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RESEARCH PLAN for the MASSACHUSETTS GAMBLING IMPACT COHORT (MAGIC)

in response to

Massachusetts Gaming Commission
Request for Proposal
to conduct a Cohort Study of Problem Gambling

November 2014

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SUMMARY OF REVISIONS

In a summary of responses from the reviewers, our original proposal was described as "elegant, comprehensive [and] thoughtful" with a methodology that was "strong, feasible and adequate." The key concerns of the reviewers related to our proposed use of Respondent Driven Sampling and the high cost of the proposed project. The greatest challenge in revising our approach was to reduce the cost and scope of the project without sacrificing our key objectives and overall design.

We have reduced the cost of the proposed study over the first 2+ years by approximately 70% (from $6.45 million to $1.97 million) through reductions in all areas of the project and using a variety of large and small measures. These include changes to the methodology, reductions in staffing and reductions in contracted services.

Changes in Methodology

In response to concerns expressed by the reviewers about the use of Respondent Driven Sampling (RDS), we have eliminated this element of the proposed study. While RDS has been successfully implemented in other areas of research, this approach has never been used in a gambling study and we agree that the methodology should be pilot-tested before being incorporated in this major study.

If MGC is willing to increase our budget to the level proposed for the first period of the study ($2.5 million), then our primary recommendation would be to add a *Biannual* sample of people who would be interviewed on a twice-yearly basis to provide a finer-grained chronology of gambling and problem gambling. The reviewers identified this feature of our original proposal as a particular strength and noted particularly that it would allow for the examination of aging effects in the cohort. Another recommendation would be the addition of a pilot study of the RDS approach. The MAGIC Research Team has already begun to consider ways in which our revised approach could be augmented in future years by seeking funding from other sources, such as the National Institutes of Health. Addition of a pilot study of the RDS approach would significantly increase the likelihood that we would be able to obtain such outside funding.

We have reduced the *General Population* sample (from 2,000 to 1,300) but have increased the *High Risk* sample (from 1,000 to 1,300) to boost the number of individuals in the sample who may be expected to transition towards higher risk and/or problem gambling.

To achieve additional budgetary savings, we have significantly altered our data collection approach. We have eliminated the use of field interviewers and instead intend to rely on telephone follow-up efforts to locate and prompt respondents to complete an online instrument. Our current 2013/2014 SEIGMA baseline survey still constitutes our Wave 1 assessment and represents an important cost efficiency since the MAGIC project will actually have 6 waves of data collection for the cost of 5 waves. Wave 2 of the study in 2014/2015 will replicate the web -> mail -> telephone approach used in Wave 1/SEIGMA baseline survey. Wave 3 in 2015/2016 will include two important procedural changes: (a) expansion of the length of the questionnaire to more comprehensively assess likely etiological factors, and (b) a switch from the web -> mail -> telephone approach used in Waves 1 and 2 to a web -> telephone approach. Similar to Waves 1 and 2, data collection in Wave 3 will begin with a mailed invitation to complete the survey online. However, substantial methodological efficiencies and cost savings will be achieved by moving directly to a telephone follow-up for locating and prompting of individuals to

complete the instrument online, either at home, at a publicly available site (e.g., public library) or at one of 2 regional site offices (reduced from the original 6).

A final change to our methodology is to add an algorithm to the questionnaire such that anyone showing a significant movement in or out of problem gambling from the previous assessment is prompted with a series of open-ended questions examining the chronology of this change and the factors the person believes are related to this change.

Changes in Staffing and Contracted Services

All of the reviewers expressed concern with what they deemed to be overly high staffing of the study. While these estimates were based on our experience with other large longitudinal cohort studies of gambling, we recognize the need to reduce staffing levels to an affordable level. Effort by all of the UMass proposed staff has been reduced substantially, including Volberg, Stanek, Houpt, Zorn, the TBD Research Analyst, and the TBD Research Assistants/Graduate Students. The budget for data collection by NORC has been reduced by significantly altering the data collection approach, as outlined above. The budget for Dr. Williams has also been reduced; in addition to a reduction in effort, he has eliminated the portion of his budget that was allocated to a post-doctoral student as well as a subcontract to the Quinte Longitudinal Study team to provide ongoing consultation to NORC. He has also reduced the amounts intended for travel and conference attendance.

