DISSERTATION IN PSYCHOLOGY
Beyond Recreational Gambling – a Psychological Perspective on Risk- and Problem Gambling

Kristina Sundqvist
Beyond Recreational Gambling
- a Psychological Perspective

on

Risk- and Problem Gambling

Kristina Sundqvist
To my family…
Abstract

The general aim of this thesis was to examine risk gambling in the general population from a psychological perspective. This was done in three studies targeting personality, risky alcohol habits and gambling motives, respectively. Initially, 19,530 randomly assigned Swedish citizens were screened for problem gambling via telephone using the two questions in the Lie/Bet questionnaire. This sample constitutes the basis for one of the studies in the thesis. For the other studies, individuals answering yes to one of the questions in the Lie/Bet questionnaire and agreeing to participate further were sent a postal questionnaire. The questionnaire included questions about gambling, personality and gambling motives.

Some of the main results showed that:

- Negative consequences of gambling were associated with higher levels of impulsivity and negative affectivity.
- Risk gamblers reported lower levels of negative affectivity compared to the general population.
- Compared to non-risk gamblers, twice as many of the risk gamblers reported weekly binge drinking during the past 12 months. This association, however, seemed to be explained by shared demographic characteristics, rather than by the risk gambling causing binge drinking.
- High risk gamblers more often reported that they gambled for the challenge and for coping reasons, compared to low risk gamblers.
- High risk gamblers had overall stronger motives for gambling.
- The results also indicated that the level of risk gambling was highly intertwined with gambling motives and could explain some differences in gambling motives between, for example, women/men and younger/older gamblers.

One of the focal points in the discussion was that higher levels of negative affectivity may be a cause of elevated problems rather than a cause of risk gambling. Another issue discussed was that the level of risk-problem gambling may be important to consider when comparing gambling motives across subgroups of gamblers.
Det övergripande syftet med denna avhandling var att undersöka riskspelande om pengar i den allmänna befolkningen utifrån ett psykologiskt perspektiv. Detta skedde i tre studier med fokus på personlighet, riskabla alkoholvanor och motiv till spel. Inledningsvis screenades 19 530 slumpmässigt utvalda svenska medborgare för spelproblem via telefon med de två frågorna i instrument Lie/Bet. Detta urval utgör grunden för en av studierna i avhandlingen. För de andra studierna fick de individer som svarade ja på en av Lie/Bet-frågorna och samtidigt accepterade att delta i ytterligare studier bevara en postenkät. Enkäten innehöll frågor om spelande, personlighet och motiv till spelande. Några av de viktigaste resultaten var att:

- Negativa konsekvenser av spel var associerat med högre nivåer av impulsivitet och negativ affektivitet.
- Gruppen riskspelare rapporterade lägre nivåer av negativ affektivitet jämfört med den allmänna befolkningen.
- Dubbelt så många av riskspelarna rapporterade veckovis berusningsdrickande under de senaste 12 månaderna, jämfört med individer utan riskspelande. Detta samband tycktes dock till stor del kunna förklaras av liknande demografiska karaktäristika, snarare än med att riskspelande orsakade berusningsdrickande.
- Högriskspelare rapporterade oftare att de spelade för utmaningens skull och för att hantera negativa känslor, jämfört med lågriskspelare.
- Högriskspelare hade överlag starkare motiv för sitt spelande.
- Resultaten tydde också på att graden av riskspelande var starkt relaterrad till spelmotiv och detta kan förklara vissa skillnader i spelmotiv mellan till exempel kvinnor/män och yngre/äldre spelare.

Diskussionen behandlade frågan om huruvida högre nivåer av negativ affektivitet kan orsakas av ökade problem, snarare än vara en orsak till riskspelande. En annan fråga som diskuterades var att nivån på risk/problemspelande kan vara viktigt att tänka på när man jämför olika subgruppers motiv till spel.
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Introduction

*True luck consists not in holding the best of cards at the table; luckiest is he who knows just when to rise and go home.*”

John Milton Hay (1838-1905, American statesman, diplomat, author and journalist)

In this thesis, gambling is thought of as a behavior that can range on a continuum from recreational gambling, via risk gambling, to problem gambling. When starting this project, the original aim was to focus mainly on problem gambling and pathways to get there. For reasons described later, the aim was changed slightly to include risk gamblers. Throughout the thesis, risk gambling refers to individuals endorsing one or more adverse effects from their gambling, embracing both risk- and problem gamblers.
Gambling History

The act of gambling is not new. From ancient literature, such as Homer, we know that gambling games were widely used in ancient Greece, and in the Roman Empire gambling was well spread (McMillen, 2005). Even in Greek mythology, Zeus, Hades and Poseidon played ‘throw the dice’ in order to split the Universe between them. In many archaeological sites in Mesopotamia, four-sided and six-sided dice cubes marked with pips have been found, dating 3000 B.C. and Chinese gambling has been traced back as far as 4 000 years (France, 1902; Tse, Yu, Rossen, & Wang, 2010).

![Figure 1 Image credit: Dice players. Roman fresco from the Osteria della Via di Mercurio (VI 10,1.19, room b) (in Coarelli, 2002, p. 146) Photo by WolfgangRieger, Public domain via Wikimedia Commons](image)

History is also full of examples of awareness of gambling-related harm. For example, the Emperor Cato attempted to restrict gambling by dice to adults only because the young should be out in the fields practicing their military skills. In China, the first Emperor of the Ming dynasty, Zhu Yuan-Zhang (1328–1398), outlawed gambling in order to redirect the work force from time-consuming gambling activities to his planned constructions.

Gambling in Sweden

In Sweden, sheep bone dice dating from 200 AD, are the oldest gambling devices found (Wessberg, 2012). In 1699, the first lottery, requiring royal permission, was organized followed by a state-run numbers lottery in 1773.
(Wessberg, 2012). This was followed by periods of either harsh restrictions or liberalism (Binde, 2014). The modern history of gambling in Sweden began in 1897 when, after nearly 40 years of almost total prohibition of gambling, a state lottery was started. Betting on horse racing was then allowed in 1923 and football pools were legalized in 1934 (Binde, 2014; Edman & Berndt, 2016). Finally, a state-controlled betting company was established in 1943.

In Sweden, during the past decade, two percent of the total population has been considered problem gamblers (3.2% of the men and 0.5% of the women), scoring 3 or more on the Problem Gambling Severity Index (PGSI) (Ferris & Wynne, 2001; Svensson, Romild, Nordenmark, & Månsdotter, 2011). Interestingly, in the oldest age group (65–84) problem gambling rates have been higher among women than among men (0.8% of men and 1.4% of women) (Swedish National Institute of Public Health, 2010). An additional 5 percent have been considered risk gamblers.

However, in a recent, not yet published prevalence survey the total proportion of problem gamblers had decreased to 1.7%, whereas individuals with severe gambling problems had increased (2016-06-23, retrieved from www.folkhalsomyndigheten.se/nyheter-och-press/nyhetsarkiv/2016/juni/spelproblemen-minskar-men-de-med-allvarliga-problem-blir-fler/). Among women aged 45-64, and men aged 25-44, problem gambling had increased. Further, gambling involvement in general had decreased, from 70% of the population in 2008, to about 60% in 2015. However, Internet gambling has increased from 9% to 18%.

Problem gamblers and individuals at risk of developing gambling problems account for more than half of the money spent on gambling in Sweden. The more serious the gambling problems, the larger the proportion of stakes (Swedish National Institute of Public Health, 2010).
Definitions of Excessive Gambling

Gambling can be defined as “betting money or material goods on an event with an uncertain outcome in the hope of winning additional money and/or material goods” (Volberg et al., 2015, p 2). Gambling is often thought to exist on a continuum, with non-gamblers at one end, and severe problem gamblers/disordered gamblers at the other (Reith & Dobbie, 2013; Strong & Kahler, 2007; Volberg et al., 2015) (see Figure 2). Longitudinal studies have shown that individuals tend to transit in and out of these categories (Swedish National Institute of Public Health, 2012; Williams et al., 2015). Below follows a description of concepts used to describe excessive gambling.

![Figure 2](image_url) Gambling on a continuum from non-gambling to gambling disorder. For each category, approximate prevalence rates from the Swedish 2015 prevalence study (www.folkhalsomyndigheten.se).

Gambling Disorder

The Diagnostic and Statistical Manual of Mental Disorders (DSM) is used to diagnose and classify mental disorders, including addictions. The latest revision of the DSM included changes in the diagnostic categories and criteria for substance use disorder. The two diagnoses, substance abuse and substance dependence, were integrated into Substance Use Disorders (SUD), (DSM-IV-TR; American Psychiatric Association, 2000; DSM-5; American Psychiatric Association, 2013). The diagnostic threshold was set to two or more symptoms, and a severity scale was introduced, where 0–1 symptoms indicate no SUD, 2–3 indicate mild SUD, 4–5 indicate moderate SUD, and 6
or more indicate severe SUD. Further, the criterion about legal problems was removed, whereas a criterion regarding craving was added.

Also, the psychiatric diagnosis regarding excessive gambling was changed from the fourth to the fifth edition. Pathological gambling was reclassified from an impulse control disorder to a behavioral addiction, and was renamed gambling disorder. The threshold for being diagnosed with gambling disorder was also lowered. Now four out of the nine criteria described below need to be met instead of as earlier, five out of ten. As with SUD, the criterion about legal problems was removed. Furthermore, a level of severity was added, ranging from mild to severe gambling disorder, based on the number of criteria endorsed. Studies suggest that the changes in DSM will result in an increased prevalence of gambling disorder (Rennert et al., 2014). According to DSM-5, a diagnosis of gambling disorder requires that the condition is persistent and recurrent, leading to clinically significant impairment or distress and that four (or more) of the following criteria are exhibited in a 12-month period:

- **Tolerance** - Needs to gamble with more and more money in order to achieve the desired excitement.
- Experiences **abstinence** when attempting to cut down gambling, (gets restless or irritable).
- **Loss of control** - Has tried to control, cut back, or stop gambling, without success.
- Is often **preoccupied** with gambling (past gambling experiences, future ventures and ways to get money with which to gamble).
- Often gambles to **relieve** emotional **distress** (helplessness, guilt, anxiousness, depression).
- **Chasing losses** - After losing money, often returns another day to get even.
- **Lies** to conceal the extent of gambling involvement.
- Has **risked** or lost a significant **relationship**, including career opportunity because of gambling.
- Relies on **others** to **provide money** to solve financial difficulties caused by gambling.

Further, gambling disorder is classified on a scale ranging from mild (4–5 criteria met), moderate (6–7 criteria met) to severe (8–9 criteria met).
Problem Gambling

The broader term problem gambling is often used to also include those that do not meet the criteria for a diagnosis but still suffer significant consequences from their gambling (Neal, Delfabbro, & O’Neil, 2005): “Problem gambling is characterised by difficulties in limiting money and/or time spent on gambling which leads to adverse consequences for the gambler, others, or for the community” (p. 3).

Accordingly, the loss of control and/or negative consequences are characteristic of problem gambling. Often when using this concept, disordered gambling is included, however, sometimes it is not.

