Ontario
MINISTRY OF HEALTH AND LONG-TERM CARE

Raising the FLAGs: *A Pilot Study adapting FLAGS, a next-generation gambling risk assessment instrument, for use in identifying risk among general gambling populations.*

An instrument to Identify Early Warning Signs for Gambling Risk, Harm & Problem Gambling

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Abstract

The Ontario Ministry of Health and Long Term Care (MOHLTC) expressed specific interest in supporting a research initiative that assists in the identification of early warning signs for gambling risk and problem gambling. In the past, gambling screens (e.g., DSM IV, South Oaks Gambling Screen) focused on identification of problem gamblers primarily to determine prevalence rates among clinical and treatment populations. With rapid gambling expansion, it became increasingly important to monitor prevalence within the context of the population at large. Although instruments subsequently were developed to track levels of problem gambling in the general population, these measures were not designed for use as prevention tools nor to identify early risk prior to the development of gambling related harm. The FocaL Adult Gambling Screen (FLAGS) was developed to address this gap and was recently found to be highly successful in detecting early, intermediate and advanced risk for gambling problems and harm among regular machine gamblers (e.g., slots, VLTs, EGMs) (Schellinck, Schrans, Bleimel & Schellinck, 2010). The current report presents the results of a pilot study undertaken to assess the ability of revised FLAGS indicators to detect risk and harm for other forms of gambling including other casino games, betting on horses, bingo, sports betting and online gambling. The pilot study consisted of a series of 8 focus groups to test a beta version of the instrument and administration of the a reduced instrument to 1223 regular gamblers for various forms of gambling. Preliminary risk profiles including identification of early warning signs were generated and examined. Structural equation modeling (SEM) using path analysis (PLS) was used to examine relationships between the various constructs comprising the screen and the latent factors (i.e., risk and harm measures). Item and construct analysis of the survey results were conducted to select the most appropriate items for inclusion in each construct comprising the harm and risk components of the new risk assessment screen. The modified constructs proved to be effective as indicators of risk. The CPGI was included as a measure of convergent validity as it is currently used as a risk measure for problem gambling. Based upon our analysis, there was high convergence in identification of problem gamblers; however, there was only 37.3 % agreement for identification of risk indicating the two instruments are measuring something different. This finding is not surprising given that the PGSI was designed to identify the level of probability that an individual is a problem gambler (low, moderate, or high) while FLAGS was specifically designed to measure indicators that occur in advance of harm or problem gambling (early, intermediate, advanced risk). The remaining 62.7 % of gamblers are better classified by the FLAGs instrument. Consequently, this survey instrument and methodology should be suitable for public health surveillance, prevention and harm reduction applications and ongoing validation in a general population study.

1.0 Introduction

The Ontario Ministry of Health and Long Term Care (MOHLTC) expressed specific interest in supporting a research initiative that assists in identification of early warning signs for gambling risk and problem gambling. Originally, gambling screens such as the DSM IV (APA, 1980) and South Oaks Gambling Screen (SOGS) (Lesieur & Blume, 1987) focused on identifying problem and pathological gambling, specifically among treatment populations. Current gambling screens, such as the Canadian Problem Gambling Prevalence Index (CPGI) (Ferris & Wynne, 2001), the Victoria Gambling Screen (Ben-Tovim, Esterman, Tolachard, & Battersby, 2001), the Gamblers Beliefs Questionnaire (Steenbergh, Meyers, May, & Whelan, 2002), the Gambling Related Cognitions Scale developed by Raylu and Oei (2004) and the National Opinion Research Center DSM – IV Screen for Gambling Problems (Wickwire, Burke, Brown, Parker, & May, 2008) are for use with the general population but do not specifically examine risk as a separate construct. For example, the CPGI includes risk estimates as a component of identifying problem gambling. This inclusion was seen to expand the potential for risk identification in general population applications over previous instruments. However, the risk and problem gambling components are selected as a single factor suggesting that the risk items are continuing to be regarded as part of the same underlying construct as the harm components. Specifically, the summed items of the CPGI used to classify players into each risk category is called the Problem Gambling Severity Index (PGSI); the PGSI scores identify those falling at different levels of severity for problem gambling ranging from No Risk (PGSI=0) to Severe Problem Gambling (PGSI=7+). Based on how the CPGI-PGSI was developed and evaluated the higher the score on the PGSI the greater certainty that individual is a problem gambler. Conversely, lower scores indicate less certainty that someone is a problem gambler not that someone is at lower risk. This means that the CPGI-PGSI identifies different levels of probability that an individual is a problem gambler (low, moderate and high probability) rather than different levels of risk for problem gambling.

To prevent problem gambling there is a need for an instrument that can identify risk independently from gambling harm and problem gambling; that is risk identification before

gambling problems, harms or dependency develop. Thomas et al. (2003) have outlined the problems associated with attempting to use one tool for multiple and divergent objectives and recommend that any measure be associated with a specific purpose including the need for a tool to determine those at risk. Shaffer, LaBrie, LaPlante, Nelson and Stanton (2004) also pointed out the need for "the investigation of risk and protective factors that influence the onset of gambling disorders".

Given the limitations of existing problem gambling screens in identifying risk, the FocaL Adult Gambling Screen (FLAGS) approach was developed to address this measurement gap. FLAGS was designed to work much in the way that the medical community has established screens to identify risk factors for specific disorders (Nagavi, Falk, Hecht, & Shah, 2006; Jordan, Sowers, Messier, Bradley, Arangio, Katz, Losina & Wahba, 2011; Stojadinovic, Summers, Eberhardt, Cerussi, Grundfest, Peterson . . . Freeman, 2011). The APA (2000) definition of pathological gambling is "persistent and recurring maladaptive gambling behaviour". Individuals so defined are preoccupied with gambling, may be unable to control their gambling, chase losses and suffer negative consequences as a result. Our operational definition assumes the gambler has suffered negative consequences and is persisting in the behaviours that lead to these consequences. The other characteristics noted by APA (2000) are seen to be causal factors leading to problem gambling and some are used in our model. Our goal is to develop the ability to identify early warning signs for gambling risk and harm such that it will also be possible to target and assess upstream efforts to prevent risk, ultimately reducing downstream gambling harm and problem gambling.

The objective of the current Pilot Study was two-fold:

1. *To adapt the FLAGS instrument to identify and measure early risk indicators for problem gambling in general including horse betting, Bingo, sports betting and newer forms of gambling such as internet gaming and other online gambling.*

2. *To use the up-dated instrument to generate risk profiles identifying and assessing early warning signs for prevention applications.*

1.1 Literature Review

1.1.1. Reflective versus Formative Constructs

A critical advancement for instrument design is related to the use of both reflective and formative constructs in accounting for the various diverse factors impacting gambling risk and harm. There has been much debate over the conceptualization and measurement of problem gambling over the past twenty years (c.f. Dickerson, 1993; Lesieur, 1994; Volberg, 1996; Walker & Dickerson 1996; Svetvia & Walker 2008). This led to the development of numerous gambling screens primarily to identify the incidence and prevalence of problem gambling in a specific population of interest. For the most part, such screens have been designed and tested as reflective constructs (c.f. South Oaks Gambling Scale, Lesieur & Blume, 1987, 1993; Victoria Gambling Screen, Ben-Tovim, Esterman, Tolachard, Battersby, 2001). However, in other cases, such as the Problem Gambling Severity Index (PGSI) of the Canadian Problem Gambling Index (CPGI), (Ferris & Wynne 2001), components of the instrument are formative in nature. This approach has implications for how such screens were structured and validated.

First, reflective constructs assume a latent variable exists and any variations in the measure are attributable to the underlying construct (Nunnally, 1978). The direction of causality is from the latent variable (e.g., problem gambling) to the items measured (e.g., because one is a problem gambler they will endorse or exhibit the various items included in the construct). With reflective constructs all items in the measure typically 'reflect' the same underlying latent construct, and therefore, the items should be highly correlated. This also means that the more items an individual endorses the greater the probability that the individual is exhibiting the latent variable, in this case experiencing problems with his or her gambling. For example, as fewer items are endorsed, there is less certainty that the individual is a problem gambler; however, this does not necessarily mean that the individual is at lower risk for having a problem which has often been assumed when applying the screens in population research or surveys.

In contrast to a reflective measure, a formative construct or indicator is said to predict the latent variable (e.g., engagement in certain gambling behaviours and/or practices produces negative gambling outcomes and/or problem gambling). The items comprising formative

constructs represent different dimensions of the latent variable and the construct is, therefore, a summation of the observed variables with which it is associated (Bollen & Lennox, 1991; Gefen, Straub, & Boudreau, 2000). For example, individual items comprising a formative construct may or may not be correlated and endorsement is additive such that the more items endorsed the greater the severity of impact or in regard to gambling the more or less severe the gambling impacts are for the individual. This is a desirable characteristic for an instrument intended to identify different levels of risk or harm especially when being applied across different forms of gambling that can be expected to have different characteristics and pose different risks for users.

Historically, since measures of problem gambling have been conceptualized as a reflective constructs, traditional item analysis, factor analysis and validation techniques have been used for testing such instruments and assumed to be appropriate. This is the case for the Canadian Problem Gambling Index; even though some items on the screen are formative in nature development and testing of the PGSI was based on techniques suitable for use with reflective constructs not formative. Recent work has focused on the weakness of such approaches setting new criteria for evaluation (c.f. Jarvis, Mackenzie, & Podsakoff, 2003; Diamantopolous & Winklhofer, 2001; MacKenzie, 2003).

