25).

Strengths and limitations

To the best of our knowledge the present study is the only known to us which is based on a representative sample of the entire population of gamblers (i.e., participation in all types of available games, with both land-based and online distribution) investigating actual use of measures to control gambling or reduce consequences. Although the sample size was relatively large and sufficient for all the main analysis, it was too small to justify analyses broken down by individual games.

The present paper comprises gamblers' self-reported use of measures. This should be of interest to e.g., gambling operators and regulators. However, the analysis would have been more precise and actual if the data were based on actual use from registered play. It is also a limitation that some of the data are too non-specific for analysis. Data on place of birth was for example limited to continents and not countries. Since e.g., cultures might differ across a continent, specific cultural explanations to the findings were difficult to obtain based on the present data. Another limitation is the small group of the youngest gamblers (16–17 years). The data for the present study stems from a prevalence study in the adult population in Norway. The age interval for Norwegian gambling problem prevalence studies has been 16–74 years since 2007 (15). Gambling among youths is an important issue and should be investigated in larger youth studies where sample sizes are more sufficient for this age group. The final limitation concerns the relatively low response rate (32.7%) implying that the majority of those invited did not reply. Over- and under-representation in the data were compensated for by weighting the sample for gender, age and place of residence (county). However, we cannot rule out that those who did not participate also differed from those who did on other parameters. Previous research has for example shown that those who participate in surveys generally are more resourceful and with better health than those who do not participate (40). Thus, it is possible that this has limited the generalizability of the findings.

Conclusions

Gamblers, to varying degree use external measures to control their gambling behaviour. The most often

used measure was to pre-commit to loss limits. Six of the measures were mostly available as features from online gambling websites. These measures can be used to prevent gambling problems, but also to reduce negative consequences from problematic gambling. Two other measures are activities which are more relevant when excessive gambling has reached a certain level (i.e., contacting help or treatment services and letting others control the economy).

All predictors had at least one significant association with the actual use of measures. Only one and a negative association was found for self-reported impact from gambling advertisement (self-test for gambling problems). Being a moderate risk or problem gambler or being born outside Norway were the most consistent predictors, being associated with, respectively, eight and seven of the eight measures. Overall, both characteristics of the gambler (e.g., male gender, young age and reporting gambling problems) and characteristics of the games (e.g., skill, online) were associated with the use of measures to regulate gambling behaviour. Although gamblers' belief in measures as helpful was a significant predictor of four of the measures, other predictors showed a more consistent relationship with the measures. This illustrates that positive views of the measures to some extents are associated with actual behaviour.

Data availability statement

The data analyzed in this study is subject to the following licenses/restrictions: Data are available on request. Requests to access the dataset should be directed to JE, jonny.engebo@lottstift.no.

Ethics statement

All procedures used in the present study were conducted in accordance with the 1964 Helsinki Declaration and its later amendments. The present study was approved by the Norwegian Centre for Research Data (no. 528056).

Author contributions

JE has conducted the analysis and drafted the first version of the manuscript. All authors contributed to the interpretation of data, revised the work critically for important intellectual content, approved the final version to be published, and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Conflict of interest

JE works as a senior adviser with The Norwegian Gambling Authority where one of his major tasks is related to regulation and responsible gambling. In addition, JE is a board member of GREF (Gaming Regulators European Forum) and he is also co-chair of a GREF working group in responsible gambling. Further he is a member of the executive committee of EASG (The European Association for the Study of Gambling).

The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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References

1. Blaszczynski A, Ladouceur R, Shaffer HJ, A. science-based framework for responsible gambling: the Reno model. *J Gambl Stud.* (2004) 20:301–17. doi: 10.1023/B:JOGS.0000040281.49444.e2

2. Auer M, Littler A, Griffiths MD. Legal aspects of responsible gaming pre-commitment and personal feedback initiatives. *Gaming Law Rev Econ.* (2015) 6:444–56. doi: 10.1089/glre.2015.1966

3. Engebø J, Torsheim T, Mentzoni RA, Molde H, Pallesen S. Predictors of gamblers beliefs about responsible gambling measures. *J Gambl Stud.* (2019) 35:1375–96. doi: 10.1007/s10899-019-09835-2

4. Haefeli J, Lischer S, Schwarz J. Early detection items and responsible gambling features for online gambling. *Int Gambl Stud.* (2011) 11:273–88. doi: 10.1080/14459795.2011.604643

5. Gainsbury SM, Angus DJ, Procter L, Blaszczynski A. Use of consumer protection tools on internet gambling sites: customer perceptions, motivators, and barriers to use. *J Gambl Stud.* (2020) 36:259–76. doi: 10.1007/s10899-019-09859-8

6. Heirene RM, Vanichkina DP, Gainsbury SM. Patterns and correlates of consumer protection tool use by Australian online gambling customers. *Psychol Addict Behav.* (2021) 35:974–84. doi: 10.1037/adb0000761

7. Griffiths MD, Wood RT, Parke J. Social responsibility tools in online gambling: a survey of attitudes and behavior among Internet gamblers. *Cyberpsychol Behav.* (2009) 12:413–21. doi: 10.1089/cpb.2009.0062

8. Ivanova E, Magnusson K, Carlbring P. Deposit limit prompt in online gambling for reducing gambling intensity: a randomized controlled trial. *Front Psychol.* (2019) 10:639. doi: 10.3389/fpsyg.2019.00639

9. Wohl MJA. Loyalty programmes in the gambling industry: potentials for harm and possibilities for harm-minimization. *Int Gambl Stud.* (2018) 18:495–511. doi: 10.1080/14459795.2018.1480649