Risk Gambling

The term risk gambling/at-risk gambling is used to describe a gambling behavior that may potentially lead to more negative consequences, (Gerstein et al., 1999). In research, the term is often used to define gamblers who have experienced one or two adverse effects, that is they have endorsed one or two items on a problem gambling measure (Problem Gambling Research and Treatment Centre, 2011).

In this thesis, the term risk gambling or at-risk gambling includes gamblers endorsing at least one adverse effect from their gambling. Hence, the group labeled risk gamblers here, includes problem gamblers and may even include some disordered gamblers. In two of the studies the concept, “level of risk gambling” is used, differentiating gamblers on the basis of the number of endorsed items on the problem gambling measurement used (see Table 2). About one fifth of the sample in these studies consider themselves previous problem gamblers.

Harmful Gambling

Harmful gambling is often referred to as negative consequences from gambling and thus these negative consequences are the “harm” caused by the gambling behavior. However, the term harm itself is rarely defined in the gambling literature, (Browne et al., 2016).

It is argued that there is a need in gambling research to shift the focus from the measurement of discrete cases of problem gambling to evaluating exposure and harm associated with all levels of participation (Blaszczynski, 2020).
The focus of gambling related harm is, according to Blaszczynski, central to advancing our knowledge and conceptual understanding of the constructs and impact of problem gambling. A shift in focus enables us to assess the extent to which gambling worsens, directly and indirectly, other interpersonal and psychological dysfunctions. Accordingly, with the aim to move beyond the focus of gambling related symptoms, Abbott et al., (2015) suggest a harm-based view, addressing a broad set of factors related to population risk, community and societal effects.

Langham et al., (2015) suggest the following definition of gambling related harm:

“Any initial or exacerbated adverse consequence due to an engagement with gambling that leads to a decrement to the health or wellbeing of an individual, family unit, community or population” (p. 4).
Understanding the etiology of problem gambling is crucial when formulating accurate prevention and treatment programs. It is commonly acknowledged that the development of problem gambling has to be understood from a multifactorial perspective. Thus, psychological, social and biological factors interact when a gambling problem evolves. Generally, sociologists stress the extrinsic factors and biologists the intrinsic factors. Researchers in the field of psychology work in both areas. In this section, initially a bio-psycho-social model, integrating those perspectives, is described. This bio-psycho-social model is built upon learning theory and cognitive theory, which is described next. This is followed by a brief description of some of the empirical findings from sociology and biology, and then a review of some findings from the psychological field, where this thesis has its roots. Finally, possible benefits from including risk gamblers in the study sample are discussed.

A Bio-psycho-social Model

Individuals with gambling problems constitute a heterogeneous group. The subtyping of problem gamblers may contribute to the understanding of the etiology and the possibilities of successful treatment. The subtyping is based on factors such as, for example, personality traits (Lobo et al., 2014; Vachon & Bagby, 2009), gambling motives (MacLaren, Harrigan, & Dixon, 2012; Stewart, Zack, Collins, & Klein, 2008) or comorbid conditions (Suomi, Dowling, & Jackson, 2014). The Pathway Model integrates knowledge about the development of problem gambling into a conceptual bio-psycho-social model including several factors (Blaszczynski & Nower, 2002).

What Blaszczynski and Nower call the ecological determinants form the foundation of this model. These are cultural/political aspects— the public policies and legislations that form the environment in which gambling is accepted, available and accessible. Another cornerstone in this model is learning theory (briefly summarized here and described more below), according to which the influence of classical and operant conditioning leads to increased gambling participation. This leads to habitual patterns of gambling.
behaviors and changes in cognitive processes, resulting in faulty beliefs about one’s own skills and control over the outcome.

The Pathway Model outlines three different subtypes with different paths leading to problem gambling: Behaviorally conditioned problem gamblers, emotionally vulnerable problem gamblers and “antisocial impulsivist” problem gamblers (See Figure 3 for a visual summary of the Pathway Model).

The behaviorally conditioned group is mainly characterized by an absence of premorbid pathological features. The gambling problem has the ecological factors as a basis, and is developed through social learning resulting in excessive gambling and changed cognitive processes. Gamblers in this group may suffer from depression or anxiety, but as a consequence, rather than a cause, of the gambling problems.

The emotionally vulnerable group shares the same ecological factors as the behaviorally conditioned group, but in addition has some premorbid anxiety/depression, childhood maltreatment, poor problem-solving skills or a personality characterized by risk taking or being prone to boredom. The development of gambling problems then follows the same path through social learning as in the group of behaviorally conditioned problem gamblers.

The antisocial impulsivist group shows the same psychosocial and biologically based vulnerabilities as the previous group. However, this group displays more features of impulsivity, attention deficits and antisocial personality disorder, suggesting neurological or neurochemical dysfunction. This also means that they present more problems independent of the gambling, such as substance use problems, criminal behavior or low tolerance for boredom.

It is evident that several risk factors need to interact in order for a gambling problem to evolve. The Pathway Model is an attempt to integrate factors that are stressed within the social, biological and psychological perspectives to understand the development of problem gambling. Empirical research has demonstrated the existence of subgroups of gamblers, closely related to the three groups described in the Pathway Model (Ledgerwood & Petry, 2010; Milosevic & Ledgerwood, 2010). Some literature studies, however, did not find subtypes when sub-clinical problem gamblers were excluded and suggest that studies including samples with severe problem gambling only, may not exhibit the same subtypes found in more varied samples (Lobo et al., 2014).
Figure 3: The Pathway Model based on Blaszczynski and Nower (2002)
Learning Theory

Learning theory is the common denominator in all three pathways in the Pathway Model described above. The approach is based on the assumption that all behaviors are learned from environmental experience, through classical conditioning (association), operant conditioning (reinforcement), or social learning (Bandura, 1977; Skinner, 1965). Thus, problem gambling is thought of as the learning of maladaptive and dysfunctional behavior. Through classical conditioning, gambling is associated with pleasure, excitement and/or relieve of negative emotional states and so may account for the onset of the excessive behavior (Sharpe, 2002; Sharpe & Tarrier, 1993). Operant conditioning explains behavior in terms of rewards and punishments, and specifically partial reinforcement (wins are experienced intermittently), can be a powerful factor in the maintenance of problem gambling.

In problem gambling research, different reinforcers have been emphasized; intermittent gains such as the money won (Moran, 1970), the excitement/arousal associated with the gambling situations (Brown, 1986), or the mechanisms of behavior completion (McConaghy, Armstrong, Blaszczynski, & Allcock, 1988). Negative reinforcement may function through reduction of negative emotions or stress by escaping, as gambling narrows the attention away from everyday life (Blaszczynski & McConaghy, 1989). Hence, behavioral models suggest that people continue to gamble as a result of becoming conditioned to the excitement/arousal associated with gambling, so that they feel bored and restless when they are not gambling.

Behavioral theories of problem gambling have been criticized for being narrow and not taking into account the complexity of problem gambling (Sharpe & Tarrier, 1993). Critics claim that behavioral models fail to acknowledge the importance of internal events, such as the power of individual emotions, perceptions and cognitions, as well as ecological, to influence behavior (Blaszczynski & Silove, 1995; Brown, 1988).

Cognitive Theory

Cognitive theory is integrated with learning theory in the Pathway Model, and constitutes a theme through all three pathways. Trying to understand problem gambling through a cognitive approach is logical since the gambler, in placing a bet, has to make several decisions, which can be influenced by cognitive biases (e.g. the tendency to reduce complex probabilistic judgments to simpler ones based on the ease with which relevant information can be brought to mind), distortions in reasoning and errors in judgment (Corney &
Cummings, 1985; Kahneman & Tversky, 1982). The gambling outcome (wins, near wins, losses or near losses) is also possible to interpret in several ways, which in turn may influence future gambling decisions. The cognitive model focuses on the way that we process information and suggests that addictions are regulated by dysfunctional cognitive processes (Tiffany & Conklin, 2000).

However, it has been argued by advocates of behavioral theory that most phenomena are developed instead largely through experience and are conditioned behaviors rather than belief systems (Delfabbro, 2004). Events preceding a reward become reinforced and therefore have a higher probability of being influential again in similar situations.

Empirical Findings from Sociology and Biology

Ecological Factors

The ecological factors, availability and accessibility, as described above, form the basis of the Pathway Model. The situational factors (e.g. accessibility, location and type of gambling venue) have been found to contribute to the development and maintenance of problem gambling (Hodgins, Stea, & Grant, 2011). Legislation and cultural acceptance are thought to have an effect on problem gambling. There are theories suggesting that an increase in gambling availability is followed by an increase in gambling problems (Volberg, 2000). This so-called total consumption model (or single distribution theory) is supported by studies identifying an increase in gambling problems in relation to the introduction of new gambling opportunities. For example, a recent study showed that per-capita EGM (Electronic Gambling Machine) expenditure was significantly correlated with rates of gambling-related harm (Markham, Young, & Doran, 2014) and Grun and McKeigue (2000), found that the introduction of a national lottery in the United Kingdom led to a pronounced increase in the prevalence of excessive gambling, especially in low-income households.

Contradicting this is the adaptation model, suggesting than an increase will only occur initially, followed by an adaptation and stable or lower prevalence (Shaffer & Martin, 2011). In Sweden, the prevalence of problem gambling on the population level has not increased over the past decade, despite greater availability of gambling with the introduction of new gambling types (www.folkhalsomyndigheten.se; Binde, 2014).
Demographics

Young age, male sex (as described in the genetics section below), separated marital status, large place of residence, ethnic minority, low education, low income and lack of employment are associated with problem gambling (Hodgins et al., 2011; Johansson, Grant, Kim, Odlaug, & Götestam, 2009; Nalpas et al., 2011; Raylu & Oei, 2002). However, more research is needed in order to assess demographic differences between problem gamblers who prefer different types of games (Hodgins et al., 2011). Poker players, for example, evolving a problem may not have the same demographic characteristic as bingo players with a gambling problem. There may also be a difference across gender in how socio-demographics are associated with problem gambling. Thus, a study found problem gambling to be significantly more frequent among unemployed women, compared to unemployed men (Nordmyr, Forsman, Wahlbeck, Bjorkqvist, & Osterman, 2014).

Genetics/Neurobiology

It has been suggested that repeated experiences of desirable feelings related to gambling might lead to changes in the brain’s reward circuitry and the release in neurotransmitters (Shaffer & Martin, 2011). Dopamine, for example, has been associated with problem gambling, but its role in the etiology of problem gambling is not yet fully understood (Potenza, 2014). Further studies have found 50-60% heritability for gambling disorder (Grant, Odlaug, & Chamberlain, 2016; Lobo, 2016) and the risk of lifetime pathological gambling was about eight times higher among first-degree relatives of individuals with pathological gambling than among other relatives (Black et al., 2014).