The use of formative measures for gambling are not new; Strong, Breen and Lejuez (2004) designed a formative measure in 2003 to assess a latent affinity for gambling, and, once refined, concluded it would also benefit treatment providers in identifying those vulnerable to problem gambling who had not yet met the criteria (i.e., prevention applications). The methods used by Strong, Breen and Lejuez (2004) were similar to those used in Focal's initial assessment of FLAGS and achieved similarly favourable results.

There has been extensive debate as to whether formative or reflective constructs are appropriate for theory development (Howell, Breivik, & Wilcox 2007a; Howell, Breivik, & Wilcox 2007b; Bollen, 2007; Bagozzi, 2007; Diamontaopoulos & Siguaw, 2006; Diamantopoulos, Riefler, & Roth 2008; Freeze & Raschke, 2007; Wilcox, Howell, & Breivik, 2008). However, there is a consensus that formative measures are suitable for prediction of given outcomes (e.g.,

gambling risk or gambling problems/negative consequences) when used with structured equation modelling.

The literature and recent research indicate a need to incorporate both reflective and formative constructs to independently identify gambling harm that has already occurred, in addition to identifying the risk factors that would predict the probability of harm taking place and the likelihood of developing problem gambling. This not only ensures broader coverage of diverse risk factors (e.g., beliefs, motivations, behaviours) and harm (e.g., financial, personal, relationship) that may differ between individuals but also defines and confirms common factors within a certain category (e.g., financial consequences) using multi-item reflective constructs (e.g., debt, losses, inability to pay bills, short of cash) thereby contributing to the opportunity for a more detailed assessment of the factors (e.g., reflective constructs) comprising and influencing the components (e.g., formative constructs) of problem gambling.

1.1.2. The Development of FLAGS for Electronic Gambling Machine (EGMs. VLT, Slots) Gamblers

Over the past 15 years, Schellinck, Schrans and colleagues have conducted research in the area of problem gambling, most specifically with the objective of detecting those at risk of developing problems in this context (Schellinck & Schrans,1998; Schrans & Schellinck 2003; Schellinck & Schrans, 2004a, 2004b; Schellinck, 2006; Schrans & Schellinck, 2008). Most recently they completed a study designed to develop, test, and refine a prototype risk assessment instrument to identify factors that cause or lead to problem gambling related behaviours (e.g., risky practices) or to harms (e.g., negative consequences) in the Ontario slot machine player and clearly differentiates between the identification of those at risk versus those already experiencing problems with their gambling. The study commenced with a thorough review of 'at risk' and 'problem gambling' literature, including an examination of research supporting natural recovery and self-motivation to modify problem behaviours (Prochaska & DiClemente, 1992; Prochaska, DiClemente, & Norcross, 1992; Hodgins & Nady, 2000; Hodgins, 2001; Schellinck & Schrans, 2004a). The review also included an assessment of the Ontario Problem Gambling Resource Centre's (OPGRC) model components including risk (risk cognitions, risk behaviours and preoccupation) and problem gambling elements (impaired control, negative

consequences, persistence) (Dickerson et al, 1992; Ozga & Brown, 2002; Toneatto & Millar, 2004). Following the review, the authors concluded that the gambling risk assessment instrument for slot machine gambling could be strengthened by including additional behavioural items as well as sub-screens associated with risk (situational and personal factors), and impaired control. Readers are referred to the report "FLAGS: Development of an Instrument for Identifying Risk for Problem Gambling among Slot Machine Gamblers in Ontario" (Schellinck, Schrans, Bliemel, & Schellinck, 2010)[1] for detailed background and rationale underlying the development and refinement of the FLAGS electronic gambling machine risk indicators.

Qualitative evaluation of a revised risk screen included a pre-session survey, an in-session evaluation of a test version of the screen and participation in focus groups with a sample of regular slot gamblers in Ontario to ensure that the items reflected the perceived characteristics of Ontario slot machine gambling. Finally, the principal investigators carried out preliminary construct analysis to aid in the selection of appropriate items for further testing of the gambling risk assessment instrument. The analysis included correlations to test for relationships between the items tested and to assess multicolinearity; factor analysis using principal component analysis (PCA) with varimax rotation; and, structural equation modeling (SEM) using partial least squares or path analysis (PLS). This work resulted in the development of a preliminary risk assessment instrument composed of both reflective and formative constructs that was administered to 374 regular monthly slot machine gamblers. This sample size was sufficient for the proposed analysis, examining item and construct properties including testing for common method bias (CMB), as well as quantitative validation of the model using structural equation modeling techniques. Partial Least Squares (PLS) analysis was used to test the overall model as well as the validity and reliability of each of the constructs comprising the new instrument. Resulting classifications were compared to those derived using the Problem Severity Gambling Index (PGSI) of the Canadian Problem Gambling Index (CPGI) with strong overlap found in classification of problem gamblers but FLAGS proved superior in classifying pre-harm gambling risk (i.e., early risk), an important threshold for prevention applications. In recent research for

[1] See the Ontario Problem Gambling Research Centre's website http://www.opgrc.org.

the Nova Scotia Gaming Foundation (NSGF) (Schellinck, Schrans, Chen, & Chambers, 2010)[2] the constructs were tested using appropriate criteria specifically related to construct type and a scoring method developed for each. In testing the instrument performed as expected.

Table 1: Description of FLAGS Risk Indicators (Constructs)

FLAGS Risk Indicators (e.g., Constructs)	Example
Risky Cognitions: Beliefs	Irrational or inaccurate beliefs about machine gambling.
Risky Cognitions: Motives	*Risky reasons for gambling (e.g., to pay off bills, to escape problems, for self-esteem or status).*
Preoccupation: Desire	*Strong drive to play the machines as much as possible.*
Risky Practices: Earlier	*Less extreme types of risky practices that usually precede more harmful practices (e.g. using bank card to get more money to play).*
Impaired Control: Continue	*Inability to stop playing slots/machines once started.*
Risky Practices: Later	*More extreme or harmful types of risky practices (e.g. using credit to finance play).*
Impaired Control: Begin	*Inability to resist or stop oneself from going to play slots/machines.*
Preoccupation: Obsessed	*Excessive preoccupation, constantly thinking about slot gambling or finding ways to gamble on machines.*
Negative Consequences	*Negative impacts in at least 3 of 14 different areas of life including financial, personal, family, work, health, social.*
Persistence	*Over an extended period, continues to gamble in a risky manner that leads to harms.*

Overall, the FLAGS instrument modified for use with slot machine gamblers was comprised of 10 constructs (5 formative and 5 reflective) including low risk indicators (Risky Cognitions: Beliefs, Risky Cognition Motivations, Preoccupation: Desire), medium risk indicators (Impaired Control: Continue, Risky Practices: Earlier) and high risk indicators (Impaired Control: Begin, Risky Practices: Later, Preoccupation: Obsessed) as well as identifying Problem Gamblers (Negative Consequences + Persistence).

[2] The Report can be accessed at Gambling Awareness Nova Scotia http://www.nsgamingfoundation.org/articles-and-reports-view.aspx/115/Evaluating+the+Impact+of+the+%22My-Play%22+System+in+Nova+Scotia+-+Phase+1+Regular+VL+Player+Benchmark+Survey+

Responses to the instrument were used to assign players to one of five risk classifications each associated with different characteristics and implications for support and/or intervention: Level 1 – No Detectable Risk; Level II – Early Risk; Level III – Intermediate Risk; Level IV - Advanced Risk; Level V – Problem Gambling. Refer to FLAGS: Development of an Instrument for Identifying Risk for Problem Gambling among Slot Machine Gamblers in Ontario (Schellinck, Schrans, Bliemel, & Schellinck, 2010) for in-depth discussion of the analysis and results.

Table 2: Description of Flag Risk Categories

Risk Level	Category	Description
Level I	*No Detectable Risk*	*Do not flag on any of the constructs so have no observable risk.*
Level II	*Early Risk (Pre-harm)*	*Have indications of risky cognitions: beliefs, risky cognitions: motives or preoccupation: desire but do not have any indications of impaired control or harm (e.g., negative consequences).*
Level III	*Intermediate Risk (Pre-harm)*	*Have indications of impaired control: continue and risky practices: earlier but do not have any indications of harm (e.g., negative consequences).*
Level IV	*Advanced Risk*	*Have one or more indications on impaired control: begin, preoccupation: obsessed and risky practices: later as well as negative consequences or persistence.*
Level V	*Problem Gambler*	*Score as having experienced both negative consequences **and** persistence (i.e., persisting in behaviours related to harm).*

Most gambling screens such as the CPGI-PGSI are composed of a brief set of statements (≈8-10) designed to identify problem gamblers whereas FLAGS is comprised of a comprehensive set of 10 multi-item indictors that are sequentially related to escalating risk and harm. Thus, the instrument can be used to identify player risk, assigning respondents to one of the five risk categories and similarly one of the five problem gambling categories, based on summing their responses to each of the indicators. However, each of the 10 components also represents a distinct area of risk or harm for players ranging from early risk indicators (e.g., risky beliefs and motivations) through to advanced risk indicators (e.g., preoccupation, impaired control, risky practices) and finally indicators of problem gambling (e.g., persistence, negative consequences). Unlike other gambling instruments that measure harm after the fact, use of this risk assessment instrument could enable gamblers to self-identify and correct their behaviour before

experiencing negative consequences and simultaneously screen out those experiencing harm or problem gambling. Because of its unique design, FLAGS can also be used to assess impacts at a component level to determine how specific strategies and interventions impact the various factors contributing to risk and the development of problem gambling. This functionality means that FLAGS moves beyond traditional identification of problem gambling prevalence by providing information for use in informing, monitoring and evaluating gambling related prevention and harm reduction programs, and informing social and public health policy. In summary, FLAGS not only enables users to identify 'who' is at risk but, more importantly, 'why'.