10. Lerkkanen T, Egerer M, Alanko A, Järvinen-Tassopoulos J, Hellman M. Citizens' perceptions of gambling regulation systems: a new meaning-based approach. *J Gambl Issues.* (2019) 43:84–101. doi: 10.4309/jgi.2019.43.6

11. Delfabbro P, King DL. The prevalence of loyalty program use and its association with higher risk gambling in Australia. *J Behav Addict.* (2021) 9:1093–7. doi: 10.1556/2006.2020.00082

12. Gainsbury SM, Hing N, Suhonen N. Professional help-seeking for gambling problems: awareness, barriers and motivators for treatment. *J Gambl Stud.* (2014) 30:503–19. doi: 10.1007/s10899-013-9373-x

13. Kowatch KR, Hodgins DC. Predictors of help-seeking for gambling disorder from the transtheoretical model perspective. *Int Gambl Stud.* (2015) 15:450–69. doi: 10.1080/14459795.2015.1078391

14. Suurvali H, Hodgins D, Toneatto T, Cunningham J. Treatment seeking among Ontario problem gamblers: results of a population survey. *Psychiatr Serv.* (2008) 59:1343–6. doi: 10.1176/ps.2008.59.11.1343

15. Pallesen S, Mentzoni RA, Torsheim T, Erevik E, Molde H, Morken AM. *Omfang av Penge- og dataspillproblemer i Norge 2019 [The Prevalence of Problem Gambling and Problem Gaming in Norway 2019]*. Bergen: University of Bergen (2020).

16. Ferris J, Wynne H. *The Canadian Problem Gambling Index*: *Final report*. Ottawa: Canadian Centre on Substance Abuse (2001).

17. Pallant J, SPSS. *Survival Manual: A Step by Step Guide to Data Analysis using IBM SPSS: Sixth Edition*. Maidenhead : Open University Press/McGraw-Hill (2016).

18. Derevensky JL, Gupta R, Messerlian C. *The Effects of Gambling Advertising Questionnaire (EGAQ)*. Montreal: McGill University (2007).

19. Hanss D, Mentzoni RA, Griffiths MD, Pallesen S. The impact of gambling advertising: problem gamblers report stronger impacts on involvement, knowledge, and awareness than recreational gamblers. *Psychol Addict Behav.* (2015) 29:483–91. doi: 10.1037/adb0000062

20. Mentzoni RA. *Structural characteristics in gambling*. Doctoral thesis, University of Bergen, Bergen, Norway (2013).

21. Gainsbury SM, Parke J, Suhonen N. Consumer attitudes towards Internet gambling: perceptions of responsible gambling policies, consumer protection, and regulation of online gambling sites. *Comput Human Behav.* (2013) 29:235–45. doi: 10.1016/j.chb.2012.08.010

22. Cohen J. *Statistical Power Analysis for the Behavioral Sciences*. 2nd ed. Abingdon-on-Thames: Routledge. 1988.

23. Mason CH, Perreault WD. Collinearity, power, and interpretation of multiple regression analysis. *J Mark Res.* (1991) 28:268. doi: 10.1177/002224379102800302

24. Johnston R, Jones K, Manley D. Confounding and collinearity in regression analysis: a cautionary tale and an alternative procedure, illustrated by studies of British voting behaviour. *Qual Quant.* (2018) 52:1957–76. doi: 10.1007/s11135-017-0584-6

25. Delfabbro PH, King DL. The value of voluntary vs. mandatory responsible gambling limit-setting systems: a review of the evidence. *Int Gambl Stud.* (2021) 21:255–71. doi: 10.1080/14459795.2020.1853196

26. Romild U, Svensson J, Volberg R, A. gender perspective on gambling clusters in Sweden using longitudinal data. *Nord Stud Alcohol Drugs.* (2016) 33:43–60. doi: 10.1515/nsad-2016-0004

27. Latvala T, Alho H, Raisamo S, Salonen AH. Gambling involvement, type of gambling and grade point average among 18–29-year-old Finnish men and women. *Nord Stud Alcohol Drugs.* (2019) 36:190–202. doi: 10.1177/1455072518800189

28. Harris CR, Jenkins M, Glaser D. Gender differences in risk assessment: why do women take fewer risks than men? *Judgm Decis Mak*. (2006) 1:48–63. doi: 10.1037/e511092014-212

29. Rolison JJ, Hanoch Y, Wood S, Liu P-J. Risk-taking differences across the adult life span: a question of age and domain. *J Gerontol: Series B.* (2014) 69:870–80. doi: 10.1093/geronb/gbt081

30. Johansson A, Grant JE, Kim SW, Odlaug BL, Götestam KG. Risk factors for problematic gambling: a critical literature review. *J Gambl Stud.* (2009) 25:67–92. doi: 10.1007/s10899-008-9088-6

31. Wilson AN, Salas-Wright CP, Vaughn MG, Maynard BR. Gambling prevalence rates among immigrants: a multigenerational examination. *Addict Behav.* (2015) 42:79–85. doi: 10.1016/j.addbeh.2014.11.003

32. Raylu N, Oei TP. Role of culture in gambling and problem gambling. *Clin Psychol Rev*. (2004) 23:1087–114. doi: 10.1016/j.cpr.2003.09.005

33. Radermacher H, Dickins M, Anderson C, Feldman S. Perceptions of gambling in Tamil and Chinese communities in Australia: the role of saving face in perpetuating gambling stigma and hindering help. *J Gambl Issues.* (2016) 34:77–99. doi: 10.4309/jgi.2016.34.5

34. Williams BM, Browne M, Rockloff M, Stuart G, Smith BP. Protective action and risky beliefs: the relationship between religion and gambling fallacies. *J Gambl Stud.* (2021). doi: 10.1007/s10899-021-10028-z

35. Martinussen W. *Sosiologisk analyse: en innføring [Sociological analysis: an introduction]*. 3rd ed. Oslo: Universitetsforl (1991).