Gender has been frequently associated with problem gambling. Problem gambling among women is associated with middle-age, higher levels of life stress, poor coping skills (Afifi, Cox, Martens, Sareen, & Enns, 2010) and psychiatric comorbidity (Petry, Stinson, & Grant, 2005). Men are three times more likely to experience problems with gambling, whereas suicidal behavior is more likely to be linked to women with problem gambling compared to problem gambling men (Husky, Michel, Richard, Guignard, & Beck, 2015). This indicates that although men develop problems with gambling to a greater extent, women may experience greater distress as a result of their problems. However, it has been suggested that demographic and health-related factors contribute more to the understanding of the development of problem gambling than gender factors (Shaffer & Martin, 2011).
Empirical Findings from Psychology

Cognition
Empirical research has concluded that there is a link between cognitive processes and problem gambling. Most consistently identified is the association between problem gambling and impaired decision-making, which in turn has been linked to the ventromedial prefrontal cortex (Potenza et al., 2003). However, differences have been found between problem gamblers and non-problem gamblers regarding several cognitive processes (Potenza, 2014). Deficits in aspects of attention, working-memory, planning and time-estimation have been shown to be more common among problem gamblers (Hodgins et al., 2011; Potenza, 2014).

Further, it has been argued that cognitive distortions play an important role in the development of problem gambling (Goodie & Fortune, 2013). Most studied is the “illusion of control” (the tendency to overestimate one’s own perceived control) and the “gamblers fallacy” (the belief that the odds for something with a fixed probability to occur increases or decrease depending on recent events), which has been found to be more common among problem gamblers (Goodie & Fortune, 2013). However, cognitive distortion has been found to correlate with impulsive behavior and it has been suggested that impulsive individuals may increase the acceptance of faulty beliefs when gambling (Michalczuk, Bowden-Jones, Verdejo-Garcia, & Clark, 2011).

Environment
The characteristics of the games (near-miss opportunities, type of prizes), contribute to the development and maintenance of problem gambling (Hodgins et al., 2011). Family factors, such as childhood maltreatment have been associated with later problem gambling. Also, early exposure to gambling will probably affect later adult gambling behavior (Shaffer & Martin, 2011).

Gambling Behavior/Game Preferences
Gambling on multiple types of games is associated with problem gambling, with males in general gambling on more types than women (Gainsbury et al., 2014; Welte, Barnes, Wieczorek, Tidwell, & Parker, 2004; Wenzel & Dahl, 2009). Males have been found to be more likely than females to gamble reg-
ularly and with higher expenditure, constituting risk behaviors (Nerilee Hing & Breen, 2001).

Further, continuous gambling forms in general, and particularly EGMs, are associated with increased risk of developing a problem (Williams, West, & Simpson, 2012). Women have higher risks for problem gambling on non-strategic forms such as EGMs and bingo (Binde, 2011; Grant, Chamberlain, Schreiber, & Odlaug, 2012). Among online gambling forms, sports and race wagering have been shown to generate most problems, though mainly among men (Hing, Russell, Gainsbury, & Blaszczynski, 2015). Skill-based online gambling is associated with elevated risk for problem gambling in males, whereas non-skill based online gambling is associated with higher risks in females (McCormack, Shorter, & Griffiths, 2013).

Personality

The role of personality in the etiology of risk and problem gambling has been of great interest for many researchers in the field of psychology and is one of the variables targeted in this thesis. A recent longitudinal study found personality to be one of the most important categories predictive of future problem gambling (Williams et al., 2015). More specifically, impulsivity was one of the strongest predictors and vulnerability (to stress), low conscientiousness and agreeableness were fairly strong predictors. Several other studies have found impulsivity to be correlated with problem gambling (McDaniel & Zuckerman, 2003; Odlaug, Schreiber, & Grant, 2013; Shaffer & Martin, 2011; Walther, Morgenstern, & Hanewinkel, 2012), altogether indicating strong evidence regarding the link between impulsivity and problem gambling.

A complication when studying impulsivity is the multifaceted nature of the trait (Whiteside & Lynam, 2001). This implies that several general personality dimensions cover different aspects of impulsivity. In the commonly used Five Factor model (Costa & MacCrae, 1992), for example, aspects of impulsivity are measured with facets within the dimensions neuroticism (low self-control), conscientiousness (low self-discipline and deliberation) and extraversion (high excitement seeking). Four distinct facets associated with impulsivity are identified and labeled: urgency, lack of planning/premeditation, lack of perseverance, and sensation seeking (Whiteside & Lynam, 2001; Zald, 2015) A meta-analysis of impulsivity studies concluded that negative urgency and low premeditation differentiated problem gamblers from non-problem gamblers (Maclaren, Fugelsang, Harrigan, & Dixon, 2011).
However, the relationship between problem gambling and impulsivity in turn may be influenced by several other factors. A longitudinal study following a sample of 7th grade students found impulsivity to be associated with age of gambling onset only for individuals with low socio-economic status (Auger, Lo, Cantinotti, & O’Loughlin, 2010). Another study found early age of onset to be related to more severe gambling problems as well as higher novelty seeking and lower self-directedness (Jiménez-Murcia et al., 2010).

Problem gambling has also been associated with high neuroticism, low agreeableness and low conscientiousness, in the Five Factor Model (Maclaren et al., 2011). A recent population-based study found higher neuroticism and lower conscientiousness among gamblers with low, moderate and severe level of problem gambling compared to non-problem gamblers (Brunborg, Hanss, Mentzoni, Molde, & Pallesen, 2016). The same study also found that moderate and severe problem gamblers differed from non-problem gamblers in agreeableness.

Studies of the association between personality and problem gambling have been criticized for relying on a single operationalization of personality and for not paying attention to moderators, such as sample characteristics, of the relations between personality and problem gambling (Miller et al., 2013).

Psychiatric Co-morbidity

The co-occurrence of psychiatric comorbidity is high among problem gamblers. The comorbid conditions may be a result of the gambling problems or constitute vulnerability as described in the Pathway Model. Substance use disorders, but also mood disorders and personality disorders, have been linked to problem gambling (Raylu & Oei, 2002; Shaffer & Martin, 2011). A meta-analysis concludes that the highest mean prevalence of other psychiatric disorders among problem gamblers was for (except for nicotine dependence): substance use disorders (57.5%), mood disorders (37.9%) and anxiety disorders (37.4%) (Lorains, Cowlishaw, & Thomas, 2011).

Further, the association between problem gambling and psychiatric comorbid condition has been found to be stronger among women than among men (Desai & Potenza, 2008; Petry et al., 2005). A Finnish population-based study found psychological distress to be associated with increased risk of problem gambling in men, whereas alcohol-related problems were significantly associated with problem gambling among female gamblers (Nordmyr et al., 2014). It has been suggested that mood and anxiety disorders predict
problem gambling, whereas problem gambling more often seems to predict substance use disorder (Hodgins et al., 2011; Kessler et al., 2008).

In addition, socio-demographic factors may have an effect on the association between gambling and comorbid conditions. In a large American study, ethnic minorities and lower socio-economic status individuals had higher than average rates of current pathological gambling (Welte, Barnes, Wieczorek, Tidwell, & Parker, 2001). However, problem gambling individuals with higher socio-economic status were more likely than lower socio-economic status persons to be dependent on alcohol. This indicates a stronger but rarer association between gambling and alcohol problems among higher socio-economic status persons. It has, however, been suggested that gambling disorder and substance use disorder are instead a single addiction disorder sharing a common etiology (Shaffer et al., 2004).

Drinking and gambling are associated behaviors even on a sub-clinical level. In the Swedish longitudinal gambling study (SWELOGS), a connection between developing risky drinking habits during the year and increasing gambling problems were found (Swedish National Institute of Public Health, 2010). Risky alcohol behaviors also reduced the likelihood of recovering from a gambling problem. Further, drinking while gambling has shown to result in larger bets and greater and more rapid losses (Cronce & Corbin, 2010; Giacopassi, Stitt, & Vandiver, 1998). In addition, hazardous drinking has been found to be one of the strongest predictors of problem gambling stability (Abbott, Williams, & Volberg, 2004).

The association between risk gambling and risk drinking is targeted in Study II in this thesis.

Motives for Gambling

People have various reasons for gambling, and this is targeted in the third study in this thesis. Most commonly described in the literature is to gamble: for excitement/fun, for the challenge, to win money, to socialize or to escape/cope. Motives for gambling have been associated with gambling and problem gambling in many studies. For example, gambling for excitement, to win money or to escape has been associated with problem gambling (Lee, Lee, Bernhard, & Tae, 2009; McGrath, Stewart, Klein, & Barrett, 2010; Shaffer & Martin, 2011). Still, research shows that individuals at all levels of involvement gamble to escape from the stresses and responsibilities of their daily lives (Back, Lee, & Stinchfield, 2011). It has been argued that a better understanding of motives in the broader gambling population is needed,
particularly as research suggests that individuals move between different levels of gambling involvement and risk over time (Dechant, 2014).

Subtyping of gamblers based on gambling motives has resulted in three subtypes: a group that gambles for positive reinforcement only (i.e., excitement/fun); a group that gambles for both positive and negative, but mainly for negative reinforcement (i.e., coping/to escape); and a third group that gambles for reasons other than regulation of affect (i.e. socially) (Stewart et al., 2008). The latter study found no pure coping motivated gamblers, but instead suggested that, among non–treatment-seeking individuals, coping-based gambling most often is combined with elevated enhancement-motivated gambling.

Further, different motives have been found for different gambling types. Slot machine players have been found to gamble to escape or for enhancement, sport gamblers to win money, for social reasons and for self-esteem, card game gamblers to win money, for social reasons, for self-esteem and for enhancement (Fang & Mowen, 2009; McGrath et al., 2010). Previous research suggests that women are more likely than men to gamble to escape, and that men are more likely than women to gamble for enhancement (Dowling, 2013; Walker, Hinch, & Weighill, 2005; Wardle et al., 2011).

Motives for gambling may have an impact on the etiology of problem gambling and to gamble for the money or to escape has been found to be predictive of future problem gambling in a longitudinal study (Williams et al., 2015). Motivational factors were also one of the self-reported causes of problem gambling in the same study.

Gambling reasons have also been found to mediate the relationship between impulsivity and problem gambling (Canale, Vieno, et al., 2015). High levels of sensation seeking were associated with high levels of enhancement motives, which in turn was associated with high levels of gambling problems.

Some gambling motives seem to correspond well to the Pathway Model. The “antisocial impulsivist”, for example, may gamble for enhancement, the “emotionally vulnerable” for coping reasons and the “behaviorally conditioned” may, at least initially, gamble mainly for social reasons. Future research will tell how gambling motives change over time, but a study not yet published shows substantial fluidity in all motives (McGrath, 2016; The Categorical Stability of Gambling Motives among Community-recruited Gamblers over 5 years)
The factors described above may interact to influence the development and maintenance of problem gambling. For example, some individuals with a genetic vulnerability for addiction might not develop a problem because they are not exposed to gambling or are more attracted by other activities that diminish the likelihood of gambling. On the other hand, people without a genetic vulnerability or without cognitive distortions or high impulsiveness might develop a gambling problem despite this, because of environmental or social factors. Further, living in a low socio-economic area may increase the risk of problem gambling due to accessibility. For example, in Sweden and many other countries, high risk electronic machines are to a greater extent placed in low socio-economic areas.
Risk Gambling – broadening the scope

As described above, the term risk gambling is often used to define gamblers who have experienced one to two adverse effects from their gambling. From a public health perspective, individuals being at risk of a disease are of great interest when it comes to prevention. For instance, most alcohol-related problems occur in low to moderate drinkers, rather than heavy drinkers, a knowledge that form the foundation for the so called “prevention paradox” (Kreitman, 1986). Although heavy drinkers are at greater individual risk of inauspicious outcome, low-risk drinkers account for most problems because there are more individuals within this group. Hence, to identify and treat individuals with high risk will only help these individuals, but the total morbidity in the population will not diminish to a great extent. The prevention paradox means that the effect, in terms of the number of new cases of illness decreased/diminished health, is highest when you invest in preventive measures for the population at large, although most individuals only have a slightly elevated risk, compared with interventions that focus on individuals with high (individual) risk of developing a disease.