1.1.3. Characteristics of Problem Gambling among Other Types of Gamblers

Much of the available literature regarding problem gambling, as reviewed above, addresses issues associated with play on electronic gambling machines in casinos and elsewhere. In order to adapt FLAGS for broader use among gamblers in general a literature search was undertaken. Information regarding the characteristics of those buying scratch lottery tickets, participating in on-course racing, playing casino table games, betting on sports and other internet gaming is much less comprehensive than is the case for electronic gambling machines and casino gambling [but see Holtgraves (2009)]. Investigations assessing internet gaming appears to be the exception, as might be expected, given the rapid rise in this type of leisure activity (Labrie, LaPlante, Nelson, Schumann, & Shaffer, 2007).

SCRATCH LOTTERY TICKETS

The purchase of scratch lottery tickets appears very common in Ontario as well in other jurisdictions where it has been assessed (Papoff & Norris, 2009; Ladd & Petry, 2002; Bakken, Gotestam, Grawe, Wenzel, & Oren, 2009). The relationship between such prevalence and problem gambling is not clear. Hendriks, Meerkerk, Van Oers, & Garretsen (1997) found it to be a low risk form of gambling; in contrast, Griffiths (2002) believed it to be as addictive as other forms of continuous gambling and has referred to it as "paper slot machines". Several Canadian researchers agree with Griffiths' (2002) report (Dickson, Derevensky, & Gupta, 2002; Poulin, 2006; Papoff & Norris, 2009) making this an important group for assessment.

Aryibuddhiphongs (2011) has recently completed an extensive review that describes the history and current knowledge of lottery gambling (LG). Although he acknowledges there are differences in forms of lotteries, (i.e., those with numbers previously printed vs. numbers to be selected vs. scratch tickets), he does not differentiate among these when he describes the theories behind LG. He explains 3 theories:

1) The theory of "judgment under uncertainty" in which gamblers use heuristics first noted by Tversky and Kahneman (1974, 1981). For example, players use the 'representativeness' heuristic in that they select random numbers in the erroneous belief that random numbers appear to be more representative of winning numbers; similarly they use the 'availability' heuristic in that they find it easier to imagine what they would do if they won the lottery than to envision their very slim chances of winning.
2) The theory of demand, developed by Nyman, Welte and Dowd (2008), that suggests the motivation behind LG is associated not only with winning but also with the lack of utility cost associated with the win, (i.e., the person did not have to work for the money).
3) Cognitive theory. In the latter description, he reviews the literature on irrational beliefs as related to LG. It is in this area that the most research on LG has been undertaken. For example, LG players believe that winning numbers are unlikely to be drawn again soon after the win referred to as 'gambler's fallacy' (Clotfelter & Cook, 1993), they are superstitious (Ariyabuddhiphongs & Chanchalermporn, 2007); they have an illusion of control such that they believe their own tickets are more likely to win and they do not wish to exchange them with others (Bar-Hillel & Neter, 1996) and they may also believe in "near misses", i.e., they almost won when their numbers nearly matched the winning combination (Rogers, 1998; Ariyabuddhiphongs & Phengphol 2008).

Other characteristics of scratch players have not been well delineated although it has been suggested that they are more likely to be extroverted (Balabanis, 2002); Frost, Meagher &

Riskind (2001) reported that both lottery and scratch ticket individuals who were identified as pathological gamblers appeared to exhibit more obsessions and compulsions, as well as avoidance behavior compared with other gamblers.

Betting on Horses

As with other forms of gambling, cognitive, behavioural, and personality variables have been postulated to correlate with problem betting on horses. Increased levels of gambling by off-course bettors in Australia were associated primarily with impaired control. Moreover, there was no suggestion that a high degree of sensation seeking was a factor in increased betting, a finding in agreement with other investigations (Blaszczynski, Winter & McConaghy, 1986; Coventry & Brown, 1993). These findings challenge the theory that high arousal and risk taking behaviours contribute to problem gambling (but see Bonnaire, Bungenar and Varescon, 2006, 2009 for an alternative interpretation). Motivational factors such as excitement and a sense of accomplishment have also been associated with increased levels of gambling in on-course betting (Chantal, Valerand & Vallieres, 2001).

Despite evidence to the contrary (Ladouceur, Giroux & Jacques, 1998), betting successfully on horses is often considered to be a game of skill. As such, it has been suggested that gamblers who engage in this activity may have different characteristics than those who play games of chance. The literature does not appear to provide specific support for this hypothesis although, recently, Myreseth, Brunborg and Eidem (2010) found that individuals who bet on horses were among those who had a greater illusion of control compared with gamblers who played slots, bingo and lotteries.

INTERNET GAMBLING

Gambling via the internet is becoming increasingly popular (Labrie, Kaplan, LaPlante, Nelson, & Shaffer, 2007; Griffiths & Park, 2010) with online poker and sports betting among the most common alternatives. Although other opportunities are available, e.g., social network and role playing games (Hussain & Griffiths, 2009; Griffiths & Park, 2010), the literature has focused on the characteristics found to be associated with poker and sports betting in particular.

A number of investigations have indicated that online poker players show many of the characteristics of other kinds of gamblers. For example, Wood, Griffiths and Park (2007) noted that individuals identified as problem poker players (PPGs) played to escape and because they felt lucky and experienced negative mood states after playing. PPGs were also found to be impulsive, prone to boredom, have negative mood states, played longer and tended to dissociate while playing (Hopley & Nicki, 2010). Other studies have examined internet gambling as a whole without differentiating among groups and have described those with problems in terms of excessive time and money spent gambling and mood state disturbances. Some of these studies focused upon sports bettors as well as poker players and other casino games but, in others, the groups were not as defined (Labrie, LaPlante, Nelson,Schumann, & Shaffer, 2007; Lloyd, Hawton, Dutton, Geddes, Goodwin & Rogers, 2010; Beutel, Brahler, Glaesmer, Kuss, Wolfling, Müller, 2011). The majority of these studies have used samples from specific internet gambling sites for analysis. This creates limitations to the interpretation of the data on internet gambling. Our sample is selected from a variety of locations and is augmented by random sampling.

1.1.4. SUMMARY OF LITERATURE

In general, our review of the literature suggests that the characteristics ascribed to problem gamblers playing EGMs, are also present in similar individuals participating in other forms of gambling. In some instances, there may be distinctive features associated with risk in one or more forms of gambling and we have modified our assessment to accommodate this.

1.2 Method

Previously, FLAGS-EGM, a new gambling risk assessment instrument, had been adapted and tested for use with slot machine gambling in Ontario. Detailed method, analysis and rationale were developed and presented in the original study available on the OPGRC website (Schellinck, Schrans, Bliemel, & Schellinck, 2010). The research design and analysis plan were adopted for the current study.

London, Ontario was selected as a test location for the Pilot Study due a number of desirable characteristics including demographic profiles, variety of gaming options available and university and college populations. The previous study with slot machine gamblers had also been conducted in London, Ontario. Focal has a registered satellite office in London with a trained professional support staff able to manage the field portion of the study.

The research was subject to independent ethics approval by the Institutional Review Board Services (IRBS) for the period of study.

1.2.1. Research Design and Methodological Approach

The Pilot Study consisted of four stages:

- Development Phase (April, 2011)
- Generation of the Research Panel (May 2-19,2011; n=1802)
- Phase 1- Qualitative Testing (i.e., Focus Groups (8 groups; n=63; May 19 –June 23, 2011)
- Phase 2- Quantitative Testing (Player Survey (n=1200); June24 - August 8, 2011)

DEVELOPMENT OF UP-DATED FLAGS INSTRUMENT

During the Development Phase the principal investigators updated the literature review for development of an expanded set of items comprising reflective and formative constructs to measure risk and harm suitable for all forms of gambling.

Following the review of the literature, a set of potential items and constructs was developed for ongoing testing and a beta version of the new up-dated FLAGS was created for qualitative testing purposes including 206 items for testing.

GENERATION OF THE RESEARCH PANEL (MAY 2-19, 2011)

The first step was to generate a research panel of regular players for the various forms of gambling available in the province including slot machine gamblers, poker players, sports betting, horse racing, casino table games, and internet gamblers.

For the purposes of the current study a random sample was neither feasible nor necessary in order to address the study objectives; we needed to obtain a sample representative of regular gamblers for various forms of gambling that comprise rare populations at large but in the pilot study we were not looking to generalize results to the population at large. For example, according to the most recent gambling prevalence study in Ontario (Wiebe, Mun, & Kaufman, 2006) with the exception of instant lottery tickets (e.g., Scratch 'n Wins: 8.7%) 2% or less of adults in the province typically take part in any of the high risk forms of gambling on a regular monthly basis (slot machine gambling: 2.2%; casino table games: 1.3%; bingo: 1%; sports betting: 1%; horse racing: 0.5%; online/internet gambling: 0.2%).

In order to find these rare populations, recruiting was initially conducted on-site at relevant gaming venues in the city of London in cooperation with the Ontario Lottery Corporation and augmented through 'snowball' (i.e., referral) methods as well as using social media (Facebook) to enhance participation by adults in specific gambling segments.