36. Harris A, Gous G, de Wet B, Griffiths MD. The relationship between gambling event frequency, motor response inhibition, arousal, and dissociative experience. *J Gambl Stud.* (2021) 37:241–68. doi: 10.1007/s10899-020-09955-0

37. Meyer G, Fiebig M, Häfeli J, Mörsen C. Development of an assessment tool to evaluate the risk potential of different gambling types. *Int Gambl Stud.* (2011) 11:1–16. doi: 10.1080/14459795.2011.584890

38. Ladouceur R, Sévigny S. Structural characteristics of video lotteries: effects of a stopping device on illusion of control and gambling persistence. *J Gambl Stud.* (2005) 21:117–31. doi: 10.1007/s10899-005-3028-5

39. Forsström D, Hesser H, Carlbring P. Usage of a responsible gambling tool: a descriptive analysis and latent class analysis of user behavior. *J Gambl Stud.* (2016) 32:889–904. doi: 10.1007/s10899-015-9590-6

40. Cohen G, Duffy JC. Are nonrespondents to health surveys less healthy than respondents? *J Off Stat.* (2002) 18:13. https://www.scb.se/contentassets/f6bcee6f397c4fd68db6452fc9643e68/are-nonrespondents-to-health-surveys-less-healthy-than-respondents.pdf

IV

Doctoral Theses at The Faculty of Psychology, University of Bergen

1980	Allen, Hugh M., Dr. philos.	Parent-offspring interactions in willow grouse (Lagopus L. Lagopus).
1981	Myhrer, Trond, Dr. philos.	Behavioral Studies after selective disruption of hippocampal inputs in albino rats.
1982	Svebak, Sven, Dr. philos.	The significance of motivation for task-induced tonic physiological changes.
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	Lau, Bjørn, Dr. philos.	Weight and eating concerns in adolescence.
2002 V	Ihlebæk, Camilla, Dr. philos.	Epidemiological studies of subjective health complaints.
	Rosén, Gunnar O. R., Dr. philos.	The phantom limb experience. Models for understanding and treatment of pain with hypnosis.

	Høines, Marit Johnsen, Dr. philos.	Fleksible språkrom. Matematikklæring som tekstutvikling.
	Anthun, Roald Andor, Dr. philos.	School psychology service quality. Consumer appraisal, quality dimensions, and collaborative improvement potential
	Pallesen, Ståle, Dr. psychol.	Insomnia in the elderly. Epidemiology, psychological characteristics and treatment.
	Midthassel, Unni Vere, Dr. philos.	Teacher involvement in school development activity. A study of teachers in Norwegian compulsory schools
	Kallestad, Jan Helge, Dr. philos.	Teachers, schools and implementation of the Olweus Bullying Prevention Program.
H	Ofte, Sonja Helgesen, Dr. psychol.	Right-left discrimination in adults and children.
	Netland, Marit, Dr. psychol.	Exposure to political violence. The need to estimate our estimations.
	Diseth, Åge, Dr. psychol.	Approaches to learning: Validity and prediction of academic performance.
	Bjuland, Raymond, Dr. philos.	Problem solving in geometry. Reasoning processes of student teachers working in small groups: A dialogical approach.
2003 V	Arefjord, Kjersti, Dr. psychol.	After the myocardial infarction – the wives' view. Short- and long-term adjustment in wives of myocardial infarction patients.
	Ingjaldsson, Jón Þorvaldur, Dr. psychol.	Unconscious Processes and Vagal Activity in Alcohol Dependency.
	Holden, Børge, Dr. philos.	Følger av atferdsanalytiske forklaringer for atferdsanalysens tilnærming til utforming av behandling.
	Holsen, Ingrid, Dr. philos.	Depressed mood from adolescence to 'emerging adulthood'. Course and longitudinal influences of body image and parent-adolescent relationship.
	Hammar, Åsa Karin, Dr. psychol.	Major depression and cognitive dysfunction- An experimental study of the cognitive effort hypothesis.
	Sprugevica, Ieva, Dr. philos.	The impact of enabling skills on early reading acquisition.
	Gabrielsen, Egil, Dr. philos.	LESE FOR LIVET. Lesekompetansen i den norske voksenbefolkningen sett i lys av visjonen om en enhetsskole.
H	Hansen, Anita Lill, Dr. psychol.	The influence of heart rate variability in the regulation of attentional and memory processes.
	Dyregrov, Kari, Dr. philos.	The loss of child by suicide, SIDS, and accidents: Consequences, needs and provisions of help.
2004 V	Torsheim, Torbjørn, Dr. psychol.	Student role strain and subjective health complaints: Individual, contextual, and longitudinal perspectives.
	Haugland, Bente Storm Mowatt Dr. psychol.	Parental alcohol abuse. Family functioning and child adjustment.