The prevention paradox may be relevant for gambling as well since gambling can be conceptualized along a continuum, ranging from recreational gambling, via risk gambling to problem gambling and gambling disorder (Canale, Vieno, & Griffiths, 2016). Additionally, gambling harm can be considered along a severity continuum ranging from no harm through mild, substantial, to severe harm (Marshall, 2009). A Finnish population-based study concludes that even though the individual risk of harm is highest among problem gamblers, most gambling-related harm can be found among the majority of low-risk gamblers (Raisamo, Mäkelä, Salonen, & Lintonen, 2015). In line with this, analysis of data from the 2010 British prevalence survey showed that gambling-related harm was distributed across low- to moderate-risk gamblers (and not limited just to problem gamblers) and was reported by the majority of gamblers who were non-high time and spend regular gamblers (Langham et al., 2015). Further, an investigation of gambling-related harm in Victoria, Australia, suggests that 50%, of the total harm resulting from gambling in Victoria comes from low-risk gamblers (Browne et al., 2016). Even though there is a complex causal pathway be-
between multiple bio-psycho-social variables, negative effects may occur at any level of participation (Blaszczynski, 2009). Further, it has been argued that a public health perspective on gambling can add to the development of more comprehensive and effective strategies for preventing and treating gambling related problems (Korn & Shaffer, 1999). Thus, it seems important to consider harm experienced at any level of gambling involvement, not only problem gambling individuals.

Hence, risk gamblers are of interest for preventive actions, as they might be more likely than non-risk gamblers to develop problems from their gambling. More knowledge regarding the characteristics of risk gamblers is likely to be helpful in the development of policy measures for preventing risk gamblers from becoming problem gamblers. Yet, little is known about the group of risk gamblers. Two previous Nordic studies, have confirmed the resemblance between risk gamblers and problem gamblers in terms of demographic variables (Lund, 2007; Lyk-Jensen, 2010). In those studies, 3.5% of the sample fell into the risk group (men 5.2 and women 1.6) and 2.9% (men 4.6 and women 1.2), respectively. Risk gambling was more common among men, young people with low income and a with a lower education, living by themselves.

Further, risk gamblers have been found to have higher levels of distress, more family problems from their gambling, and more frequently to be alcohol dependent compared to non-problem gamblers (Marshall & Wynne, 2004). In the Swedish Longitudinal Gambling Study (SWELOGS), risk gamblers were found to develop problems associated with a loss of control of finances (Swedish National Institute of Public Health, 2010). Female risk gamblers reported to a greater extent that they had gambled more than they could afford while risk gambling men stated that they had gambled more than they intended. In addition, the Quinte longitudinal study (Williams et al., 2015) found that almost 15% of risk gamblers, at some follow-up point, had developed problem gambling.

Another reason for including risk gamblers in a study sample is that the prevalence of gambling problems is fairly low in the normal population; the results of any screening are vulnerable to variations in the response rate, even with large samples. In Denmark and Norway, prevalence rates for problem and pathological gamblers differed significantly dependent on the problem gambling measure used, whereas prevalence rates for risk gambling did not (Bonke & Borregaard, 2006). Furthermore, it is generally assumed that disordered gamblers are under-represented in gambling studies (Lesieur, 1994).
Thus, it seems warranted to broaden the study sample to include not only those with severe problems, but also risk gamblers. Apart from the studies mentioned above, very few studies have included risk gambling individuals, and even fewer (if any) have had a psychological perspective.
General Aims

The overall aim of this thesis was to study a group of risk gamblers, in the general Swedish population, from a psychological perspective. More specifically, the aim was to examine:

- the association between risk gambling and personality
- differences in risk gambling and personality, contingent on preferred type of game activity
- differences in personality between individuals with risk gambling behavior and the general Swedish population
- the association between lifetime risk gambling and 12-month binge drinking and to test whether this association remained after controlling for confounding variables
- differences in gambling motives in different subgroups of lifetime risk gamblers categorized by: age, gender, alcohol- and drug habits and type of game preferred, when considering the level of risk gambling.
Data and Methods

Data Sources

The papers in this dissertation have made use of data from two sources (see Table 1). First, from the Swedish Monitor Project, which is an ongoing survey with the overall aim of estimating unrecorded alcohol and tobacco consumption in Sweden. Second, a postal questionnaire directed to respondents in the Monitor survey who have reported at least one adverse effect from their gambling.
Table 1 Overview of data and methods included in the three studies

<table>
<thead>
<tr>
<th></th>
<th>Study II</th>
<th>Study I</th>
<th>Study III</th>
</tr>
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<tbody>
<tr>
<td><strong>Data set</strong></td>
<td>Monitor project</td>
<td>Questionnaire</td>
<td>Questionnaire</td>
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<tr>
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<td>257</td>
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<td>Risk gambling,</td>
<td>Risk gambling,</td>
</tr>
<tr>
<td></td>
<td>binge drinking</td>
<td>personality</td>
<td>gambling motives</td>
</tr>
<tr>
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<td>Population based</td>
<td>Population based</td>
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<td>Cross-sectional</td>
<td>Cross-sectional</td>
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<td>**Gambling</td>
<td>Lie/Bet</td>
<td>Lie/Bet</td>
<td>Lie/Bet</td>
</tr>
<tr>
<td>measures**</td>
<td>NODS-PERC</td>
<td>NODS-PERC</td>
<td>NODS-PERC</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>RGQ</td>
</tr>
<tr>
<td><strong>Analyze</strong></td>
<td>Multiple logistic</td>
<td>t-test</td>
<td>t-test</td>
</tr>
<tr>
<td><strong>methods</strong></td>
<td>regression</td>
<td>Pearson’s correlation</td>
<td>Pearson’s correlation</td>
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<tr>
<td></td>
<td></td>
<td>ANOVA</td>
<td>ANOVA</td>
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<tr>
<td></td>
<td></td>
<td>ANCOVA</td>
<td>ANCOVA</td>
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</table>

*Note* NODS-PERC is a short version of the NORC DSM-IV Screen for Gambling Problems
RGQ is the Reason for Gambling Questionnaire
The Monitor Project

This is an ongoing project since 2000, with the aim to follow the unrecorded alcohol consumption in Sweden after Swedish entry into the European Union in 1995 (Boman, Engdahl, Gustafsson, Hradilova Selin, & Ramstedt, 2006). The data form the basis of the official alcohol statistics in Sweden. The sampling and interviewing are carried out by a market research company (Ipsos Synovate) specialized in conducting telephone interviews (Raninen, Leifman, & Ramstedt, 2013). Every month, 1 500 telephone interviews are conducted with individuals aged 16–84 from the Swedish population, selected through Random-Digit Dialing (RDD). In total, this amounts to about 18 000 interviews per year. The sample is representative of the Swedish-speaking population with respect to gender, age and indicators of socio-economic status. Until July 2013, the interviews were carried out using Computer-Aided Telephone Interviews (CATI), where the interviewer follows a computerized questionnaire and the respondents are selected based on the method of “latest birthday in the household”. Individuals with only mobile phones are included. Multiple (30) contact attempts are made before the subject is considered a non-respondent (Ramstedt, 2010). A respondent not being reached or declining participation is replaced, so that 1 500 individuals are interviewed every month. The survey covers socio-demographic data and other respondent characteristics as well as different aspects of alcohol and tobacco purchases and use. These data form the empirical basis for the analyses in Study II.

Since the Monitor Project allows for adding questions from other research projects, from April 2012 until May 2013 all participants (N=19 530) were also screened for risk gambling. In total, 607 respondents screened positive, 382 of those agreed to participate and were sent a postal questionnaire.

Postal Questionnaire

In addition to providing the empirical underpinning of Study II, the Monitor data have also served to screen out life-time risk gamblers (see Figure 4 for a flow chart) for the two other studies based on data from the postal questionnaire. It was not possible to obtain access to personal identification and therefore we could not link the two sets of data. The project was positively reviewed by the Regional Ethical Board in Stockholm (Diary No. 2012/2202-31/5). During the study period (April 2012–May 2013), 19 530 respondents were asked whether they ever had had to lie to people important to them about how much they gamble, or if they ever had felt the need to bet more and more money. On the basis of endorsing at least one of those ques-
tions, 607 respondents were considered to be life-time risk gamblers, and out of these, 382 (63 per cent) agreed to participate in this project. The postal questionnaire covered self-reported:

- respondent characteristics
- gambling onset
- gambling behavior
- changes in gambling over life
- negative consequences from gambling
- gambling motives
- recovery strategies and motives for change
- personality traits
- childhood maltreatment
- locus of control
- alcohol- and drug use

Most of the questions used pre-coded response alternatives and a few were open-ended questions. A first draft of the survey was sent to national problem gambling experts, both researchers and clinicians. After revision, based on their comments, a pilot study was conducted with eight members from the Swedish Gambling Addiction National Association (“Spelberoendes riskförbund”). In addition, they were then interviewed about their experience and opinion of the questionnaire. Those eight were not included in the final sample. After a second revision, based on comments from members from the Swedish Gambling Addiction National Association, the survey was dispatched in May-June 2013. In order to increase the response rate, respondents were offered two free cinema tickets on returning the form. Two reminders were sent out at regular intervals and the data collection ended in December 2013. By that time, 257 of the 382 respondents had answered, yielding a response rate of 67 per cent.

The answers were continuously coded into a SPSS data file. This data forms the empirical basis for the analyses in Study I and III.
**Figure 4.** Recruitment flow chart for study I, II and III
Participants

The Monitor Project

The participants in Study II consisted of 19,530 randomly selected, nationally representative Swedish residents. Out of the 19,530, 54% were female and 46% male. They were between 16-82 years old with a mean age of 50. In total, 40% had a university education, 67% were married or cohabiting and 92% were born in Sweden. In total, 3.1% reported lifetime risk gambling and 4.4% 12-month weekly binge drinking.

Postal Questionnaire

The participants in Study I and III consisted of 257 out of the 19,530 described above (see Figure 4), answering yes to at least one of the two Lie/bet questions, agreeing to participate in an upcoming study and returning a postal questionnaire. Of those were 78 females (30%) and 179 males (70%). They were between 17-82 years old with a mean age of 49. Of the respondents, 67% had a steady income and 66% were married or living together with someone. The level of risk gambling, (here number of endorsed items on the Lie/bet questionnaire and NODS-PERC summarized), is shown in Table 2. In the sample, 48 individuals (18.6%) report that they have experienced gambling problems.