From May 2 to May 19 fully trained Focal staff went on-site at various gaming locations in London including the Slots at Western Fair, the Western Fair Raceway, Forest City Bingo Centre and OLG lottery booth and gathered names and telephone numbers for 1606 regular monthly gamblers for various forms of gambling. Given the low occurrence and recruitment of online gamblers, regular sports bettors or regular players that had not yet tried slot machine gambling an additional sample of 196 regular gamblers was gathered through referral methods and cold calling. In total, using convenience sampling this approach generated a research panel of approximately 1802 regular players.[3]

[3] Originally an over-sample of young adults was proposed through recruiting on campus at a local college (Fanshawe College) and university (University of Western Ontario). Due to delays, the project did not start until after the end of the school year pre-empting the option for on-campus recruiting.

PHASE 1- QUALITATIVE TESTING (FOCUS GROUPS; MAY 19 – JUNE 23, 2011

A series of 8 focus groups were conducted to test the relevance and suitability of the existing and up-dated statements for the various different forms of gambling.

Recruiting was conducted from May 19 to 26, 2011 using the research panel comprised of regular players previously consenting to re-contact. Those in treatment for gambling or other related substance use or mental health issues were excluded from participation as were those working for Addiction Services, OLG, or any other gambling provider.

In total, 80 players were recruited to take part in the focus groups conducted May 27 and 28, 2011 at the Radisson Hotel in London Ontario.

Overall 64 players took part in the sessions including:

- Group 1: Scratch 'n Win Players (n=8);
- Group 2: Online Poker Players (n=7);
- Group 3: Online Sports Bettors (n=6);
- Group 4: Bingo Hall Players (n=9);
- Group 5: Horse Race Bettors (n=10);
- Group 6: Other Sports Bettors (e.g., Pro Line, sports pools) (n=7);
- Group 7: Poker Players (e.g., tournament, in-person/off-line games)(n=10);
- Group 8: Casino Table Game Players (n=8)

There were 38 men (59%) and 26 women (41%) who took part in the qualitative assessment of the instrument fairly evenly divided among those age 19-35 years (n=20; 31%), 36 to 55 years (n=20; 31%) and over 55 years of age (n=24; 38%).

Prior to participating in the focus groups players individually completed the Beta version of the up-dated FLAGS instrument.

Participants then took part in focus group discussion for approximately 1.5 hours. Participants referenced a mock brochure during the sessions including sample items from the screen in order to stimulate discussion. All sessions were audio-taped. An independent observer

attended all sessions and a professional note-taker produced transcripts. A triangulation method was used whereby the moderator and the independent observer independently summarized key findings and in the case of any discrepancies a third-party used the sessions notes and audio-tapes to confirm outcomes.

Participants were offered a do-no-harm incentive for a $50 gift certificate to a grocery store or gas station of their choice for taking part in the groups.

The discussion focused on general understanding, comprehension and relevance of each of the items for the various forms of gambling.

The data from the individual surveys was entered into a computer database to conduct preliminary factor analysis, item analysis and structural equation modeling to ensure the structure of the constructs and the severity of the risk associated with each indicator was confirmed.

Principal Component Analysis (PCA) was used to assess and adjust the various constructs (represented by groups of items) comprising the harm and various risk components of the revised instrument.

Items representing the same construct were grouped and, when possible, any items found to be confusing, unclear, or misunderstood were deleted. Those with preferred wording, clarity, and understanding, or that elicited more uniform understanding were retained for further testing.

The feedback from the sessions in conjunction with the preliminary analysis of the Beta version of FLAGS was used to produce a final instrument for testing in the Pilot telephone survey.

An up-dated instrument was pre-tested June 15 – 20, finalized and approved by ethics (IRBS) June 24, 2011. Ethics approval was granted from June 24, 2011 to June 23, 2012.

PHASE 2- QUANTITATIVE TESTING (PLAYER PILOT SURVEY; JUNE 24 - AUGUST 8, 2011)

The Phase 2 quantitative research consisted of a telephone survey administered to the research panel members to determine the effectiveness, validity and reliability of the up-dated FLAGS instrument in capturing risk associated with the various forms of gambling available in Ontario.

The Phase 2 gambling risk survey instrument was comprised of the updated items/constructs identified during Phase 1 of the study.

The statements were randomized for each participant to reduce the risk of common method bias (Bliemel & Hassanein, 2007).

The survey took approximately 20-30 minutes to administer.

Informed consent was obtained from potential respondents before initiating any data collection. This included full disclosure of privacy and confidentiality of the survey data; the voluntary nature of participation and right to withdraw consent at any time throughout the process; survey length; contact information for Focal Research; and, contact information for authorized client project personnel (e.g. toll-free number, email, Project Manager).

Participants who were currently receiving treatment or services for substance use, gambling, or a mental health issue were excluded from taking part, as well those who indicated they worked for the media, a political or lobby group, Addiction Services, Ontario Lottery Gaming, or an affiliate.

Referral information for assistance and/or information regarding gambling and gambling problems was provided to all individuals during the interview.

In total 1223 surveys were completed representing a completion rate of 67.7% among those consenting to join the research panel. All surveys were 100% edited and a random quality control check was conducted whereby 15% of completed surveys were re-contacted to verify key data points.

1.3 Limitations

The proposed study is qualitative and quantitative in nature and comprised of a large sample of regular gamblers that is suitable for refining instrument design and development. However, the sample is not a true random sample and estimates associated with use of the new instrument (i.e., estimates of problem gambling, gambling harm and risk) cannot be generalized to the population of gamblers at-large. Moreover, additional research will be required to assess test re-test reliability and screen performance for those in the general population as well as those both within and outside of Ontario.

2.0 Results

2.1 Player Segment Selection process

Six player segments were created for purposes of testing the statements on different types of gamblers. The segments were created based on a respondent's regular involvement in specific gaming activities (i.e., once a month or more). Holtgraves (2009) had found that internet gambling, betting on sports and horse races formed one factor and that lotteries, raffles, slots and bingo formed a second factor. Therefore, we felt it was important to focus specifically on these forms of gambling in addition to regular slot machine gamblers; regular slot players (n=824), regular purchasers of instant lottery tickets (n=636) and regular bingo players (n=185). A fourth segment was comprised of those who regularly gambled on sports and/or any form of animal racing (n=154). The fifth segment was comprised of those who regularly gambled on the internet, gambled at the tables at casinos and/or played poker for money (n=120).

A sixth sample was formed that included only those who gambled on the internet, bet on sports and racing, played the tables, and played poker, but did not play the slots (n=98). In 2009 Holtgraves had found this segment of players to be distinctive from those who played slot machines. As FLAGS had originally been developed for machine gamblers we felt it was important to test the modified version with this specific segment of players. In the current study we refer to this player segment as the Strategic Gambling segment as our research showed that these forms of gambling attracted gamblers who tended to use strategies while gambling in order to improve the likelihood of winning.

2.2 Statement Selection Process

The survey questionnaire initially contained 162 candidate statements for inclusion in the general FLAGS instrument. These statements had come out of the qualitative phase of the study and were grouped into 31 reflective constructs and one formative construct covering a wide range of possible risk indicators. Each construct consisted of between four and six statements which allowed an option for deleting one or two statements from a construct in the

event factor analysis indicated a poor fit between any of the statements comprising the construct.

There were four types of analyses used to assist in the statement selection process.

First, frequency analysis was conducted for each of the six player segments and statements that had fewer than five responses in the segment were eliminated. Though these may be valid statements for inclusion in FLAGS the low response suggests they would not play a significant role in identifying At Risk gamblers. Moreover, the statistical techniques used to evaluate the statements required a minimum of five responses per statement for the analysis to be appropriate. Additionally, statements that were close to each other in percentage agreement were selected for inclusion in the same reflective construct if possible.

Second, correlation of the statements with the PGSI score for each of the six player segments was used as a criterion for selection. Statements with a significant correlation to the PGSI score within each of the player segments would be selected over those with few significant correlations.

Third, factor analysis was conducted on each of the 31 reflective constructs over the six player segments and those statements with consistently low loadings were dropped from the constructs. Those that consistently loaded highly over the six segments were more likely to be chosen for inclusion in the final list of statements. In accordance with recommendations for formative constructs, Henseler, Ringle, and Sinkovics (2009) who said that in the end the researcher has to select statements that make sense from a theoretical perspective, we selected orphan statements that did not load highly on any of the factors but were significantly related to problem gambling and seemed to be measuring a distinctive characteristic.

Formative constructs were built by selecting one statement from each of the original reflective constructs as well as relevant orphan statements identified during this phase of the analysis.

The five reflective constructs were pared down to four statements for purposes of testing for discriminant validity and reliability as well as for input into structural equation modeling.

The fourth analysis used for statement selection was the test for discriminant validity. It was expected that the validation testing of both types of constructs would help further define the constructs. This proved to be true with one statement dropped from each of Impaired Control: Begin Play, Preoccupation: Desire and Persistence leaving each construct with three statements. This process produced 60 statements for testing in the structural equation modeling phase of the analysis.

For a more detailed description of the techniques used to derive the final list of statements refer to Schellinck, Schrans, Bliemel and Schellinck (2010).

The output from the analysis generated a large number of tables that will be available for downloading and/or upon request on the website at the Ontario Problem Gambling Research Centre, the Ministry of Health and Long-term Care and at focalresearch.com following release of the report.

2.3 Testing the Reliability and Discriminant Validity of the Reflective Constructs

The reliability and validity of the five reflective measures were tested using methods appropriate for assessing reflective constructs (Bollen and Lennox 1999). The first measure reported in the top of each cell in Table 3 was Cronbach's Alpha; scores above 0.6 are questionable, above 0.7 are acceptable, above 0.8 are good and above 0.9 are excellent (Cortina 1993).