	Milde, Anne Marita, Dr. psychol.	Ulcerative colitis and the role of stress. Animal studies of psychobiological factors in relationship to experimentally induced colitis.
	Stornes, Tor, Dr. philos.	Socio-moral behaviour in sport. An investigation of perceptions of sportspersonship in handball related to important factors of socio-moral influence.
	Mæhle, Magne, Dr. philos.	Re-inventing the child in family therapy: An investigation of the relevance and applicability of theory and research in child development for family therapy involving children.
	Kobbeltvedt, Therese, Dr. psychol.	Risk and feelings: A field approach.
2004 H	Thomsen, Tormod, Dr. psychol.	Localization of attention in the brain.
	Løberg, Else-Marie, Dr. psychol.	Functional laterality and attention modulation in schizophrenia: Effects of clinical variables.
	Kyrkjebø, Jane Mikkelsen, Dr. philos.	Learning to improve: Integrating continuous quality improvement learning into nursing education.
	Laumann, Karin, Dr. psychol.	Restorative and stress-reducing effects of natural environments: Experiencal, behavioural and cardiovascular indices.
	Holgersen, Helge, PhD	Mellom oss - Essay i relasjonell psykoanalyse.
2005 V	Hetland, Hilde, Dr. psychol.	Leading to the extraordinary? Antecedents and outcomes of transformational leadership.
	Iversen, Anette Christine, Dr. philos.	Social differences in health behaviour: the motivational role of perceived control and coping.
2005 H	Mathisen, Gro Ellen, PhD	Climates for creativity and innovation: Definitions, measurement, predictors and consequences.
	Sævi, Tone, Dr. philos.	Seeing disability pedagogically – The lived experience of disability in the pedagogical encounter.
	Wiium, Nora, PhD	Intrapersonal factors, family and school norms: combined and interactive influence on adolescent smoking behaviour.
	Kanagaratnam, Pushpa, PhD	Subjective and objective correlates of Posttraumatic Stress in immigrants/refugees exposed to political violence.
	Larsen, Torill M. B. , PhD	Evaluating principals` and teachers` implementation of Second Step. A case study of four Norwegian primary schools.
	Bancila, Delia, PhD	Psychosocial stress and distress among Romanian adolescents and adults.
2006 V	Hillestad, Torgeir Martin, Dr. philos.	Normalitet og avvik. Forutsetninger for et objektivt psykopatologisk avviksbegrep. En psykologisk, sosial, erkjennelsesteoretisk og teorihistorisk framstilling.
	Nordanger, Dag Øystein, Dr. psychol.	Psychosocial discourses and responses to political violence in post-war Tigray, Ethiopia.

	Rimol, Lars Morten, PhD	Behavioral and fMRI studies of auditory laterality and speech sound processing.
	Krumsvik, Rune Johan, Dr. philos.	ICT in the school. ICT-initiated school development in lower secondary school.
	Norman, Elisabeth, Dr. psychol.	Gut feelings and unconscious thought: An exploration of fringe consiousness in implicit cognition.
	Israel, K Pravin, Dr. psychol.	Parent involvement in the mental health care of children and adolescents. Emperical studies from clinical care setting.
	Glasø, Lars, PhD	Affects and emotional regulation in leader-subordinate relationships.
	Knutsen, Ketil, Dr. philos.	HISTORIER UNGDOM LEVER – En studie av hvordan ungdommer bruker historie for å gjøre livet meningsfullt.
	Matthiesen, Stig Berge, PhD	Bullying at work. Antecedents and outcomes.
2006 H	Gramstad, Arne, PhD	Neuropsychological assessment of cognitive and emotional functioning in patients with epilepsy.
	Bendixen, Mons, PhD	Antisocial behaviour in early adolescence: Methodological and substantive issues.
	Mrumbi, Khalifa Maulid, PhD	Parental illness and loss to HIV/AIDS as experienced by AIDS orphans aged between 12-17 years from Temeke District, Dar es Salaam, Tanzania: A study of the children's psychosocial health and coping responses.
	Hetland, Jørn, Dr. psychol.	The nature of subjective health complaints in adolescence: Dimensionality, stability, and psychosocial predictors
	Kakoko, Deodatus Conatus Vitalis, PhD	Voluntary HIV counselling and testing service uptake among primary school teachers in Mwanza, Tanzania: assessment of socio-demographic, psychosocial and socio-cognitive aspects
	Mykletun, Arnstein, Dr. psychol.	Mortality and work-related disability as long-term consequences of anxiety and depression: Historical cohort designs based on the HUNT-2 study
	Sivertsen, Børge, PhD	Insomnia in older adults. Consequences, assessment and treatment.
2007 V	Singhammer, John, Dr. philos.	Social conditions from before birth to early adulthood – the influence on health and health behaviour
	Janvin, Carmen Ani Cristea, PhD	Cognitive impairment in patients with Parkinson's disease: profiles and implications for prognosis
	Braarud, Hanne Cecilie, Dr.psychol.	Infant regulation of distress: A longitudinal study of transactions between mothers and infants
	Tveito, Torill Helene, PhD	Sick Leave and Subjective Health Complaints
	Magnussen, Liv Heide, PhD	Returning disability pensioners with back pain to work