Table 2 Distribution of the level of risk gambling in the postal questionnaire sample. Frequency and percent per number of endorsed items on the Lie/Bet Questionnaire+NODS-PERC

<table>
<thead>
<tr>
<th>Endorsed items</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>125</td>
<td>48.6</td>
</tr>
<tr>
<td>2</td>
<td>46</td>
<td>17.9</td>
</tr>
<tr>
<td>3</td>
<td>41</td>
<td>16.0</td>
</tr>
<tr>
<td>4</td>
<td>15</td>
<td>5.8</td>
</tr>
<tr>
<td>5</td>
<td>14</td>
<td>5.4</td>
</tr>
<tr>
<td>6</td>
<td>9</td>
<td>3.5</td>
</tr>
<tr>
<td>Missing</td>
<td>7</td>
<td>2.7</td>
</tr>
</tbody>
</table>

n=257
There were two levels of dropout. First, out of the 607 who answered yes to one of the two questions in the Lie/Bet questionnaire in the Monitor Project, 219 declined participation (for an additional 6 persons the address was unknown). There were no significant differences between this group and the group accepting participation, neither concerning age, gender, education, binge drinking past year nor number of positive answers on Lie/Bet (see Table 3).

Second, of those 382 that received the postal questionnaire, 119 did not respond, 3 were deceased and 3 surveys were returned as undelivered. The non-responders did not differ significantly from responders concerning demographics. However, there was a significant difference in the answers on the Lie/Bet questionnaire. Among the respondents, 11% screened positive on both questions, compared to 22% of the non-responders, $\chi^2(1, N = 382) = 8.19$, $p = .004$. 
Table 3 Sample characteristics of risk gambling individuals in the Monitor Project agreeing and declining participation in the upcoming postal questionnaire.

<table>
<thead>
<tr>
<th></th>
<th>Agreed to participate n=388</th>
<th>Declined to participate n=219</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (mean)</td>
<td>45.8 (SD 18.0)</td>
<td>40.3 (SD 18.3)</td>
</tr>
<tr>
<td>Women (%)</td>
<td>31.4</td>
<td>26.5</td>
</tr>
<tr>
<td>Men (%)</td>
<td>68.6</td>
<td>73.5</td>
</tr>
<tr>
<td>Higher education (%)</td>
<td>32.5</td>
<td>31.9</td>
</tr>
<tr>
<td>Living in a big city (%)</td>
<td>40.2</td>
<td>34.7</td>
</tr>
<tr>
<td>Daily smoker (%)</td>
<td>15.7</td>
<td>16.0</td>
</tr>
<tr>
<td>Unemployed (%)</td>
<td>9.4</td>
<td>7.8</td>
</tr>
<tr>
<td>Income less 10 000 (%)</td>
<td>14.6</td>
<td>19.7</td>
</tr>
<tr>
<td>Weekly binge drinking (%)</td>
<td>9.6</td>
<td>9.0</td>
</tr>
<tr>
<td>Lie/Bet 1 (%)</td>
<td>22.4</td>
<td>23.7</td>
</tr>
<tr>
<td>Lie/Bet 2 (%)</td>
<td>92.8</td>
<td>90.9</td>
</tr>
<tr>
<td>Lie+Bet (%)</td>
<td>15.2</td>
<td>14.6</td>
</tr>
</tbody>
</table>

n= 607
Measures

The Monitor Project

Gambling: As described above, from April 2012 until May 2013, all participants in the Monitor Project were asked questions about gambling. Respondents were classified as lifetime risk gamblers if they reported ever having: 1. Had to lie to people important to them about how much they gambled and/or 2. felt the need to bet more and more money. These are the questions in the Lie/Bet questionnaire (Johnson et al., 1997). This instrument has previously shown both high sensitivity (.92) and specificity (.96) for screening problem and pathological gamblers (individuals with DSM-IV scores of 3 or more) in a community sample (Götestam, Johansson, Wenzel, & Simonsen, 2004).

Binge drinking: In Study II, the association between risk gambling and binge drinking was examined. To screen for binge drinking the respondents were asked: During the past 12 months, how often did you, on the same occasion, drink alcohol equivalent to at least a bottle of wine (75 cl), or 5 glasses of strong spirits (25 cl), or 4 cans of strong beer or strong cider (>3,5 percentage per volume), or 6 cans of medium strong beer (3,5 percentages per volume). Also, consider all the occasions when you combined different types of alcohol and try to report how often you drank an equivalent amount. The response categories were on a gradient ranging from ‘more or less every day’, ‘4–5 times a week’, ‘2–3 times a week’, ‘once a week’, ‘about 2–3 times’, a few times, ‘about once’ to ‘never’. Individuals reporting consuming alcohol equivalent to at least one bottle of wine, 25 centiliters of spirits or four cans of beer per occasion every week or more often during the past 12 months were classified as current weekly binge drinkers.

Socio-demographics: Respondents were asked about their marital status, smoking habits, monthly income, educational level, contemporary occupation, city of residence and if they were born in or outside Sweden. Size of place of residence was divided into large (The three largest cities in Sweden; Stockholm, Gothenburg and Malmö), medium (>100 000 residents within 100 km) or small (<100 000 residents within 100 km). In Study II, occupational status was categorized into employed/retired/other, student or unemployed. Marital status was categorized into living together with someone as a partner or not. Smoking habits were categorized into daily smoking or not, educational level into completed university or not and income into having a
monthly income less than 10 000 SEK/month (about 1200 USD or 1080 EUR) or not.

Postal Questionnaire

Gambling

*Problem severity:* The respondents screening positive on one of the Lie/Bet questions, and accepting to participate in an upcoming study, were sent a postal survey (Sundqvist & Wennberg, 2015). Measure of life-time risk gambling was complemented by the short version of the National Opinion Research Center DSM-IV Screen for Gambling Problems (NODS). The short version, NODS-PERC, consists of four of the original 17 questions (Volberg, Abbott, Rönberg, & Munck, 2001) and the authors found the combination of the four questions about Preoccupation, Escape, Risked relationships and Chasing (PERC) to predict problem gambling best. In this project, the vast majority of the respondents could not be classified as problem or pathological gamblers according to the PERC and hence, risk gambling seems to be an accurate definition of the samples used in the studies included.

*Type of game:* The respondents were asked to list their three most frequently played games. In Study I, the most frequent game was categorized into one of four preferred types: card games (poker and black jack) (n = 55), sports games (e.g. betting on sports and horse betting) (n = 93), machines (e.g. “Vegas” or one-armed bandits) (n = 17) or games of chance (scratch cards, lottery, bingo and roulette) (n = 57). We had no information regarding game setting and all categories may include both online and land-based gambling. In Study II, minor changes were made, and roulette was moved from the “games of chance” category and merged into card/casino games (poker, black jack and other casino games) (n = 67). The reason for this change was a discussion among co-authors resulting in the notion that even though roulette is in fact a game of chance, it is also a casino game and has a greater risk potential than scratch cards. The category, ”games of chance” was renamed lotto/bingo (including scratch cards and lottery, but excluding roulette) (n = 49), “machines” was renamed EGM (e.g. “Vegas” or one-armed bandits) (n = 18). Sports games (e.g. betting on sports and horse betting) (n = 92) remained unchanged. One EGM player had erroneously been categorized in the first study as a sports gambler, which was corrected in Study III.

*Risk level of preferred game:* In Study I, respondents preferring games with different risk potential were compared. Hence, the respondents most frequently played game was classified according to the risk potential of the
game (Meyer, Fiebig, Häfeli, & Mörsen, 2011; Swedish National Institute of Public Health, 2010). Low risk games (preferred by 12%) were characterized by a long time between stake and outcome, short duration time and low variability (e.g. scratch cards and lotto). Games that had a longer time between stake and outcome and with a gambling time that was able to extend to a suite of rounds were classified as medium risk games (preferred by 43%; sports betting, live poker, bingo and gambling on horses). Finally, games that had a short time from bet to outcome, possibility of long gambling sessions and winnings quickly paid out were classified as high risk games (preferred by 45%; Internet poker, casino games, machines).

Gambling motives: To measure gambling motives, the Reasons for Gambling Questionnaire (RGQ) was used. The RGQ was developed for the 2010 British gambling prevalence survey and was designed to reflect broad motivations for gambling in general (Wardle et al., 2011). The instrument was based upon the Gambling Motives Questionnaire (Stewart & Zack, 2008), which in turn was based on the Drinking Motives Questionnaire (Cooper, Russell, Skinner, & Windle, 1992), and therefore lacked some reasons that do not apply to drinking, such as monetary reasons. RGQ was adjusted according to reasons for gambling found in the literature, and reasons were divided broadly into: social reasons, monetary reasons, amusement (or excitement), challenge (or learning/knowledge) and coping (or avoidance/escape) (Cripps & Blake, 2009; Wardle, Dobbie, Kerr, & Reith, 2009).

All 15 items of the RGQ are statements concerning the frequency of gambling for the five dimensions. The respondents were asked how often they had gambled for each given motive (e.g.; Social – ”because it’s something that I do with my friends or family”, Monetary – ”for the chance of winning big money”, Amusement – ”because it’s fun”, Challenge – ”for the mental challenge or to learn about the game or activity” and Coping – ”because it helps when I’m feeling tense”). Items were answered on a 4-point Likert scale ranging from “never” (coded as 1) to “always” (coded as 4). This five-dimensional structure has been confirmed in a general sample, and the findings indicate that the RGQ is a valid instrument to assess motives for gambling in the general population (Canale, Santinello, & Griffiths, 2015).

The translation of the instrument into Swedish was done using a method called committee translation. Two independent translators translated the instrument from English to Swedish. This was followed by a consensus discussion comparing the translations and agreeing upon a final version. For this project, a minor adjustment in the introduction was done to also address individuals not having gambled in the past 12 months. In the present study,
the Cronbach's alphas for each subscale were: .63 for the social subscale, .77 for the monetary subscale, .77 for the amusement subscale, .72 for the challenge subscale and .75 for the coping subscale. This indicates an overall acceptable internal consistency (i.e. >.70). The subscale Social is somewhat low, which may be due to few items (Tavakol & Dennick, 2011). Each subscale consists of 2-4 items.

**Alcohol- and drug habits:** were measured by one question each. Respondents answered on a 5-point Likert scale how often they: “have 6 or more drinks on one occasion?” (AUDIT-3; Babor, Higgins-Biddle, Saunders, & Monteiro, 2001) or “have used illicit or non-prescribed drugs?”

**Personality:** To measure personality traits in Study II, the Health-Relevant Personality Inventory (HP5i ; Gustavsson et al., 2008; Gustavsson, Jönsson, Linder, & Weinryb, 2003) was used. This is a self-rating instrument based on selected facets from the five-factor model. The aim of the development of HP5i was to generate a model based on specific traits found to be empirically or theoretically associated with health (e.g. predictors of outcome after therapy, interventions or rehabilitation). Twenty items were derived from a pool of 196 items, mainly from the Karolinska Scales of Personality (Gustavsson, Weinryb, Göransson, Pedersen, & Åsberg, 1997). The HP5i traits are:

1. Antagonism: a facet of Agreeableness (inversely related), and pertains to an overtly hostile interpersonal style or expressive hostility.
2. Impulsivity: a facet of Conscientiousness (inversely related), that addresses the tendency to choose rapidly with little thought and to be non-planning.
3. Hedonic capacity: a facet of extraversion. Relates to the emotional core of extraversion that defines positive emotionality as a motivation in daily life.
4. Negative affectivity: a facet of neuroticism that represents a tendency to experience negative feelings.
5. Alexithymia: a facet of openness (inversely related), characterized by a disinterest or disability to recognize, understand and/or express feelings.