The scores for Preoccupation: Desire were found to range from acceptable to good in all players segments. Preoccupation: Obsession was acceptable in the first four segments and scored as excellent in Sports/Racing and the Strategic Gambling segments. Impaired Control: Continue rated good in all segments, Impaired Control: Begin achieved a questionable score within the Slot, Instant Lottery and Bingo segments and was found to be acceptable in the other segments. Persistence scored primarily as in the good range.

The lower number displayed in each cell represents the component reliability score. All five

constructs had a component reliability well above the recommended level of 0.70 (Nunnally, 1978) for all six player segments indicating sufficient internal consistency.

Table 3: Measures of Reliability: Cronbach's Alpha and Composite Reliability

Alpha Component Reliability	Slots N=826	Instant Lottery N=636	Bingo Hall N=185	Internet/ Tables/ Poker N=120	Sports/ Racing N=154	Strategic Gambling N=98
Preoccupation Desire	0.71 0.84	0.73 0.85	0.84 0.90	0.75 0.86	0.73 0.85	0.84 0.90
Preoccupation Obsession	0.77 0.84	0.76 0.85	0.74 0.84	0.74 0.84	0.94 0.96	0.98 0.98
Impaired Control Continue	0.80 0.87	0.80 0.87	0.87 0.91	0.81 0.88	0.81 0.86	0.81 0.88
Impaired Control Begin	0.64 0.81	0.63 0.80	0.67 0.82	0.78 0.87	0.74 0.85	0.75 0.86
Persistence	0.82 0.89	0.78 0.87	0.85 0.90	0.87 0.92	0.83 0.90	0.87 0.92

In Table 4 in all six player segments the five reflective constructs were found to perform above the guideline of 0.5 average variance extracted (AVE) recommended by Fornell and Larcker (1981) for indicating convergent validity.

Table 4: Convergent Validity: Average Variance Extracted

AVE Average Variance Extracted	Slots N=826	Instant Lottery N=636	Bingo Hall N=185	Internet/ Tables/ Poker N=120	Sports /Racing N=154	Strategic Gambling N=98
Preoccupation Desire	0.63	0.65	0.76	0.66	0.65	0.75
Preoccupation Obsession	0.59	0.58	0.56	0.57	0.85	0.93
Impaired Control Continue	0.62	0.62	0.72	0.64	0.64	0.65
Impaired Control Begin	0.58	0.57	0.60	0.69	0.65	0.67
Persistence	0.73	0.69	0.76	0.80	0.75	0.79

The discriminant validity of the five reflective constructs was evaluated using two approaches.

The first approach compared the square root of the Average Variance Extracted (AVE) to the inter-construct correlations. Adequate discriminant validity was indicated if the square root of the construct's AVE was greater than its correlations with the other constructs (Compeau et al. 1999). Diagonal matrices testing the constructs for each player segment were produced and are available for download or upon request. Table 5 below presents instead the conclusions drawn from each analysis and shows that all constructs passed the test for all six segments.

Table 5: Results of Square Root of AVE and Inter-construct Correlations to Test for Divergent Validity

Construct	Slots N=826	Instant Lottery N=636	Bingo Hall N=185	Internet/ Tables/ Poker N=120	Sports/ Racing N=154	Strategic Gambling N=98
Preoccupation Desire	X	X	X	X	X	X
Preoccupation Obsession	X	X	X	X	X	X
Impaired Control Continue	X	X	X	X	X	X
Impaired Control Begin	X	X	X	X	X	X
Persistence	X	X	X	X	X	X

X means the square root of the Average Variance Explained (AVE) was greater than the inter-construct correlations with the remaining reflective constructs

Gefen and Straub (2005) have suggested a second approach that compares the correlations between the individual items and the PLS calculated construct scores. In order for the construct to have discriminant validity the item loadings for the reflective construct must be greater (i.e., greater by 0.10) than the construct's correlations with the other items. The advantage of this test is that the validity of individual statements can be evaluated along with the construct as a whole.

The five constructs proved to have discriminant validity in five of the segments (Table 6). In the Bingo player segment the Impaired Control: Begin Play statement "If I have the opportunity to gamble I can't stop myself from taking it." loaded 0.77 on its construct compared to 0.70 on the Preoccupation: Desire construct suggesting a lack of discriminate validity between the two

constructs. Given this was the only segment where this occurred, we decided to retain the statement in the construct.

Table 6: Results of Tests of Factor Loadings to Measure Discriminant Validity of Reflective Constructs

Construct	Slots N=826	Instant Lottery N=636	Bingo Hall N=185	Internet/ Tables/ Poker N=120	Sports/ Racing N=154	Strategic Gambling N=98
Preoccupation Desire	X	X	X	X	X	X
Preoccupation Obsession	X	X	X	X	X	X
Impaired Control Continue	X	X	X	X	X	X
Impaired Control Begin	X	X	Preocc Desire	X	X	X
Persistence	X	X	X	X	X	X

X means the factor loadings for the constructs were at least 0.10 higher than the cross loadings on the remaining reflective constructs.

2.4 Formative Construct Validity

We measured nomological validity where the relationships between the formative index and other constructs in the path model, which are sufficiently well known through prior research, are strong and significant (Henseler, Ringle, and Sinkovics 2009, page 309). In the context of PLS modeling this means that relationships found to exist in the past and hypothesised to exist in the current study should emerge as significant. Two previous studies have been conducted using the five formative constructs in this instrument (Schellinck, Schrans, Bliemel & Schellinck 2010; Schellinck Schrans Chen & Chambers 2010) permitting hypothesis to be developed.

Table 7 below presents the coefficients and associated t scores found for the six segments. All formative constructs in all six segments were significantly related to at least one other construct as hypothesised and, therefore, have sufficient nomological validity for inclusion in the model.

It is recommended that manifest variables in a formative block be tested for multicolinearity using the variance inflation factor (VIF) (Henseler, Ringle, and Sinkovics 2009). As a rule of thumb, a VIF greater than ten indicates the presence of harmful colinearity. Table 7 below presents the VIF scores for the statements in the five formative constructs for each of the six player segments.

Table 7: Variance Inflation Factor Test for Multicolinearity within Formative Constructs

Construct Statements	Slots N=824	Instant Lottery N=636	Bingo Hall N=185	Internet/ Tables/ Poker N=120	Sports/ Racing N=154	Strategic Gambling N=98
Beliefs						
Belief1	1.12	1.18	1.25	1.55	1.42	1.39
Belief2	1.15	1.27	1.30	1.69	1.55	1.48
Belief3	1.06	1.13	1.16	1.18	1.15	1.20
Belief4	1.15	1.32	1.25	2.18	1.54	1.74
Belief5	1.13	1.18	1.17	1.43	1.31	1.39
Belief6	1.16	1.32	1.42	1.80	1.60	1.68
Belief7	1.08	1.12	1.13	1.16	1.20	1.20
Belief8	1.11	1.12	1.23	1.34	1.26	1.29
Belief9	1.09	1.12	1.27	1.11	1.15	1.14
Motives						
Motive1	1.16	1.23	1.29	1.22	1.21	1.25
Motive2	1.22	1.21	1.34	1.37	1.32	1.34
Motive3	1.44	1.38	1.64	1.59	1.54	1.53
Motive4	1.41	1.41	1.54	1.42	1.54	1.53
Motive5	1.21	1.16	1.47	1.38	1.33	1.26
Motive6	1.15	1.22	1.43	1.18	1.36	1.35
Motive7	1.23	1.31	1.56	1.32	1.38	1.38
Risky Practices Earlier						
RPE1	1.31	1.40	1.76	1.45	1.42	1.44
RPE2	1.22	1.20	1.33	1.24	1.39	1.30
RPE3	1.30	1.42	1.76	1.84	1.61	1.66
RPE4	1.23	1.22	1.38	1.36	1.40	1.41
RPE5	1.16	1.17	1.30	1.19	1.22	1.20
RPE6	1.17	1.21	1.21	1.28	1.27	1.37

Construct Statements	Slots N=824	Instant Lottery N=636	Bingo Hall N=185	Internet/ Tables/ Poker N=120	Sports/ Racing N=154	Strategic Gambling N=98
Risky Practices Later						
RBL1	1.41	1.47	1.68	1.92	1.61	1.59
RBL2	1.21	1.27	1.62	1.48	1.49	1.48
RBL3	1.38	1.48	1.61	1.59	1.41	1.44
RBL4	1.41	1.39	1.74	2.74	1.82	1.86
RBL5	1.16	1.32	1.66	1.20	1.51	1.48
RBL6	1.17	1.27	1.57	1.35	1.25	1.34
RBL7	1.64	1.71	2.06	2.16	1.87	1.82
RBL8	1.21	1.17	1.25	1.56	1.65	1.48
RBL9	1.16	1.26	1.37	1.25	1.20	1.22
Negative Consequences						
Consequence1	2.02	1.65	4.93	2.86	4.41	3.20
Consequence2	2.47	2.38	3.73	3.60	3.32	3.28
Consequence3	1.92	1.96	10.37	2.11	4.35	3.27
Consequence4	2.79	2.07	3.18	2.50	4.51	4.24
Consequence5	1.95	1.96	2.74	2.62	2.93	3.13
Consequence6	2.15	2.22	6.90	5.36	4.69	4.80
Consequence7	2.54	2.39	8.95	5.48	5.46	4.88
Consequence8	1.55	1.79	4.16	3.35	1.96	2.03
Consequence9	2.26	2.55	7.52	1.73	2.95	2.63
Consequence10	1.65	1.83	4.54	2.77	2.79	2.39
Consequence11	2.35	2.51	5.24	4.76	2.99	3.18
Consequence12	1.63	1.96	3.21	2.34	2.14	2.03

Only one statement (Consequence3: *My performance at work was negatively affected by my gambling*) in the Bingo player segment has a score above the recommended cut-off of 10.0 (Henseler, Ringle, and Sinkovics 2009) which indicates that for the most part the constructs perform as expected in the six player segments.