	Thuen, Elin Marie, Dr.philos.	Learning environment, students' coping styles and emotional and behavioural problems. A study of Norwegian secondary school students.
	Solberg, Ole Asbjørn, PhD	Peacekeeping warriors – A longitudinal study of Norwegian peacekeepers in Kosovo
2007 H	Søreide, Gunn Elisabeth, Dr.philos.	Narrative construction of teacher identity
	Svensen, Erling, PhD	WORK & HEALTH. Cognitive Activation Theory of Stress applied in an organisational setting.
	Øverland, Simon Nygaard, PhD	Mental health and impairment in disability benefits. Studies applying linkages between health surveys and administrative registries.
	Eichele, Tom, PhD	Electrophysiological and Hemodynamic Correlates of Expectancy in Target Processing
	Børhaug, Kjetil, Dr.philos.	Oppseding til demokrati. Ein studie av politisk oppseding i norsk skule.
	Eikeland, Thorleif, Dr.philos.	Om å vokse opp på barnehjem og på sykehus. En undersøkelse av barnehjemsbarns opplevelser på barnehjem sammenholdt med sanatoriebarns beskrivelse av langvarige sykehusopphold – og et forsøk på forklaring.
	Wadel, Carl Cato, Dr.philos.	Medarbeidersamhandling og medarbeiderledelse i en lagbasert organisasjon
	Vinje, Hege Forbech, PhD	Thriving despite adversity: Job engagement and self-care among community nurses
	Noort, Maurits van den, PhD	Working memory capacity and foreign language acquisition
2008 V	Breivik, Kyrre, Dr.psychol.	The Adjustment of Children and Adolescents in Different Post-Divorce Family Structures. A Norwegian Study of Risks and Mechanisms.
	Johnsen, Grethe E., PhD	Memory impairment in patients with posttraumatic stress disorder
	Sætrevik, Bjørn, PhD	Cognitive Control in Auditory Processing
	Carvalhosa, Susana Fonseca, PhD	Prevention of bullying in schools: an ecological model
2008 H	Brønnick, Kolbjørn Selvåg	Attentional dysfunction in dementia associated with Parkinson's disease.
	Posserud, Maj-Britt Rocio	Epidemiology of autism spectrum disorders
	Haug, Ellen	Multilevel correlates of physical activity in the school setting
	Skjerve, Arvid	Assessing mild dementia – a study of brief cognitive tests.

	Kjønniksen, Lise	The association between adolescent experiences in physical activity and leisure time physical activity in adulthood: a ten year longitudinal study
	Gundersen, Hilde	The effects of alcohol and expectancy on brain function
	Omvik, Siri	Insomnia – a night and day problem
2009 V	Molde, Helge	Pathological gambling: prevalence, mechanisms and treatment outcome.
	Foss, Else	Den omsorgsfulle væremåte. En studie av voksnes væremåte i forhold til barn i barnehagen.
	Westrheim, Kariane	Education in a Political Context: A study of Konwledge Processes and Learning Sites in the PKK.
	Wehling, Eike	Cognitive and olfactory changes in aging
	Wangberg, Silje C.	Internet based interventions to support health behaviours: The role of self-efficacy.
	Nielsen, Morten B.	Methodological issues in research on workplace bullying. Operationalisations, measurements and samples.
	Sandu, Anca Larisa	MRI measures of brain volume and cortical complexity in clinical groups and during development.
	Guribye, Eugene	Refugees and mental health interventions
	Sørensen, Lin	Emotional problems in inattentive children – effects on cognitive control functions.
	Tjomsland, Hege E.	Health promotion with teachers. Evaluation of the Norwegian Network of Health Promoting Schools: Quantitative and qualitative analyses of predisposing, reinforcing and enabling conditions related to teacher participation and program sustainability.
	Helleve, Ingrid	Productive interactions in ICT supported communities of learners
2009 H	Skorpen, Aina Øye, Christine	Dagliglivet i en psykiatrisk institusjon: En analyse av miljøterapeutiske praksiser
	Andreassen, Cecilie Schou	WORKAHOLISM – Antecedents and Outcomes
	Stang, Ingun	Being in the same boat: An empowerment intervention in breast cancer self-help groups
	Sequeira, Sarah Dorothee Dos Santos	The effects of background noise on asymmetrical speech perception
	Kleiven, Jo, dr.philos.	The Lillehammer scales: Measuring common motives for vacation and leisure behavior
	Jónsdóttir, Guðrún	Dubito ergo sum? Ni jenter møter naturfaglig kunnskap.
	Hove, Oddbjørn	Mental health disorders in adults with intellectual disabilities - Methods of assessment and prevalence of mental health disorders and problem behaviour
	Wageningen, Heidi Karin van	The role of glutamate on brain function

	Bjørkvik, Jofrid	God nok? Selvaktelse og interpersonlig fungering hos pasienter innen psykisk helsevern: Forholdet til diagnoser, symptomer og behandlingsutbytte
	Andersson, Martin	A study of attention control in children and elderly using a forced-attention dichotic listening paradigm
	Almås, Aslaug Grov	Teachers in the Digital Network Society: Visions and Realities. A study of teachers' experiences with the use of ICT in teaching and learning.
	Ulvik, Marit	Lærerutdanning som danning? Tre stemmer i diskusjonen
2010 V	Skår, Randi	Læringsprosesser i sykepleieres profesjonsutøvelse. En studie av sykepleieres læringserfaringer.
	Roald, Knut	Kvalitetsvurdering som organisasjonslæring mellom skole og skoleeigar
	Lunde, Linn-Heidi	Chronic pain in older adults. Consequences, assessment and treatment.
	Danielsen, Anne Grete	Perceived psychosocial support, students' self-reported academic initiative and perceived life satisfaction
	Hysing, Mari	Mental health in children with chronic illness
	Olsen, Olav Kjellevold	Are good leaders moral leaders? The relationship between effective military operational leadership and morals
	Riese, Hanne	Friendship and learning. Entrepreneurship education through mini-enterprises.
	Holthe, Asle	Evaluating the implementation of the Norwegian guidelines for healthy school meals: A case study involving three secondary schools
H	Hauge, Lars Johan	Environmental antecedents of workplace bullying: A multi-design approach
	Bjørkelo, Brita	Whistleblowing at work: Antecedents and consequences
	Reme, Silje Endresen	Common Complaints – Common Cure? Psychiatric comorbidity and predictors of treatment outcome in low back pain and irritable bowel syndrome
	Helland, Wenche Andersen	Communication difficulties in children identified with psychiatric problems
	Beneventi, Harald	Neuronal correlates of working memory in dyslexia
	Thygesen, Elin	Subjective health and coping in care-dependent old persons living at home
	Aanes, Mette Marthinussen	Poor social relationships as a threat to belongingness needs. Interpersonal stress and subjective health complaints: Mediating and moderating factors.
	Anker, Morten Gustav	Client directed outcome informed couple therapy