**Statistical Analyses**

In Study I, Pearson’s correlations were used to analyze the association between the level of risk gambling and personality, and Pearson’s partial correlations to control for age and gender. To assess whether there were any differences in personality and risk level across groups preferring different types of games, Analysis of Variance (ANOVA) was conducted with each person-
ality trait as a dependent variable, and Analysis of Covariance (ANCOVA) was used to control for age, gender and the overall level of risk gambling. A Bonferroni post hoc test was used to assess how the groups of preferred game differed from each other. To compare the study sample with norm data, one sample \( t \)-test was conducted, with mean norm data for each trait and gender as test value.

In Study II, demographics found in previous research (Johansson et al., 2009; Marsh & Dale, 2005; Matzger, Delucchi, Weisner, & Ammon, 2004; Nalpas et al., 2011; Swendsen et al., 2009) to predict or to be likely to predict excessive gambling and drinking, and included in the Monitor Project, were chosen as confounding variables in the analyses. Selected variables were: gender, age, education, size of place of residence, marital status, occupational status, country of origin and smoking. Although smoking is not a demographic variable it is a behavior that often co-occurs with both problem gambling and problem drinking (Harrison, Desai, & McKee, 2008; Daniel McGrath & Barrett, 2009) and was therefore included as a potential confounder. The variable “income” was excluded due to the high number of missing cases. To check for multicollinearity, Variance Inflation Factors (VIF) were conducted through linear Regression, including all variables. The calculated VIF-scores were between 1.01 and 1.06 and the risk for multicollinearity was therefore rejected. The association between lifetime risk gambling and current weekly binge drinking (12 months), was examined using multiple logistic regression models. Model 1 was unadjusted since we were interested in the overall association. Model 2 was adjusted for age since younger people are known to both gamble and drink to a greater extent. Model 3 was adjusted for age and smoking. Since smoking is not a demographic variable per se, we think it is interesting to see the impact of this factor. Finally, a Full Model adjusted for all demographic variables was calculated. The analyses were stratified on gender, but not on age since that yielded too few cases in some cells.

In Study III, Pearson’s partial correlations were calculated between the motivational dimensions and the level of risk gambling, frequency of past year binge drinking, frequency of life time use of illicit drugs, gender and age. When relevant, age and gender were controlled for (e.g. only controlling for age when examining the association between gambling motives and gender). Next, the analyses were redone taking the level of risk gambling into account. To examine gambling motives across preferred game types (card/casino games, sports betting, EGM:s or lotto/bingo), one-way ANCOVAs were conducted. Again, the level of risk gambling was controlled for in the next step. Furthermore, comparisons between low risk gamblers
and moderate risk gamblers were performed with independent t-tests. Since moderate risk gamblers had a higher general gambling motivation level, ANCOVAs were conducted controlling for the total gambling motivational level (i.e. other motivational scales), and for age and gender. The risk of mass-significance needs to be taken into consideration and results with a significance level above .01 should be interpreted with caution.

For all studies, data were analyzed in SPSS, version 21 and 22. In Studies I and III, Spearman’s correlations were conducted since data were on an ordinal level. Only small differences were found compared to analyses done with Pearson’s correlations, and no differences in significance, and were therefore not reported.
Study 1
Aims and Methods
The first paper examines the association between personality and risk gambling. The aims were to describe this association, to explore whether it is contingent on type of preferred game and finally, to compare the group of risk gamblers with the general population. The respondents were recruited through the Swedish Monitor Project, in which a sample of randomly selected and nationally representative respondents answer questions about alcohol- and tobacco use habits. During the period April 2012 to May 2013 the respondents were also asked whether they ever had felt the need to bet more and more money and/or if they ever had had to lie to people important to them about how much they gambled. Respondents with a positive answer to either of the two gambling questions and agreeing to participate in an upcoming study were sent a postal questionnaire. About 67% of the 382 participants returned the questionnaire containing such instruments as the short version of the NODS (NODS-PERC) and the Health Relevant five-factor Personality inventory (HP5i). The analyses in the study were built on data from the questionnaire, completed by 257 respondents.

Results
The results showed that negative affectivity (a facet of neuroticism) and impulsivity (an inversely related facet of conscientiousness) were positively correlated with the level of risk gambling. That is, the higher the self-reported impulsivity and negative affectivity, the more self-reported adverse consequences from gambling. Analyses did not show any differences regarding personality contingent on preferred game type. Finally, when compared to the general population, the study sample of risk gamblers scored lower on negative affectivity. Risk gambling men, but not women, scored higher on impulsivity than men in the general population. The findings in this study are partly in line with previous findings, where neuroticism, conscientiousness and agreeableness have been found to be associated with problem gambling. The reason for the difference regarding agreeableness may be due to the use of a representative population based sample in this study as opposed to
treatment seeking problem gamblers in many previous studies. The results in this study are in line with results reported by Bagby et al., (2007), who also used a population based sample.

Conclusion
The association between risk gambling and personality found in other studies on personality and problem gambling was corroborated in this study using a representative sample. We find this to support the assumption that personality may have an implication in the etiology of excessive gambling. We conclude that personality factors should be considered in the development of prevention and treatment interventions targeting problem gamblers.

Study 2
Aims and Methods
The second study aimed at examining the association between risk gambling and binge drinking in the general Swedish population. Further, the aim was to test whether this potential association remained when taking demographic factors into consideration. Respondents (N=19 530) were recruited through the Swedish Monitor Project. This larger ongoing project estimates alcohol- and tobacco habits in the Swedish population. Within the Monitor Project, every month 1 500 telephone interviews are conducted with randomly assigned and nationally representative participants from the general population. From April 2012 until May 2013 participants were also screened for risk gambling using the two questions from the Lie/Bet questionnaire: have you ever felt the need to bet more and more money and have you ever had to lie to people important to you about how much you gamble. Anyone answering yes to either of the two questions was classified as a life-time risk gambler. Respondents reporting drinking alcohol equivalent to a bottle of wine on the same occasion every week were classified as weekly binge drinkers.

Results
In total, 3.1% of the participants were classified as life-time risk gamblers and 4.4% percent were considered current weekly binge drinkers. Compared to male non-risk gamblers, male risk gamblers were characterized to a higher extent by younger age, daily smoking, lower education, living without a partner, living in a big city, being born outside of Sweden and not being employed. A similar pattern was found among women. There were, however, smaller differences between non-risk and risk gambling women regarding age and size of place of residence. Life-time risk gamblers had been binge drinking more frequently in the past 12 months (11.8% for men and 3.9% for...
women) than non-risk gamblers (7.2% for men and 1.8% for women). However, when taking demographic factors into consideration, the association between risk gambling and risk drinking did not remain significant. The association was confounded mainly by age and smoking.

Conclusion
Risk gambling and binge drinking are associated behaviors and in this study life-time risk gamblers had a substantially increased risk for weekly binge drinking during the last year. However, this only held true when not considering confounding variables. We hypothesize that beyond demographic factors and smoking, personality profile and health aspects may account for an additional part of the association.

Study 3
Aims and Methods
This study addressed gambling motives in a group of risk gamblers from the general Swedish population. The specific aim was to describe differences in gambling motives between subgroups characterized by gender, age, alcohol- and drug habits and preferred type of game, when also considering the level of risk gambling. The same sample as in Study I was used, i.e. recruited from the larger ongoing Monitor Project. Respondents answering yes to either having bet more and more money or having had to lie to people important to them about their gambling, were sent a questionnaire. In total, 257 respondents completed questions about, among other things, consequences of gambling (NODS-PERC) and gambling motives (Social, amusement, challenge, monetary and coping) (Reasons for Gambling Questionnaire).

Results
The level of risk gambling, that is number of items endorsed on the NODS-PERC and Lie/Bet summarized, was significantly correlated with all gambling motives, the strongest correlation being with coping. Thus, the more severe the level of risk gambling the more reasons to gamble. Gender and age were significantly correlated with challenge, indicating that male and younger respondents, to a greater extent reported gambling for the challenge. Younger respondents also reported playing for coping reasons more often than older participants. However, when controlling for the level of risk gambling, the gender difference did not remain significant, nor did the association between age and gambling for coping reasons.
Individuals preferring card/casino and sports games, to a greater extent reported gambling for social reasons then did individuals preferring lotto/bingo. Individuals preferring card/casino games more often gambled for the challenge compared to lotto/bingo players. The same was true for sports betting. However, that association was no longer significant when controlling for the level of risk gambling. EGM players reported gambling more often for coping reasons than individuals preferring sports betting and lotto/bingo. However, this association was not significant when taking the level of risk gambling into account. Hence, when controlling for level of risk gambling, there were no significant differences on coping, monetary or amusement reasons between the groups preferring different types of game.

Since the level of risk gambling was highly intertwined with motives for gambling, further analyses comparing low to moderate risk gamblers were made. Moderate risk gamblers, to a greater extent than low risk gamblers, reported gambling for the challenge and for coping reasons, when considering the general motivational level. Further, moderate risk gamblers endorsed twice as many reasons for gambling, then did low risk gamblers.

Conclusion
Motives for gambling differ across subgroups of preferred gambling type and between gamblers with low and moderate risk. The level of risk gambling is associated with motives for gambling and studies on gambling motives could benefit from considering gambling involvement.
Discussion

The journey of this dissertation about risk gambling started with a slightly different goal – to examine ways into and out of problem gambling. Almost 20,000 Swedish residents were screened for problem gambling using the Lie/Bet questionnaire, that previously had been shown to capture over 90% of problem and pathological gamblers in a Norwegian population-based sample (Johnson et al., 1997). We did not see any reason why there would be any large differences in prevalence rates in this project. While the screening was going on, a postal questionnaire was constructed, with the purpose of trying to capture both the process of developing gambling problems over time, and that of resolving those problems. When the screening was complete, 607 individuals had endorsed either having felt the need to gamble for more and more money, or having had to lie to people important to them about how much they gamble. Those who agreed to participate further were sent the postal questionnaire. So far so good.

However, when the questionnaires started coming back, it did not take long to realize that the answers were not as we had expected. It turned out that about half of the 257 respondents returning the postal questionnaire endorsed none of the items on the problem gambling measurement (NODS-PERC) and an additional 25% endorsed only one item. Further, not even one in five (18%) of the respondents admitted to having had any problems from gambling. It became clear that the aims of this dissertation had to be modified. We still had a very large randomly assigned sample drawn from the general population and from the postal questionnaire. In addition, we had a lot of data on some of the respondents, we just could not claim that this was a problem gambling sample.