2.5 Structural Equation Modeling (SEM) Results

The model was designed based on the findings of previous research conducted when developing, and testing the FLAGS egm. There were 18 path coefficients identified in the original FLAGS egm report (Schellinck, Schrans, Bliemel, & Schellinck, 2010). Subsequent testing of the model using a sample of 500 Nova Scotia VLT players confirmed seventeen of the coefficients and found partial support for the eighteenth (Schellinck, Schrans, Chen, & Chambers, 2010). In the current study we tested the model on the six segments to determine its viability for application to those who participate in the various forms of gambling. Table 8 presents the path coefficient and the t score (minimum 1.84 for 95% CL, one tailed test) for each model (based on 2000 bootstrap runs).

Table 8: Nomological Validity of Constructs: Significant Path Coefficients

Construct Paths	Slots N=824	Instant Lottery N=636	Bingo Hall N=185	Internet/ Tables/ Poker N=120	Sports/ Racing N=154	Strategic Gambling N=98
Beliefs → Motives	0.567 (17.85)	0.588 (15.66)	0.600 (9.82)	0.642 (8.75)	0.633 (10.34)	0.615 (7.05)
Motives →Preocc Desire	0.436 (11.66)	0.525 (12.58)	0.612 (8.54)	0.558 (7.33)	0.617 (9.06)	0.722 (12.68)
Motives →RPE	0.304 (8.87)	0.237 (6.97)	0.230 (3.73)	0.280 (2.33)	0.419 (6.51)	0.300 (2.29)
Motives → Preocc Obsession	0.286 (6.23)	0.279 (4.66)	0.482 (4.52)	0.370 (3.23)	0.285 (3.12)	0.509 (3.24)
Motives → RPL	0.289 (7.29)	0.369 (7.93)	0.306 (3.80)	0.254 (2.99)	0.240 (3.09)	NS
Preocc Desire → ICCP	0.494 (14.19)	0.534 (12.89)	0.639 (10.06)	0.490 (5.93)	0.563 (7.76)	0.721 (8.76)
Preocc Desire → Preocc Obsession	0.383 (8.14)	0.374 (7.49)	0.299 (3.64)	0.276 (2.85)	0.430 (4.90)	NS
ICCP → ICBP	0.529 (14.12)	0.559 (13.63)	0.554 (7.25)	0.529 (5.94)	0.454 (4.84)	0.657 (12.25)
ICCP → RPE	0.536 (16.66)	0.602 (15.30)	0.657 (10.74)	0.594 (7.49)	0.492 (7.78)	0.621 (5.44)
RPE → RPL	0.292 (7.89)	0.249 (5.10)	0.187 (2.09)	0.352 (3.87)	0.404 (4.20)	0.468 (5.62)

Construct Paths	Slots N=824	Instant Lottery N=636	Bingo Hall N=185	Internet/ Tables/ Poker N=120	Sports/ Racing N=154	Strategic Gambling N=98
RPE → Persistence	NS	NS	NS	NS	NS	NS
ICBP → Consequences	0.237 (4.46)	0.308 (4.61)	NS	0.318 (2.10)	NS	0.444 (2.54)
ICBP →RPL	0.255 (5.95)	0.255 (5.01)	0.232 (2.48)	0.369 (3.60)	0.351 (4.06)	0.483 (4.99)
Preocc Obsession → ICBP	0.300 (6.18)	0.273 (5.38)	0.355 (4.63)	0.382 (3.91)	0.413 (4.28)	0.238 (2.20)
Preocc Obsession → RPL	0.170 (3.37)	0.115 (2.22)	0.297 (2.20)	NS	NS	NS
Preocc Obsession → Persistence	NS	NS	NS	NS	NS	NS
RPL → Consequences	0.586 (12.10)	0.567 (11.39)	0.923 (23.63)	0.559 (5.22)	0.842 (17.00)	0.413 (2.24)
Consequences → Persistence	0.817 (36.36)	0.858 (30.72)	0.852 (15.41)	0.912 (22.73)	0.898 (24.71)	0.899 (21.51)

Based on the results of the previous FLAGS egm study we improved the persistence measure so that it was aligned more closely to Negative Consequences. We believe that introduction of this change impacted the association between Preoccupation: Obsession and Risky Practices: Earlier and Persistence accounting for the lack of influence found between these constructs and Persistence. Of the remaining sixteen hypothesised paths, all were confirmed in the slots and instant lottery player segments; fifteen were confirmed in the Bingo and Internet/Tables/Poker player segments; fourteen in the Sports or Racing segment; and, thirteen in the Strategic Gambling segment. The models for each of the player segments retain their same basic structure with the key paths significant in all player segments.

To be useful as risk measures the constructs should all make a significant contribution to problem gambling through the paths that lead to Negative Consequences.

Table 9 below presents the total effects results illustrating the contribution of each construct in explaining the Negative Consequences score. The results suggest that efforts to minimize risk would focus more on those indicators that make a major contribution to problem gambling.

Table 9: Total Effects of Constructs on experiencing negative consequences

Constructs	Slots	Instant Lottery	Bingo	Sports Racing	Internet Tables Poker	Strategic Forms
Beliefs	0.22	0.25	0.39	0.33	0.26	0.27
Motives	0.38	0.43	0.65	0.52	0.41	0.43
Preocc Desire	0.23	0.25	0.25	0.22	0.25	0.41
IC Continue Play	0.30	0.34	0.23	0.30	0.39	0.54
Preocc Obsession	0.21	0.19	0.35	0.12	0.20	0.15
Risky Behavior Early	0.17	0.14	0.17	0.34	0.20	0.19
IC Begin Play	0.39	0.45	0.21	0.30	0.52	0.64
Risky Behavior Later	0.59	0.57	0.92	0.84	0.56	0.41

All constructs make a contribution to Negative Consequences though the size of the effect varies somewhat among the segments suggesting a campaign aimed at specific player types may target different indicators. We have highlighted those cells with effects greater than 0.40 in order to focus on those aspects that are more predictive of experiencing Negative Consequences, and therefore, deserving of attention. Risky Behaviour: Later and Impaired Control: Begin Play were important for several segments. Risky Cognitions: Motives, an earlier indicator, is important for most segments as well. For those who play strategic forms of gambling Preoccupation: Desire and Impaired Control: Continue Play also strongly influence the experience of Negative Consequences.

2.6 Setting Criterion levels for Constructs as Indicators

The procedure for scoring an individual on the FLAGS instrument involves summing the number of positive responses to the statements in a particular construct and then determining if the sum is greater than a predetermined cut-off point. If the sum exceeds the threshold the gambler is said to have an indication of risk on that criterion. Therefore, it is necessary to determine the cut-off point that will assign the gambler with an acceptable degree of accuracy.

We used Receiver Operating Characteristic (ROC) analysis to determine the optimal cut-off for each construct (see Metz (2006) for a description and review of the process). (See Currie et al (2006) for an application of ROC analysis in the gambling field and Conigrave et al (1995) for an application in the alcohol field.)

The first step in ROC analysis is to specify a state variable and a state value against which the sum score will be tested. For example, the PGSI score could act as a state variable recoded such that any score of 8 or more is coded a 1 and anything less is coded as 0. The sum score is evaluated at each value to assess its predictive power in terms of sensitivity (i.e., percent of target value identified) and 1-specificity which is the percent incorrectly classified (i.e., false positives). Conigrave et al (1995) indicate that the point in the ROC analysis where the chi-square test score is maximized provides the optimal cut-off point. However, we chose to minimize the percent of false positives over sensitivity as we feel there may be significant stigmatization in being labelled as a problem gambler and the instrument is being developed to be self administered. For that reason, although we attempt to maximize sensitivity, minimizing 1-specificity was the priority.

Lower risk constructs such as Risky Cognitions: Beliefs were not expected to predict problem gambling directly with a high degree of accuracy. We therefore used the results of the PLS analysis to select state variables to which the construct in question was directly connected. The state variable chosen for each construct is listed in Table 10.

Table 10: Results of ROC Analysis for Ten FLAGS Constructs

Construct	State Variable	Cut-Off Chosen	% Indicated	Sensitivity	1-Specificity (False Positives)
Persistence	PGSI 8+	2	5.2%	65.1%	3.0%
Negative Consequences	PGSI 8+	3	6.5%	79.1%	3.9%
Preoccupation: Obsession	FLAGS PG	2	2.3%	36.0%	0.9%
Impaired Control: Begin	FLAGS PG	2	7.1%	74.0%	4.3%

Construct	State Variable	Cut-Off Chosen	% Indicated	Sensitivity	1-Specificity (False Positives)
Risky Practices: Later	FLAGS PG	3	11.1%	90.0%	7.7%
Risky Practices: Earlier	FLAGS Risky Beh: Later	3	14.3%	69.6%	7.9%
Impaired Control: Continue	FLAGS Risky Beh: Earlier	2	20.0%	73.3%	10.8%
Preoccupation: Desire	FLAGS Preocc Obsession	2	10.3%	92.9%	8.4%
Risky Cognitions: Motives	FLAGS Risky Beh Earlier	2	19.9%	62.2%	12.6%
Risky Cognitions: Beliefs	FLAGS Risky Cog: Motives	3	22.2%	54.3%	14.3%

Four of the five formative constructs have cut-offs of 3 while all the reflective constructs and Risky Cognitions: Motives have a cut-off of 2. As would be expected the percent indicated as at risk by the construct tends to be larger for lower risk constructs.