	Bull, Torill	Combining employment and child care: The subjective well-being of single women in Scandinavia and in Southern Europe
	Viig, Nina Grieg	Tilrettelegging for læreres deltakelse i helsefremmende arbeid. En kvalitativ og kvantitativ analyse av sammenhengen mellom organisatoriske forhold og læreres deltakelse i utvikling og implementering av Europeisk Nettverk av Helsefremmende Skoler i Norge
	Wolff, Katharina	To know or not to know? Attitudes towards receiving genetic information among patients and the general public.
	Ogden, Terje, dr.philos.	Familiebasert behandling av alvorlige atferdsproblemer blant barn og ungdom. Evaluering og implementering av evidensbaserte behandlingsprogrammer i Norge.
	Solberg, Mona Elin	Self-reported bullying and victimisation at school: Prevalence, overlap and psychosocial adjustment.
2011 V	Bye, Hege Høivik	Self-presentation in job interviews. Individual and cultural differences in applicant self-presentation during job interviews and hiring managers' evaluation
	Notelaers, Guy	Workplace bullying. A risk control perspective.
	Moltu, Christian	Being a therapist in difficult therapeutic impasses. A hermeneutic phenomenological analysis of skilled psychotherapists' experiences, needs, and strategies in difficult therapies ending well.
	Myrseth, Helga	Pathological Gambling - Treatment and Personality Factors
	Schanche, Elisabeth	From self-criticism to self-compassion. An empirical investigation of hypothesized change prosesses in the Affect Phobia Treatment Model of short-term dynamic psychotherapy for patients with Cluster C personality disorders.
	Våpenstad, Eystein Victor, dr.philos.	Det tempererte nærvær. En teoretisk undersøkelse av psykoterapautens subjektivitet i psykoanalyse og psykoanalytisk psykoterapi.
	Haukebø, Kristin	Cognitive, behavioral and neural correlates of dental and intra-oral injection phobia. Results from one treatment and one fMRI study of randomized, controlled design.
	Harris, Anette	Adaptation and health in extreme and isolated environments. From 78°N to 75°S.
	Bjørknes, Ragnhild	Parent Management Training-Oregon Model: intervention effects on maternal practice and child behavior in ethnic minority families
	Mamen, Asgeir	Aspects of using physical training in patients with substance dependence and additional mental distress
	Espevik, Roar	Expert teams: Do shared mental models of team members make a difference
	Haara, Frode Olav	Unveiling teachers' reasons for choosing practical activities in mathematics teaching

2011 H	Hauge, Hans Abraham	How can employee empowerment be made conducive to both employee health and organisation performance? An empirical investigation of a tailor-made approach to organisation learning in a municipal public service organisation.
	Melkevik, Ole Rogstad	Screen-based sedentary behaviours: pastimes for the poor, inactive and overweight? A cross-national survey of children and adolescents in 39 countries.
	Vøllestad, Jon	Mindfulness-based treatment for anxiety disorders. A quantitative review of the evidence, results from a randomized controlled trial, and a qualitative exploration of patient experiences.
	Tolo, Astrid	Hvordan blir lærerkompetanse konstruert? En kvalitativ studie av PPU-studenters kunnskapsutvikling.
	Saus, Evelyn-Rose	Training effectiveness: Situation awareness training in simulators
	Nordgreen, Tine	Internet-based self-help for social anxiety disorder and panic disorder. Factors associated with effect and use of self-help.
	Munkvold, Linda Helen	Oppositional Defiant Disorder: Informant discrepancies, gender differences, co-occuring mental health problems and neurocognitive function.
	Christiansen, Øivin	Når barn plasseres utenfor hjemmet: beslutninger, forløp og relasjoner. Under barnevernets (ved)tak.
	Brunborg, Geir Scott	Conditionability and Reinforcement Sensitivity in Gambling Behaviour
	Hystad, Sigurd William	Measuring Psychological Resiliency: Validation of an Adapted Norwegian Hardiness Scale
2012 V	Roness, Dag	Hvorfor bli lærer? Motivasjon for utdanning og utøving.
	Fjermestad, Krister Westlye	The therapeutic alliance in cognitive behavioural therapy for youth anxiety disorders
	Jenssen, Eirik Sørnes	Tilpasset opplæring i norsk skole: politikeres, skoleledereres og læreres handlingsvalg
	Saksvik-Lehouillier, Ingvild	Shift work tolerance and adaptation to shift work among offshore workers and nurses
	Johansen, Venke Frederike	Når det intime blir offentlig. Om kvinners åpenhet om brystkreft og om markedsføring av brystkreftsaken.
	Herheim, Rune	Pupils collaborating in pairs at a computer in mathematics learning: investigating verbal communication patterns and qualities
	Vie, Tina Løkke	Cognitive appraisal, emotions and subjective health complaints among victims of workplace bullying: A stress-theoretical approach
	Jones, Lise Øen	Effects of reading skills, spelling skills and accompanying efficacy beliefs on participation in education. A study in Norwegian prisons.