Additional Changes to the Proposal

In response to specific reviewer comments, we have amended our proposal in several other ways. For example, we now more clearly state that several of the research questions under Etiology only *indirectly* address the overall aim of developing an etiological model of problem gambling. We have added references on the development of 'low-risk guidelines' for gambling so as to better contextualize the research question on this topic. We have not provided "clearly articulated hypotheses to be tested" since we agree with the reviewer who went on to comment that "given the complexity of the possible models and the number of variables to be tested as well as the exploratory nature of the examination, it would be difficult at this time to provide directional hypotheses." We have not included time-line follow-back interviews with participants due to budgetary constraints. We have included locating attempts for respondents who have moved within Massachusetts since last contact but have not included resources to locate respondents who move outside of Massachusetts.[1]

We have revised the proposal to more clearly indicate that one of the most important aspects of this project is how the findings will inform prevention and treatment initiatives. We have not added a clinical intervention researcher to the proposed project, as suggested by one reviewer. This is partly for budgetary reasons and partly because Dr. Williams, a clinical psychologist by training who has published extensively on the prevention of problem gambling and the treatment of addictions, already serves this role on the project.

[1] This decision is not based solely on budgetary constraints. Research done in preparation for the SEIGMA baseline survey determined that MA has quite low levels of geographic mobility.

Finally, we have added material in the section on Statistical Analysis related to how missing data will be dealt with statistically. We have also commented in a footnote on the question of whether the SEIGMA baseline sample provides adequate coverage of institutionalized populations.

PROJECT SUMMARY

Goals

The two primary research goals are to determine the **incidence** of problem gambling in Massachusetts and to develop an **etiological model** of problem gambling. The value of this study to Massachusetts is that it will (a) establish the raw number of new problem gamblers each year (necessary for resource allocation); (b) determine whether proportionally more resources should be put into prevention or treatment; (c) identify the variables of greatest etiological importance in the development of, and remission from, problem gambling and should therefore be the focus of prevention and treatment efforts; (d) identify 'safe levels' of gambling involvement that could potentially be used in an analogous way to the guidelines that have been developed for 'safe levels' of alcohol consumption; and (e) provide synergy with the Social and Economic Impacts of Gambling in Massachusetts (SEIGMA) study, with each study providing considerable information relevant to the other study's goals.

Methodology

Our current 2013/2014 SEIGMA baseline survey (*n* = 10,000) will constitute the Wave 1 assessment, with 2,600 of these individuals recruited into the MAGIC cohort to be assessed again in 2014/15; 2015/16; 2016/17; 2017/18; and 2018/19. Fifty percent of these individuals (*n* = 1,300) will be randomly selected and will thus constitute a representative sample of Massachusetts residents and be known as the *General Population* subsample. The other 50% will be the 1,300 people from the SEIGMA baseline who are deemed to be at the highest risk of becoming problem gamblers. These individuals will be known as the *High Risk* subsample. The Wave 3 assessment in 2016/17 will introduce an expanded questionnaire so as to assess all variables of etiological relevance to problem gambling. We anticipate a 'yield' of 230 problem gamblers over the course of the project; this is significantly higher than any previous longitudinal study and should be sufficient to create a comprehensive etiological model of problem gambling.

If additional funds became available, there are three additional methodological elements that would add significant scientific value. The first is extending the length of the study to 10 years so as to better understand the overall natural course of gambling and problem gambling. The second is to sample 1,000 people on a twice yearly basis (*Biannual* sample) to provide a finer-grained chronology of gambling and problem gambling. The third is adding a pilot study to assess whether the use of Respondent Driven Sampling (RDS) is an effective way to add participants to our *High Risk* sample to increase our 'yield' of problem gamblers and allow us to better understand the various subtypes and trajectories of problem gambling.