Thus, we came up with the idea to embrace the public health perspective on sub-clinical conditions. From a public health perspective, individuals at risk of a disease are of great interest since they constitute a much larger group than those with the disease, and therefore have a larger societal impact. In our sample, even though about half of the individuals scored zero on the NODS-PERC in the postal questionnaire, previously they had answered yes to one of the Lie/Bet questions. Hence, risk gamblers seemed to be a more
adequate term to describe the sample. Therefore, instead of excluding the greater part of the sample for not meeting the criteria for problem gambling, we decided to adjust our focus to the sample we actually had – a Swedish population-based sample of risk gamblers.

**Aims Revisited**

This project examined risk gambling in the Swedish population, from a psychological perspective. This was done through three studies, targeting personality, binge drinking and motives for gambling, respectively. The specific questions concerning this aim are addressed and discussed below.

The first study examined the association between risk gambling and personality with the specific aims to describe:

1. **a) the association between risk gambling and personality**
   1. **b) differences in risk gambling and personality contingent on preferred type of gambling activity**
   1. **c) differences in personality between individuals with risk gambling behavior and the general Swedish population**

*a)* This study showed a positive correlation between the level of risk gambling and both impulsivity and negative affectivity. That is, the more items endorsed on the problem gambling measure (NODS-PERC), the higher the self-reported impulsivity and negative affectivity.

*b)* We did not find any significant differences in personality across preferred gambling type.

*c)* When comparing the study sample of risk gamblers with a norm group, risk gambling men scored higher on impulsivity than the norm group (general Swedish population) of males. We found no differences between risk gambling women and the female norm group regarding impulsivity. Surprisingly, the group of risk gamblers scored *lower* on negative affectivity than the norm group.

Regarding the association between gambling and personality, previous research on problem gamblers has shown similar results to those found in this
study including risk gamblers. In prior meta-analyses, neuroticism and conscientiousness, but also agreeableness, have been found to correlate with problem gambling. In this study, impulsivity (a reversed facet of conscientiousness) and negative affectivity (a facet of neuroticism) but not antagonism (a reversed facet of agreeableness) were associated with the level of risk gambling. This is congruent with findings of Bagby et al., (2007). A possible explanation for the inconsistent findings across studies may be differences in type of populations studied. In the meta-analysis by MacLaren et al., (2011) most of the studies included, compared non-pathological gamblers to treatment seeking pathological gamblers, whereas this study as well as Bagby et al., (2007) used non-clinical samples. Another possible explanation for the contradicting results is the inclusion of risk gamblers in this project. In the study by Brunborg et al., (2016), referred to earlier, higher neuroticism and lower conscientiousness were found among individuals with low, moderate and severe levels of problem gambling, compared to non-problem gamblers. Agreeableness differed significantly between moderate/problem gamblers, but not low problem gamblers, compared to non-problem gamblers. Hence, low agreeableness may characterize moderate and problem gamblers, but not low problem- or risk gamblers.

Further, we hypothesized that personality might influence type of game preferred, which in turn influences gambling involvement. Casino gambling, for example, has been associated with high risk of problem gambling, whereas gambling on lottery or bingo has been associated with low risk (Welte et al., 2004). However, when taking age and gender into account, we did not find any support for our hypothesis that personality influences the type of game preferred.

An interesting result in this study is that the study sample of risk gamblers scored lower on negative affectivity than the general population. At the same time, negative affectivity was positively correlated with the level of risk gambling. Hence, the higher the gambling involvement, the higher the scores on negative affectivity. Yet, the group as a whole scored lower than the norm group. This result surprised us since neuroticism (the factor from which negative affectivity is drawn) previously has been associated with problem gambling as well as with problems with alcohol and other drugs. However, previous studies examining risk behaviors have not found neuroticism to be related to risky behavior (Caspi et al., 1997; Cloninger, Sigvardsson, & Bohman, 1988; Forsyth & Hundleby, 1987; Zuckerman & Kuhlman, 2000). Zuckerman and Kuhlman (2000) discuss that elevated scores of neuroticism are instead a result of the problems and refer to a study showing rapid decrease in neuroticism after 3-6 months of treatment (Zuckerman, Sola,
Masterson, & Angelone, 1975). Further, in Zuckerman and Kuhlman’s study, women scored higher than men on neuroticism, whereas men showed more risk taking. Even though these studies referred to problems with alcohol and other drugs, this explanation might be applicable to gambling as well. If so, the correlation between neuroticism and negative affectivity (a facet of neuroticism) could be due to elevated levels of stress among the respondents and hence a cause of the problems. Confirming this are findings from Study III in this thesis, where a positive correlation between gambling for coping reasons (which is likely to be done by individuals high in neuroticism) and the level of risk gambling was found (Sundqvist, Jonsson, & Wennberg, 2016).

As a group, however, risk gamblers instead may be more prone to sensation seeking, which is highly related to impulsivity, and hence more likely to become involved in risky situations (Donohew et al., 2000). However, arguing that individuals scoring high on neuroticism would not be prone to risk gambling actually contradicts the Pathway Model, where the second path is initiated via emotional vulnerability, as well as previous research (Hodgins et al., 2011; Kessler et al., 2008). It is possible, though, that there is a difference regarding personality, so that elevated neuroticism predicts problem gambling but not risk gambling. It is also possible that the personality plays different roles depending on where in the process of becoming/being a problem gambler the individual is. For example, elevated levels of neuroticism may not be crucial to the onset of problem gambling, but may make it more difficult to resolve the problems, hence playing a role in the maintenance of the problems.

The second study included in this thesis addressed the specific questions:

2. What does the association between lifetime risk gambling and current (12 months) binge drinking look like in the general Swedish population and does this association remain after controlling for confounding variables?

In this study, weekly binge drinking was twice as common among risk gamblers as among controls without risk gambling. This means that there was a significant association between risk gambling and binge drinking. Interestingly, when controlling for demographic variables and smoking, the association between risk gambling and binge drinking weakened and was no longer significant. Unfortunately, the only information on gambling that we had on
the control group was that they did not have a life-time history of risk gambling.

In prior research, an association has been found between the diagnoses gambling disorder and alcohol use disorder, as well as between gambling and alcohol problems on a sub-clinical level (Cowlishaw, Merkouris, Chapman, & Radermacher, 2014; Lorains et al., 2011). The latter association, between problem gambling and alcohol abuse seems to be due, to a great extent, to socio-demographic similarities (Kessler et al., 2008; Park et al., 2010; Petry et al., 2005). This corresponds with what was found in this study on risk behaviors in the general population.

Excessive gambling and drinking have other common risk factors, such as personality profiles and health aspects (Johansson et al., 2009; Marsh & Dale, 2005; Sundqvist & Wennberg, 2015). It is possible that such factors could be an additional explanation of the association between the behaviors. In that case, the association between excessive gambling and drinking could be mainly due to shared characteristics rather than a causal link between the behaviors. This would be in line with the theory of an addiction syndrome (Shaffer et al., 2004), suggesting that addiction is a unitary disorder with a variety of expressions, rather than distinct conditions. The results in this thesis indicate that the same line of thinking could be used even on risk behaviors such as risk gambling and binge drinking (Sundqvist, Rosendahl, & Wennberg, 2015).

The third study addressed the following question:

3. Are there any differences in gambling motives in different subgroups of lifetime risk gamblers categorized by: age, gender, alcohol- and drug habits and type of game preferred when considering the level of risk gambling?

In this study, the level of risk gambling was associated with all included motives for gambling (social, amusement, challenge, coping and monetary reasons). Therefore, comparing different subgroups of risk gamblers regarding gambling motives was affected by taking the level of risk gambling into account. Concerning gender and age, we found that younger males more often reported gambling for the challenge then did women and older individuals. Younger participants also reported gambling for coping reasons more often than older respondents. However, when considering the level of risk
gambling, the only of those associations remaining significant was the one between older participants gambling for challenge reasons.

We found differences in gambling reasons across different preferred gambling types. However, that association too was influenced by the individual’s level of risk gambling. EGM gamblers, for example, had a higher mean score on coping motives than the two groups preferring sports betting and lotto/bingo; a difference that did not hold true when controlling for the level of risk gambling. Individuals preferring card/casino games and sports betting were found to gamble to a greater extent for social reasons than individuals preferring lotto/bingo. Further, the group preferring card/casino games were gambling for the challenge to a greater extent than the group preferring lotto/bingo. The same was true for the group preferring sports betting, although this difference was no longer significant after considering the level of risk gambling. For the subscales on RGQ with the highest general mean (amusement and monetary), there were no differences between the gambling types.

Since we found that gambling motives were affected by the level of risk gambling, we decided to examine how low and moderate risk gamblers differed with respect to their gambling motives. Low and moderate risk gamblers differed significantly on all motivational scales. The largest differences were found regarding gambling for coping, challenge and amusement reasons. However, the difference regarding amusement did not remain significant after controlling for the general gambling motivation level. Furthermore, moderate risk gamblers reported twice as many reasons (items from the RGQ) for gambling than low risk gamblers.

In previous research, gambling motives have been shown to have an impact on future gambling problems. In this thesis, gambling motives were highly intertwined with the level of risk gambling. Thus, it is possible that gambling reasons change as gambling involvement escalates. The approach to control for the level of risk gambling may have led to some results contradicting previous research. For example, Wardle et al., (2011), found younger individuals more often gambling for coping reasons than older gamblers. This was also found in this study, although this did not hold true when considering the level of risk gambling. Differences in gambling motives between women and men have been found in previous research (McGrath et al., 2010; Walker et al., 2005; Wardle et al., 2011). This was also found in this thesis, but did not remain true when controlling for the level of risk gambling. A third example of how the choice of controlling for the level of risk gambling may lead to results contradicting previous research regards EGM
players gambling for coping reasons (found in e. g.: Balodis, Thomas, & Moore, 2014; Bonnaire, Bungener, & Varescon, 2006; Clarke, 2005). Again, this was found in this study as well, but after considering gambling involvement, EGM gamblers did not differ significantly from the other preferred game groups regarding how often they gambled for coping reasons.

Hence, when controlling for the level of risk gambling, the relative impact of the motives for gambling weakens or disappears. Previous research has shown an association between problem gambling severity and motives for gambling (Francis, Dowling, Jackson, Christensen, & Wardle, 2014), which is supported in this project. We believe that this is relevant for future research concerning gambling reasons and differences across subgroups.

General Implications
In summary, this project has found that risk gambling in the general Swedish population is associated with personality, risk drinking and gambling motives. However, the project also showed that these associations can be counter-intuitive and the results presented in this thesis sometimes contradict previous research. It is concluded that several factors need to be taken into consideration when studying the association between these psychological factors/behaviors and risk gambling.

Level of Risk Gambling
First, the level of risk gambling, i.e. how many adverse effects the individuals have experienced from gambling, turned out to be an important aspect to take into consideration. The more negative consequences the individuals had experienced from gambling, the more they seemed to score themselves as impulsive and prone to negative feelings. This, however, does not necessarily mean that people’s personality traits cause their risk gambling. Impulsivity previously has been found to be a strong predictor of problem gambling. Regarding negative affectivity, on the other hand, it seems as if the direction of the causality needs to be clarified. Even though, in this project, negative affectivity (a facet of neuroticism) increased with gained level of risk gambling, the group as a whole scored lower than a norm sample from the general population. Personality is thought of as being fairly stable over a lifetime. However, there is a possibility that negative affectivity/neuroticism increases as a consequence of adverse effects of gambling. Longitudinal studies could clarify the role of neuroticism in the development of excessive
gambling, and whether there is a difference between risk and problem gamblers regarding neuroticism.