2.7 Determining the Hierarchy (Sequential Order) of the Constructs

In Schellinck, Schrans, Bliemel, and Schellinck (2010) the order of the constructs in the path toward problem gambling was determined based on two empirical analyses. First, the PLS modeling determined a structure where the directionality of the paths was tested. Second, statements were assigned a hierarchy measure that provided an indication of how far along the path gamblers were who answered each statement.

The hierarchy measure was based on the approach taken by Toce-Gerstein, et al. (2003) who formed a hierarchy of gambling disorders based upon an average number of criteria met by gamblers. The number of criteria met establishes an individual's placement in the hierarchy such that those gamblers who triggered on more criteria were rated higher in the hierarchy for disordered gambling whereas those triggering on few criteria fall lower in the hierarchy.

A similar approach and logic was used to place statements rather than gamblers in a hierarchy. It is assumed that those players falling further along the gambling disorder hierarchy will meet more of the criteria and thus will respond positively to more of the questions. Therefore, we say that a statement is associated with elevated levels of risk if it is a criterion selected by those who meet a larger number of criteria. Conversely, a statement that is answered by those who meet relatively few criteria is low in the hierarchy. Thus, to define an "early indicator" of risk we assumed that those who answered 'yes' to only a few statements were early on in their path to problem gambling. This approach assumes an ordinal relationship between the number of indicators and degree of risk for problem gambling.

The hierarchy scores reported here are based on the total sample and the sixty statements that comprised the final version of FLAGS. Table 11 presents the mean hierarchy score and the median hierarchy ranking, ordered by mean hierarchy score from lowest to highest. The scores on the individual statements ranged from 8.94 (the person who answered "yes" to this statement on average answered "yes" to 8.94 statements out of 60) to 38.94.

Table 11: Average Hierarchy Scores across Construct Items

Constructs	Mean Hierarchy Score	Median Hierarchy Ranking
Risky Cognitions: Beliefs	14.29	8
Risky Behaviours: Early	16.24	12.5
Impaired Control: Continue Play	18.45	19
Risky Cognitions: Motives	18.54	25
Preoccupation: Desire	18.82	22
Risky Behaviours: Later	21.86	34
Impaired Control: Begin Play	23.05	38
Persistence	29.66	47
Negative Consequences	32.30	53
Preoccupation: Obsession	32.80	52.5

The order found in the current study was very similar to that found in the FLAGS egm study with the exception that Preoccupation: Obsession scored highest versus a sixth highest rank in the FLAGS egm study. However, in the previous study this construct was considered to be indicative of high risk with recommendations made to improve the individual items comprising the construct in future testing. As a result, there were no differences between the role of the construct in assigning gamblers to the advanced risk category; in both studies Preoccupation: Obsession was treated as an advanced risk indicator.

2.8 Procedure for the Scoring of FLAGS

We assigned gamblers to problem or risk levels based on their 'state of mind' (e.g., cognitions, preoccupation, and impaired control) and experiences (e.g., behaviours, consequences). Thus, a gambler must meet certain conditions before he/she qualifies for a specific category of risk. Based on the definition provided by the APA (2000) Problem Gamblers were those who had indications of having suffered Negative Consequences and having an indication of Persistence in their gambling.

Gamblers who had indications on Impaired Control: Begin, Risky Practices: Later, and Preoccupation: Obsessed, were assigned to the Advanced Risk category. These constructs were

chosen due to their direct connection to Negative Consequences in the PLS model or, in the case of Impaired Control: Obsession, received a very high hierarchy score (32.80). Impaired Control: Begin and Risky Behaviours: Later also received high average hierarchy scores of 23.05 and 21.86 respectively. Gamblers who had an indication of Negative Consequences or Persistence (but not both as this would have assigned them to the Problem Gambler category) were also assigned to the Advanced Risk category.

When assigning constructs to the early and intermediate risk categories the underlying assumption was that it is easier to influence gamblers before they start risky practices based on their motives, beliefs or desires. Thus, we want to identify gamblers with risk indications prior to their adoption of risky practices in order to maximize the chances of successfully influencing them, or helping them to self reduce their risk levels. Two constructs were designated as intermediate risk indicators; Impaired Control: Continue and Risky Practices: Earlier. Both were low to mid-range in terms of average hierarchy scores, with median ranks of 12.5 and 19 (Table 11), and both had significant paths to advanced risk constructs in all the PLS models (Table 6).

The three remaining constructs, Risky Cognitions: Beliefs, Risky Cognitions: Motives and Preoccupation: Desire had low to medium hierarchy scores and in all the PLS models were connected by significant paths to the constructs comprising the intermediate risk category. Based on these results, we adopted the following criteria for classifying machine gamblers to one of five levels of risk for problem gambling (see Figure 1).

Figure 1: FLAGS Five Levels of Player Risk for Machine Gambling

Risk Level	Label	Description
Level V	Problem Gambler	A Problem Gambler is a person who flagged as exhibiting both Negative Consequences and Persistence and is characterized as having experienced harm in association with their gambling.
Level IV	Advanced Risk (High Risk – Problematic)	Those at Advanced Risk are not flagging as a problem gambler (i.e., do not score on both Negative Consequence and Persistence) but have one or more indications on the five constructs ranked highest in the hierarchy score and are directly connected to either Negative Consequences or Persistence. Three of these constructs are Impaired Control: Begin, Preoccupation: Obsessed and Risky Practices: Later. Negative Consequences and Persistence are included as it is possible that a person only flagged on one of these constructs and, therefore, has not (yet) reached the threshold for identification as a problem gambler. Those at Advanced Risk may or may be experiencing harm.
Level III	Intermediate Risk	Those at Intermediate Risk are not Problem or Advanced Risk gamblers, but have been flagged on one or more of the medium risk constructs. The Intermediate Risk constructs are Impaired Control: Continue and Risky Practices: Earlier. Intermediate Risk Gamblers are not triggering on negative consequences or exhibiting signs of persistence. While positioned higher in the risk hierarchy than the Early Risk group these players are comprised of those at pre-harm risk levels.
Level II	Early Risk	Those at Early Risk have flagged on at least one of Risky Cognitions: Beliefs, Risky Cognitions: Motives or Preoccupation: Desire but are not triggering for high-risk or problem gambling, and thus are also characterized as a pre-harm risk group.
Level I	No Detectable Risk	Those at No Detectable Risk do not flag on any of the risk indicators although it is possible that they answered yes to one or more statements making up some of the constructs. For those who answered yes to at least one statement there was insufficient certainty for us to say there was an indication on one of the dimensions. These people may still have unobservable or latent characteristics that would make them susceptible to becoming a problem gambler should the right conditions exist.
Level 0	Non-Gambler	FLAGS instrument categorizes a person's risk based on their perceptions about and behaviours associated with gambling. It cannot therefore categorize a person's risk if they do not have gambling experience within the last year. There is a long list of correlates that have been shown to be associated with risk of problem gambling that we have left out of FLAGS that if possessed by an individual could indicate risk for problem gambling should they start to gamble. It was decided that in order to keep the instrument to a reasonable size its constructs would only be gambling specific; from the point of view of FLAGS these risk factors are therefore latent or unobservable.

2.9 Profile of FLAGS Risk Categories

Table 12 presents the mean number of indicators out of ten that were triggered by those gamblers assigned to each risk category. The mean number of indicators roughly doubles with each increase in risk level; with Problem Gamblers averaging 8.06 out of the possible ten indicators.

Table 12: Mean Number of Indications by FLAGS Risk/PG Segments

Risk Categories	Mean Indicators	Std. Deviation	N
All Gamblers	1.19	2.11	1223
No Detectable Risk	0.00	0.00	723
Early Risk	1.27	0.49	180
Intermediate Risk	1.96	0.98	141
Advanced Risk	4.27	1.76	129
Problem Gamblers	8.06	1.73	50

Table 13 presents the FLAGS risk profile for gamblers in each of the six player segments and Table 14 presents the average number of gambling types in which the members of each segment participated regularly over the last year. Given the overlap in segment membership, it is not possible to conduct a statistical test for differences in the distributions. However, it appears that those in the Internet/Tables/Poker and Sports/Racing segments were at higher risk (31.7% and 31.1% at Advanced Risk or Problem Gamblers respectively compared to 16.8% - 22.4% for the other four segments). While players in each of the two groups participated in these specific types of gambling many of them also participated in Slots play (63.3% for the Internet/Tables/Poker segment and 58.8% for Sports/Racing segment) suggesting these combinations are associated with higher risk. While these two segments had a similar risk distribution this outcome is not likely due to overlap in membership; of those who belong to either segment, only 17.6% are members of both segments.

It might also be assumed that the increased risk is due to their participation in more forms of gambling as suggested by Holtgraves (2009). Members of both segments do tend to participate

in more types of gambling (3.38 and 3.10 compared to 2.11 – 2.47 for members of three of the other segments) but those who regularly played bingo also participated in a larger number of different gambling types (3.61). Thus, the relationship between participation in more types of gambling and risk due to gambling is not clear from this data and cannot be used to explain the increased risk observed for these two player segments.