Demonstrated Excellence

All members of the MAGIC Research Team have extensive background and expertise in either gambling research, large-scale project management, and/or longitudinal research. Two members of the MAGIC Research Team (Volberg and Williams) have directed or played key roles in four large-scale longitudinal cohort studies of gambling that provide the basis for the approach recommended in this proposal. A third (Stanek) has considerable experience developing analytic methods for use with longitudinal cohort data. Finally, NORC has years of experience in survey research as well as recruiting and retaining longitudinal cohort samples with hard-to-reach populations.

SPECIFIC AIMS

Section 71 of the Expanded Gaming Act requires the Massachusetts Gaming Commission (MGC) to establish an annual research agenda to assist in understanding the social and economic effects of casino gambling in Massachusetts and to minimize the harmful impacts. Section 71 identifies three essential elements of this research agenda:

- Understanding the social and economic effects of expanded gambling;
- Implementing a baseline study of problem gambling and the existing prevention and treatment programs that address its harmful consequences; and
- Obtaining scientific information relative to the neuroscience, psychology, sociology, epidemiology and etiology of gambling.

In March 2013, the MGC selected UMass Amherst to carry out the first two elements of this research agenda. The methodology of the 'SEIGMA' project, while robust in many regards, provides population-based 'snap shots' of the dynamic process of behavior change during a time of gaming expansion. In contrast, a longitudinal cohort study follows a group of people with a shared experience (exposure to expanded gaming) at intervals over time. This type of study can provide etiological information about how gambling and problem gambling develops, progresses, and remits. The information collected through a cohort study has significant value as it can highlight risk and protective factors important in developing effective prevention, treatment, and recovery support services.

In October of 2013, the MGC, with the unanimous support of the Gaming Policy Advisory Committee, recommended to the Legislature that a longitudinal cohort study be added to the MGC Research Agenda. In order to capitalize on an opportunity to collect prospective baseline information in advance of expanded gaming in the Commonwealth, the MGC recommended the cohort study be launched in the near future and well in advance of slot parlor operations. This proposal presents our plan for conducting a longitudinal cohort study in Massachusetts. This research program has two overarching aims:

Determine the incidence of problem gambling in Massachusetts

The population prevalence rate of problem gambling has stabilized or gone down in most Western jurisdictions since the late 1990s to early 2000s (Williams, Volberg, & Stevens, 2012). Many people have taken this to mean that gambling-related harm is lessening and that further efforts to mitigate this harm may be unnecessary. However, a stable prevalence rate over time can either be a result of (a) ongoing unremitting problem gambling in the same group of individuals or it could be that (b) the rate of new cases is roughly equivalent to the rate of remission among existing problem gamblers. It is very important to understand which of these two different scenarios is occurring, as they have different implications for prevention and treatment. If problem gambling is a chronic condition and new cases are relatively uncommon, then it may be preferable to devote resources primarily to treatment rather than prevention. However, in a situation where both the incidence and natural recovery from problem gambling are quite high, an argument can be made that more resources should be devoted to prevention than to treatment.

Longitudinal research is the only way to determine which of these two scenarios is occurring. Aside from understanding the portion of the Massachusetts prevalence rate that represents new cases, simply knowing the actual raw number of new cases in Massachusetts both before and after casino introduction is quite important for the purposes of resource allocation and program planning.

The specific research questions to be addressed are as follows:

1. What is the incidence of problem gambling in Massachusetts prior to the introduction of the four new gambling venues?
2. What is the incidence of problem gambling immediately after the introduction of the four new gambling venues?
3. Does the incidence of problem gambling decrease after several years of these venues being open?
4. What is the raw number of new problem gamblers each year?
5. What are the normal patterns of continuity and discontinuity in gambling and problem gambling behavior over time?

Develop an etiological model of problem gambling

Considerable effort is currently going into the development of strategies to prevent problem gambling. Unfortunately, the majority of these initiatives have been ineffective (Williams, West & Simpson, 2007, 2008, 2012). This is partly due to the fact that most of these educational and policy initiatives have been put in place because they "seemed like good ideas" and/or were being used in other jurisdictions, rather than having demonstrated scientific efficacy or being derived from a good understanding of effective prevention practices. However, it is also due to the fact that there is no comprehensive and well established etiological model of disordered gambling to guide these efforts.