Further the level of risk gambling was found to be highly intertwined with gambling motives. Several differences, between subgroups of risk gamblers, were found which did not hold true when taking into account the number of adverse effects experienced by the gamblers. For example, no gender differences were found regarding gambling reasons. This contradicts previous research, and may be due to the circumstance that men in general have a higher gambling involvement than women. Hence, only when controlling for this will it be clear whether there is a true difference between the genders, or if the difference depends on the gambling involvement.

Socio-demographic Characteristics
As previously discussed, in this project the association between risk gambling and binge drinking seemed, to a great extent, to be due to shared characteristics. Future research will show if this holds true, and if it is applicable even regarding conditions on a clinical level, i.e. between gambling disorder and alcohol use disorder. If so, from a public health perspective, this would mean that prevention strategies could target individuals with specific risk characteristics as well as individuals with a specific risk behavior.

Gender
Since female problem gamblers are comparatively few, they are usually collapsed with males in studies of problem gambling. The obvious risk with this is that problem gamblers in general are described as having characteristics that are in fact only true for male gamblers. In the first study included in this thesis, problem gambling men, but not women, reported higher levels of impulsivity than a norm population (Sundqvist & Wennberg, 2015), indicating gender differences. In this project, as well as in most gambling studies, women are few and results need to be interpreted with caution.

Gender differences regarding gambling motives have been found in previous research, suggesting that women are more likely than men to gamble to escape, and that men are more likely than women to gamble for enhancement (Dowling, 2013; Walker et al., 2005; Wardle et al., 2011). However, as found in the third study included in this thesis, some differences across groups may be due to differences in gambling involvement (Sundqvist et al., 2016).
The Pathway Model

The Pathway Model (Blaszczynski & Nower, 2002) describes three different trajectories towards problem gambling. The different paths are discriminated by different initial individual factors, such as emotional vulnerability and personality. The results in this study showed, in line with this model, that impulsivity and vulnerability were associated with risk gambling. However, findings in one study included in this thesis suggested that negative affectivity/neuroticism may be more complex than being a risk factor for the onset of problem gambling.

It can be discussed whether previous findings, confirming the pathway initiated by emotional vulnerability, instead have found a group of individuals with a high level of gambling involvement. Hence, instead of causing excessive gambling, negative affectivity/neuroticism may primarily be a cause of it.

In addition, substance abuse is seen in the Pathway Model as a factor that may initiate the path towards problem gambling. However, in this project, risk gambling and binge drinking were no longer significantly associated when considering socio-demographic variables and smoking. Further, we hypothesize that other factors, such as personality and health aspects may account for an additional part of the association. If so, one can question whether alcohol abuse is a factor related to the development of problem gambling or if instead it is another manifestation of shared characteristics.

The question remains open as to whether the pathways outlined in the model are in fact different types, or instead if it is a matter of only one type being identified at different levels of risk/problem and therefore with different characteristics.

Strengths and Limitations

The results presented in this dissertation need to be considered in the light of some limitations.

Study design: A limitation of this thesis is the cross-sectional design. This is unfortunate considering that there seems to be a change in both personality scores and gambling motivation as gambling involvement progresses. From our results we cannot determine if the elevated scores in negative affectivity are due to increased gambling involvement or if the increased level of risk gambling causes the increased scores in negative affectivity. We are also unable to tell whether moderate risk gamblers, compared to low risk gam-
blers, had a higher gambling motivation to begin with or if it is a result of their gambling involvement. A longitudinal design would have been able to answer more questions and would have been preferable.

Measures: Another limitation concerns measurement. For practical reasons, lifetime gambling measures were used. Measuring problem gambling from a life time perspective does not give full information about severity; thus reporting several consequences does not mean that they appeared simultaneously. The additional use of point prevalence measures would have been beneficial. However, some argue that lifetime measures have methodological advantages over past-year, when identifying pathological gamblers, (see Toce-Gerstein and Gerstein, 2004).

The Lie/Bet questionnaire, used in the initial screening, is a validated and well-established instrument. However, it has been criticized because the items in the Lie/Bet questionnaire differ from the criteria in DSM-IV upon which they are based (Stinchfield, 2014). The first question: “Have you ever had to lie to people important to you about how much you gambled?” is based on the DSM-IV criterion, “lies to family members, therapist, or others to conceal the extent of involvement with gambling”. The addition of the words “had to” changes the content slightly and adds a notion of “force” or “obligation” that is not present in the criterion. There are likely to be respondents that have lied about their gambling, but that have not felt that they “had to” lie. The second question: “Have you ever felt the need to bet more and more money?” has taken out the end of the sentence “… in order to achieve the desired excitement”. These seemingly minor additions and deletions of content must, nevertheless, be acknowledged since they may not measure the DSM-IV criteria they intend to measure. Further, there is a lack of empirical evidence of classification accuracy with a criterion other than a measure of DSM-IV. However, the present project does not propose to investigate problem gambling, but rather to screen for risk gambling. Another limitation is the use of only two items for screening risk gamblers. It is likely that the use of more items would have yielded a higher proportion of risk gamblers.

Regarding motives for gambling, there is a possibility that the measure used (RGQ), in addition to the intensity of gambling motivation, also reflects gambling frequency, which in turn is correlated with risk level. However, this has been addressed, to some extent, by considering the level of risk gambling (gambling involvement) and the general motivational level in the analyses.
The majority of population-based gambling studies, including this project, use self-report measures since they are easy and inexpensive. A weakness of this method is the risk of bias due to the need for recollection, social desirability or difficulties with self-reflection.

Generalizability: A limitation in the study is the large proportion of non-responders in the Monitor Project. The monthly non-response is about 60% during the study period. As described in the Methods section, respondents who could not be reached were replaced with other respondents by the same RDD method so that 1500 individuals were interviewed every month. For this reason, the sample may not represent the general population. In order to make the data more generalizable, from 2010 the Monitor data also include respondents that only have mobile phones. A previous analysis of the effects of missing data, including 2 500 non-responders that were re-contacted a year later, found no significant differences in alcohol habits between those and responders answering at the first occasion (Wennberg, Svensson, & Ramstedt, 2011). However, the proportion of abstainers was significantly higher among the initial non-responders. The Monitor Project has also been evaluated by an independent expert group, from the Nordic countries, Canada and the US, who concluded that the methods of the project were satisfying (Ramstedt, Sohlberg, Engdahl, & Svensson, 2009). (Leifman & Trolldal, 2013; Ramstedt, 2010; Ramstedt, Lindell, & Raninen, 2013; Raninen et al., 2013). Nevertheless, a group of “hard“ non-responders (not responding despite extensive efforts) remains unstudied. It is likely that this group includes a higher proportion of problem gamblers. Studies on non-responders have found that risk behaviors are underestimated and that non-responders are more likely to be younger, male and with lower socio-economic status (Maclennan, Kypri, Langley, & Room, 2012; Meiklejohn, Connor, & Kypri, 2012). Hence, it is likely that this project had underestimated the prevalence of risk gamblers. However, this does not necessarily affect the association between risk gambling and the psychological factors/behaviors studied in the project.

Strengths: A major strength of this project is the recruitment of a large, population based, randomly selected and nationally representative group of risk gamblers. This means that the results are somewhat more generalizable to the general Swedish gambling population than when using more targeted samples, such as students or gamblers in treatment. A second strength is the focus on risk behaviors. Many gambling studies focus on problematic/disordered behaviors, concerning a relatively small part of the population. Another strength of this project is the use of commonly used, validated
measures increasing the reliability of the studies and the comparability to other studies.

**Future Directions**

Besides the need to know more about gender differences and similarities regarding risk and problem gambling, and how socio-demographic characteristics interact with variables predicting problem gambling, three targets for future research will be addressed here: gambling involvement, the Pathway Model and problem gambling measures.

**Level of Risk Gambling**

How many adverse effects from gambling an individual has experienced turned out to have an impact on the associations studied in this project. It is possible that the level of risk gambling has an impact on more associations commonly studied in gambling research. The game preference is such a variable that might change with increased gambling involvement, and not only be a risk factor for gambling problems. It is suggested that future studies take the level of risk/problem gambling into account when studying associations that might be influenced by gambling involvement. Considering gambling involvement may also make it possible to crystallize possible distinctive characteristics, discriminating low risk gamblers from high risk gamblers.

**The Pathway Model**

In this thesis, questions regarding the Pathway Model have been raised, based mainly on the finding that the more adverse effects of gambling the higher level of negative affectivity; and yet as a group risk gamblers scored lower than the population. It has been discussed whether previous findings, confirming the model, instead of different pathways have found groups of individuals in different stages of their gambling “career”, i.e. with different levels of gambling involvement. Data from longitudinal studies will be able to add to the knowledge on different pathways to problem gambling.

**Problem Gambling Measures**

Last, but not least, the intention of this project was originally to examine ways in to and ways out of problem gambling. One of the reasons that this was changed most likely concerned problem gambling measures. Two ques-
tions, previously used in screening out problem and pathological gamblers, yielded a sample of individuals where most reported not having had any gambling problems at all. This may be due to causes such as social desirability or vague recollection, but probably also due to measurement issues. When we administrate a problem gambling measure, we obtain a yes or no (or a scale ranging from never to almost always) on each item, we add the number of “yes” responses and we decide on the severity of problem gambling based on that. We do not have the opportunity to consider the circumstances of a respondent reporting that someone, for example, criticizes their gambling. Also, we do not know why they have felt guilt about how they gamble. Is it because the gambling is a big problem for them or because they feel stupid for yet again having let themselves be fooled by the dream of big money? There is a need for refinement of the measures we use in gambling research. One step towards improving our measures could be through qualitative studies, interviewing problem gamblers about the items included in the measures. What do the specific items mean to the individuals we ask? Do they reflect significant issues, or something else?

Concluding Remarks

Before I became a doctoral student, I worked as a clinician with individuals having problems with alcohol or gambling. When in a session with a client, it is possible choose how to define the problem from situation to situation. If it is helpful to call the problems a gambling disease, that is what you call it. Or if the client is better helped by referring to the problem as a risky behavior, that is what you call it. This freedom is not possible in research. How we define what we study is crucial in order to be able to draw conclusions and make comparisons with previous research. Further, when we want to define individuals on a scale from non-gamblers to disordered gamblers we administrate a gambling measure. As a clinician, this measure only constitutes material for discussion. The results of the discussion and perhaps other sources form the basis for the choice of definition. As a researcher, this measure is often the only source. It has become clear during this doctoral period that the definitions we use, as well as the measures we use, need to be further developed and clarified.

It also has become clear that there is much more to learn about the etiology of problem gambling. Many risk factors have already been identified, but more knowledge about how they influence each other is needed. To step by step disentangle how those factors, associated with risk- and problem gambling, interact with each other to contribute to the onset or the maintenance
of problem gambling is a challenge laying ahead of the research field. I look forward to taking part in the development of knowledge about the etiology of problem gambling, both as a reader and a contributor.
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