Table 13: FLAGS Gambling Risk Profile by Sub-Segment

Risk Categories	% of Sample N=1223	Regular Slot N=824	Regular Instant N=636	Regular Bingo N=185	Internet Tables Poker N=120	Sports Racing N=154	Not Slots Strategic N=98
No Detectable Risk	59.1%	53.4%	54.4%	54.6%	37.5%	41.6%	56.1%
Early Risk	14.7%	15.2%	15.9%	16.2%	23.3%	20.8%	18.4%
Intermediate Risk	11.5%	14.7%	13.1%	10.8%	7.5%	6.5%	3.1%
Advanced Risk	10.5%	11.8%	11.9%	12.4%	21.7%	21.4%	16.3%
Problem Gamblers	4.1%	5.0%	4.7%	5.9%	10.0%	9.7%	6.1%

Table 14: Number of Gambling Types Played Regularly

Risk Categories	% of Sample N=1223	Regular Slot N=824	Regular Instant N=636	Regular Bingo N=185	Internet Tables Poker N=120	Sports Racing N=154	Not Slots Strategic N=98
Mean	1.93	2.17	2.47	3.61	3.38	3.10	2.11
St Dev	1.09	1.10	1.05	1.09	1.46	1.54	0.93

Table 15: Percent of FLAGS Risk/PG Segments with Specific Indications of Risk

Constructs	All Gamblers N=1223	No Detectable Risk N=723	Early Risk N=180	Intermediate Risk N=141	Advanced Risk N=129	Problem Gambler N=50
Persistence	5.2%	0.0%	0.0%	0.0%	10.1%	100%
Negative Consequences	6.5%	0.0%	0.0%	0.0%	23.3%	100%
Preoccupation: Obsession	2.3%	0.0%	0.0%	0.0%	7.8%	36.0%
Impaired Control: Begin	7.1%	0.0%	0.0%	0.0%	38.8%	74.0%
Risky Practices: Later	11.1%	0.0%	0.0%%	0.0%	69.8%	90.0%
Risky Practices: Earlier	14.3%	0.0%	0.0%	47.5%	55.8%	82.0%
Impaired Control: Continue	20.0%	0.0%	0.0%	75.9%	70.5%	94.0%
Preoccupation: Desire	10.3%	0.0%	16.7%%	14.2%%	34.1%	64.0%
Risky Cognitions: Motives	19.9%	0.0%	42.2 %	28.4%	62.0%	94.0%
Risky Cognitions: Beliefs	22.2%	0.0%	68.3%	29.8%	55.0%	72.0%

Table 15 provides a profile of the five FLAGS risk categories on the ten risk indicators. Indications of Risky Cognitions Beliefs (68.3%) were associated with the majority of those at the early risk stage, followed by Risky Cognitions: Motives at 42.2%. The role of the cognitive indicators was greatly reduced in the Intermediate Risk segment while indications of Impaired Control: Continue at 75.9% and Risky Practices: Earlier at 47.5% were more common. Similar results were found in the FLAGS egm risk profiles where the intermediate risk gamblers had substantially fewer risky cognitions and were mainly characterized as having Risky Practices Earlier and Impaired Control: Continue Playing. We speculated that this indicated gamblers take either a path toward problem gambling due to risky cognitions or one that results from risky play practices and may be due to conditioning that leads to impaired control.

For those in the Advanced Risk segment the most common indications were Risky Cognitions: Beliefs and Motives, Impaired Control: Continue, and Risky Practices both Earlier and Later. Interestingly, some in this segment had indications of experiencing Negative Consequence and a few claim to be persisting in their gambling despite suffering negative consequences. There were very few indications of Preoccupation: Obsession in the Advanced Risk segment. By definition, all those identified as Problem Gamblers must have indications of Negative Consequences and Persistence, but most also tripped on the other eight indicators (64.0% to 94.0%) with the exception of Preoccupation: Obsession at 36.0%.

Table 16: Overlap in Classification by Risk Categories between FLAGS and PGSI

PGSI Categories	FLAGS Categories					
	No Detected Risk	Early Risk	Inter-mediate Risk	Advanced Risk	Problem Gambler	Total
No Risk	47.9%	7.8%	3.4%	1.4%	0.2%	60.7%
Low Risk	9.8%	5.6%	4.7%	2.9%	0.2%	23.1%
Medium Risk	1.4%	1.4%	3.3%	5.1%	1.6%	12.8%
Problem Gambler	0.0%	0.0%	0.2%	1.2%	2.1%	3.5%
Total	59.1%	14.7%	11.5%	10.5%	4.1%	100.0%

The overlap in classification between FLAGS and the PGSI is presented for the whole sample in Table 16. The shaded cells indicate where it is reasonable to consider the two measures agree on gambler risk classification. A total of 68.7% of the gamblers are classified similarly. Both instruments suggest that around 60% of the gamblers in this sample are not at risk and that 3.5% - 4.1% are Problem Gamblers. The Spearman correlation between the two sets of categories is 0.612 significant at the 0.000 level. Of those classified as At Risk by either instrument only 37.3% were classified at approximately the same level of risk.

3.0 Summary and Discussion

The primary goal of this research was to modify the FLAGS EGM instrument to accurately classify gamblers of all forms of gambling into risk and problem gambler categories. The five formative constructs comprising FLAGS EGM were substantially modified to ensure the items comprising each construct took into account beliefs and behaviours that would be relevant for all gamblers and gaming products and indicative of general risk due to gambling. A broad list of candidate statements (206) were identified during the development phase and then tested and refined during the qualitative phase using select samples of gamblers who regularly participated in a variety of specific forms of gambling including online gambling, poker, sport betting, horse racing, bingo and instant lottery tickets. Based on discussion and analysis of a beta version of the instrument a reduced and refined set of 162 statements was designed and administered to a sample of 1223 gamblers who regularly participated in these types of gambling. Six sub-segments of gamblers were created, five representing those who regularly gambled in different forms of gambling (slots, instant lottery tickets, bingo, sports/racing, and internet/casino tables/poker), and the sixth representing those who regularly gambled in the more strategic forms of gambling and specifically excluding those who gambled at the slots regularly in order to ensure the instrument works with these non-egm gamblers.

The final 60 statements comprising FLAGS–General were selected based on frequency analysis, correlations with the PGSI sum score, principle component analysis of each of the 32 reflective constructs, analysis of the discriminant validity of the resulting reflective constructs, and VIF analysis of the formative constructs.

The reliability and validity of the reflective and formative constructs were tested using techniques appropriate for each form of construct. Except for minor discrepancies on one or two segments, all the constructs were found to be reliable and valid and were therefore accepted as they were.

The degree to which each construct measured risk was determined by testing eighteen hypothesized path connections using structural equation modeling based on the analysis

method outlined in earlier research during the development of the FLAGS - EGM (Schellinck, Schrans, Bliemel & Schellinck 2010) and further testing of the instrument (Schellinck, Schrans, Chen, & Chambers, 2011). Two hypothesized paths were rejected and sixteen found to exist for most player segments. The resulting PLS models for all player segments confirmed the validity of the constructs as risk measures. A hierarchy score was calculated for each statement and a mean score and median ranking reported for each construct. The hierarchical ranking of the constructs were found to largely be in agreement with those found in the FLAGS - EGM research and supported the positioning of the constructs as early, intermediate or advanced indicators of risk.

When applied to the six player segments there were strong indications that the distribution was substantially skewed toward Advanced Risk and Problem Gamblers in the regular Sports/Racing and Internet/Tables/Poker segments. Given the instrument was specifically modified to accurately classify these gamblers, and all of our tests showed the constructs to be valid and reliable for these segments, it is assumed that the distribution skews reflect the actual risk profile of gamblers in these segments.

A comparison to the classification of risk using the PGSI found considerable overall agreement (68.7%) and strong correlation (0.612) as well as a similar overall distribution for those identified as At Risk and Problem Gamblers. FLAGS and the PGSI were found to be similarly effective in identifying problem gamblers. However, only 37.7% of those categorized as being 'at risk' by either instrument were likewise classified. This lack of correspondence in risk identification suggests the two instruments are measuring something different. This finding is not surprising given that the PGSI was designed to identify the level of probability that an individual is a problem gambler (low, moderate, or high) while FLAGS was specifically designed to measure indicators that occur in advance of harm or problem gambling (early, intermediate, advanced risk).

There were only minor changes identified during the analysis process. In developing the final set of statements one statement was dropped from each of three reflective constructs; Preoccupation: Desire, Impaired Control: Begin Play and Persistence. It is our belief that a

minimum of four statements should be included in a construct in order to reach a desirable level of reliability and validity (while three statements is sufficient we believe it is important to ensure a degree of redundancy is built into the measures). We would recommend that another statement be add to each of these construct and that further testing confirm the validity and reliability of the reformatted constructs.

Based on the results of the pilot study, we have produced a reasonable instrument to accurately classify gamblers into risk categories. However, we feel the instrument can still be improved through minor changes (e.g., the addition of statements as outlined above). Ideally before moving to a random population study it would be prudent to test the new instrument on an independent stratified random sample of gamblers to verify the pilot study findings.

For example, while current sample sizes were sufficient to perform all required analysis we may have found more significant relationships among the constructs if we had been able to obtain larger sample sizes for those who gambled on less common forms of gambling. Regardless, we were able to create homogeneous groups of gamblers and obtain significant results that confirmed almost all of our hypotheses in each segment.

In conclusion, we cannot prove conclusively that the early risk factors identified in the current study will lead to problem gambling. Not all of those who are classified at a lower risk level will advance toward problem gambling and we cannot judge how many will advance nor when. When developing this current instrument and the FLAGS - EGM we found evidence (Table 15) that gamblers may take at least two paths toward problem gambling, one due to risky cognitions, the other due to play experiences and perhaps conditioning. Further research is needed to determine if these paths exist and what the implications are for identification of risk and helping those who follow each path.

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