2012 H	Danielsen, Yngvild Sørebø	Childhood obesity – characteristics and treatment. Psychological perspectives.
	Horverak, Jøri Gytre	Sense or sensibility in hiring processes. Interviewee and interviewer characteristics as antecedents of immigrant applicants' employment probabilities. An experimental approach.
	Jøsendal, Ola	Development and evaluation of BE smokeFREE, a school-based smoking prevention program
	Osnes, Berge	Temporal and Posterior Frontal Involvement in Auditory Speech Perception
	Drageset, Sigrunn	Psychological distress, coping and social support in the diagnostic and preoperative phase of breast cancer
	Aasland, Merethe Schanke	Destructive leadership: Conceptualization, measurement, prevalence and outcomes
	Bakibinga, Pauline	The experience of job engagement and self-care among Ugandan nurses and midwives
	Skogen, Jens Christoffer	Foetal and early origins of old age health. Linkage between birth records and the old age cohort of the Hordaland Health Study (HUSK)
	Leversen, Ingrid	Adolescents' leisure activity participation and their life satisfaction: The role of demographic characteristics and psychological processes
	Hanss, Daniel	Explaining sustainable consumption: Findings from cross-sectional and intervention approaches
	Rød, Per Arne	Barn i klem mellom foreldrekonflikter og samfunnsmessig beskyttelse
2013 V	Mentzoni, Rune Aune	Structural Characteristics in Gambling
	Knudsen, Ann Kristin	Long-term sickness absence and disability pension award as consequences of common mental disorders. Epidemiological studies using a population-based health survey and official ill health benefit registries.
	Strand, Mari	Emotional information processing in recurrent MDD
	Veseth, Marius	Recovery in bipolar disorder. A reflexive-collaborative exploration of the lived experiences of healing and growth when battling a severe mental illness
	Mæland, Silje	Sick leave for patients with severe subjective health complaints. Challenges in general practice.
	Mjaaland, Thera	At the frontiers of change? Women and girls' pursuit of education in north-western Tigray, Ethiopia
	Odéen, Magnus	Coping at work. The role of knowledge and coping expectancies in health and sick leave.
	Hynninen, Kia Minna Johanna	Anxiety, depression and sleep disturbance in chronic obstructive pulmonary disease (COPD). Associations, prevalence and effect of psychological treatment.
	Flo, Elisabeth	Sleep and health in shift working nurses

	Aasen, Elin Margrethe	From paternalism to patient participation? The older patients undergoing hemodialysis, their next of kin and the nurses: a discursive perspective on perception of patient participation in dialysis units
	Ekornås, Belinda	Emotional and Behavioural Problems in Children: Self-perception, peer relationships, and motor abilities
	Corbin, J. Hope	North-South Partnerships for Health: Key Factors for Partnership Success from the Perspective of the KIWAKKUKI
	Birkeland, Marianne Skogbrott	Development of global self-esteem: The transition from adolescence to adulthood
2013 H	Gianella-Malca, Camila	Challenges in Implementing the Colombian Constitutional Court's Health-Care System Ruling of 2008
	Hovland, Anders	Panic disorder – Treatment outcomes and psychophysiological concomitants
	Mortensen, Øystein	The transition to parenthood – Couple relationships put to the test
	Årdal, Guro	Major Depressive Disorder – a Ten Year Follow-up Study. Inhibition, Information Processing and Health Related Quality of Life
	Johansen, Rino Bandlitz	The impact of military identity on performance in the Norwegian armed forces
	Bøe, Tormod	Socioeconomic Status and Mental Health in Children and Adolescents
2014 V	Nordmo, Ivar	Gjennom nåløyet – studenters læringserfaringer i psykologutdanningen
	Dovran, Anders	Childhood Trauma and Mental Health Problems in Adult Life
	Hegelstad, Wenche ten Velden	Early Detection and Intervention in Psychosis: A Long-Term Perspective
	Urheim, Ragnar	Forståelse av pasientaggresjon og forklaringer på nedgang i voldsrate ved Regional sikkerhetsavdeling, Sandviken sykehus
	Kinn, Liv Grethe	Round-Trips to Work. Qualitative studies of how persons with severe mental illness experience work integration.
	Rød, Anne Marie Kinn	Consequences of social defeat stress for behaviour and sleep. Short-term and long-term assessments in rats.
	Nygård, Merethe	Schizophrenia – Cognitive Function, Brain Abnormalities, and Cannabis Use
	Tjora, Tore	Smoking from adolescence through adulthood: the role of family, friends, depression and socioeconomic status. Predictors of smoking from age 13 to 30 in the "The Norwegian Longitudinal Health Behaviour Study" (NLHB)
	Vangsnes, Vigdis	The Dramaturgy and Didactics of Computer Gaming. A Study of a Medium in the Educational Context of Kindergartens.

	Nordahl, Kristin Berg	Early Father-Child Interaction in a Father-Friendly Context: Gender Differences, Child Outcomes, and Protective Factors related to Fathers' Parenting Behaviors with One-year-olds
2014 H	Sandvik, Asle Makoto	Psychopathy – the heterogenety of the construct
	Skotheim, Siv	Maternal emotional distress and early mother-infant interaction: Psychological, social and nutritional contributions
	Halleland, Helene Barone	Executive Functioning in adult Attention Deficit Hyperactivity Disorder (ADHD). From basic mechanisms to functional outcome.
	Halvorsen, Kirsti Vindal	Partnerskap i lærerutdanning, sett fra et økologisk perspektiv
	Solbue, Vibeke	Dialogen som visker ut kategorier. En studie av hvilke erfaringer innvandrerungdommer og norskfødte med innvandrerforeldre har med videregående skole. Hva forteller ungdommenes erfaringer om videregående skoles håndtering av etniske ulikheter?
	Kvalevaag, Anne Lise	Fathers' mental health and child development. The predictive value of fathers' psychological distress during pregnancy for the social, emotional and behavioural development of their children
	Sandal, Ann Karin	Ungdom og utdanningsval. Om elevar sine opplevingar av val og overgangsprosessar.
	Haug, Thomas	Predictors and moderators of treatment outcome from high- and low-intensity cognitive behavioral therapy for anxiety disorders. Association between patient and process factors, and the outcome from guided self-help, stepped care, and face-to-face cognitive behavioral therapy.
	Sjølie, Hege	Experiences of Members of a Crisis Resolution Home Treatment Team. Personal history, professional role and emotional support in a CRHT team.
	Falkenberg, Liv Eggset	Neuronal underpinnings of healthy and dysfunctional cognitive control
	Mrdalj, Jelena	The early life condition. Importance for sleep, circadian rhythmicity, behaviour and response to later life challenges
	Hesjedal, Elisabeth	Tverrprofesjonelt samarbeid mellom skule og barnevern: Kva kan støtte utsette barn og unge?
2015 V	Hauken, May Aasebø	«*The cancer treatment was only half the work!*» A Mixed-Method Study of Rehabilitation among Young Adult Cancer Survivors
	Ryland, Hilde Katrin	Social functioning and mental health in children: the influence of chronic illness and intellectual function
	Rønsen, Anne Kristin	Vurdering som profesjonskompetanse. Refleksjonsbasert utvikling av læreres kompetanse i formativ vurdering

	Hoff, Helge Andreas	Thinking about Symptoms of Psychopathy in Norway: Content Validation of the Comprehensive Assessment of Psychopathic Personality (CAPP) Model in a Norwegian Setting
	Schmid, Marit Therese	Executive Functioning in recurrent- and first episode Major Depressive Disorder. Longitudinal studies
	Sand, Liv	Body Image Distortion and Eating Disturbances in Children and Adolescents
	Matanda, Dennis Juma	Child physical growth and care practices in Kenya: Evidence from Demographic and Health Surveys
	Amugsi, Dickson Abanimi	Child care practices, resources for care, and nutritional outcomes in Ghana: Findings from Demographic and Health Surveys
	Jakobsen, Hilde	The good beating: Social norms supporting men's partner violence in Tanzania
	Sagoe, Dominic	Nonmedical anabolic-androgenic steroid use: Prevalence, attitudes, and social perception
	Eide, Helene Marie Kjærgård	Narrating the relationship between leadership and learning outcomes. A study of public narratives in the Norwegian educational sector.
2015 H	Wubs, Annegreet Gera	Intimate partner violence among adolescents in South Africa and Tanzania
	Hjelmervik, Helene Susanne	Sex and sex-hormonal effects on brain organization of fronto-parietal networks
	Dahl, Berit Misund	The meaning of professional identity in public health nursing
	Røykenes, Kari	Testangst hos sykepleierstudenter: «Alternativ behandling»
	Bless, Josef Johann	The smartphone as a research tool in psychology. Assessment of language lateralization and training of auditory attention.
	Løvvik, Camilla Margrethe Sigvaldsen	Common mental disorders and work participation – the role of return-to-work expectations
	Lehmann, Stine	Mental Disorders in Foster Children: A Study of Prevalence, Comorbidity, and Risk Factors
	Knapstad, Marit	Psychological factors in long-term sickness absence: the role of shame and social support. Epidemiological studies based on the Health Assets Project.
2016 V	Kvestad, Ingrid	Biological risks and neurodevelopment in young North Indian children
	Sælør, Knut Tore	Hinderløyper, halmstrå og hengende snører. En kvalitativ studie av håp innenfor psykisk helse- og rusfeltet.
	Mellingen, Sonja	Alkoholbruk, partilfredshet og samlivsstatus. Før, inn i, og etter svangerskapet – korrelater eller konsekvenser?
	Thun, Eirunn	Shift work: negative consequences and protective factors

	Hilt, Line Torbjørnsen	The borderlands of educational inclusion. Analyses of inclusion and exclusion processes for minority language students
	Havnen, Audun	Treatment of obsessive-compulsive disorder and the importance of assessing clinical effectiveness
	Slåtten, Hilde	Gay-related name-calling among young adolescents. Exploring the importance of the context.
	Ree, Eline	Staying at work. The role of expectancies and beliefs in health and workplace interventions.
	Morken, Frøydis	Reading and writing processing in dyslexia
2016 H	Løvoll, Helga Synnevåg	Inside the outdoor experience. On the distinction between pleasant and interesting feelings and their implication in the motivational process.
	Hjeltnes, Aslak	Facing social fears: An investigation of mindfulness-based stress reduction for young adults with social anxiety disorder
	Øyeflaten, Irene Larsen	Long-term sick leave and work rehabilitation. Prognostic factors for return to work.
	Henriksen, Roger Ekeberg	Social relationships, stress and infection risk in mother and child
	Johnsen, Iren	«Only a friend» - The bereavement process of young adults who have lost a friend to a traumatic death. A mixed methods study.
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