While there are many well established correlates of problem gambling (e.g., gambling fallacies, mental health problems, etc.), their association with problem gambling may occur either because they *caused* problem gambling, developed *concurrently* with problem gambling, or developed as a *consequence* of problem gambling. From a prevention standpoint, knowing how and where to effectively intervene hinges on having research that clearly identifies the variables that are etiologically involved in problem gambling, their temporal sequence, and their causal connections. Similarly, knowing the factors implicated in sustained recovery from problem gambling is very important for the purposes of treatment. Longitudinal research is the best way of disentangling these complex relationships and understanding the chronology and causal directions, potentially allowing for the creation of a detailed etiological model of how gambling and problem gambling develops, continues, and remits. Longitudinal research has been applied successfully many times in the fields of health, mental health, and addiction to elucidate these connections. To date, however, comprehensive longitudinal studies are relatively uncommon in the area of gambling and problem gambling.

The specific research questions to be addressed in creating an etiological model of problem gambling are as follows:

1. What individual, social, and environmental variables (e.g., casino proximity, public attitudes, gambling advertising, media coverage) are most predictive of, and mediate the development of, future gambling and problem gambling?
2. What variables are most predictive of recovery from problem gambling?
3. What is the best way of translating the findings from #1 and #2 so as to optimize prevention and treatment services in Massachusetts?

There are two other research questions indirectly related to the question of etiology:

4. Are there 'safe levels' of gambling involvement that usually do not lead to problem gambling, that could be used in an analogous way to the guidelines that have been developed for 'safe levels' of alcohol consumption? (see Currie et al., 2006, 2008 for discussion of this issue).
5. What characteristics differentiate problem gamblers who seek treatment from those who do not?

RESEARCH STRATEGY

Significance

There are many studies that have identified correlates of problem gambling. These correlates include: Male gender, Young age (18 – 25), Less education, Lower income, Not married, Minority group and/or non-Caucasian, Impulsivity, Risk-seeking tendencies, Presence of other addictive behavior (particularly substance abuse), Presence of mental health problems (particularly mood disorders), Abusive or neglectful upbringing, Parental involvement/modelling of gambling, Early onset of gambling behavior, Peer group involvement in gambling, Antisocial Personality Disorder, Presence of significant ongoing stressors, Cultural tradition of gambling, Gambling opportunities being readily available, Experiencing an 'early big win,' Engaging in 'continuous' forms of gambling that provide a high frequency of reinforcement (i.e., electronic gaming machines, casino table games), Engaging in forms of gambling that provide 24-hour access, Gambling fallacies, and Gambling serving a psychological need.[2]

All of these correlates are of potential etiological relevance to problem gambling, but they tell us nothing about whether they caused problem gambling, developed concurrently with problem gambling, or developed as a consequence of problem gambling. Such relationships can only be disentangled using longitudinal cohort studies.

Existing Cohort Studies of Gambling and Problem Gambling

Several small scale cohort studies of gambling and problem gambling exist (for reviews see el-Guebaly et al., 2008; Slutske 2007; and Williams et al., 2014). While all of these studies provide useful information, *none of them are large enough in scope to create an etiological model of problem gambling, as they all have one or more of the following limitations*:

- A very circumscribed demographic (e.g., youth, elderly, casino employees);
- A very small sample size and/or a very small number of people who became problem gamblers during the course of the study;
- A very short time span and/or a small number of assessment periods;
- A study of either gambling or problem gambling, but not both;
- A short questionnaire that examined only a small subset of variables potentially involved in the etiology of problem gambling;
- Poor retention rates with differentially higher attrition for certain demographic groups (e.g., males, younger people) and people who are heavy gamblers and/or problem gamblers.

[2] Relevant sources include Alegria et al., 2009; Blaszczynski & McConaghy, 1994; Blaszczynski & Nower, 2002; Breyer et al., 2009; Carlton et al., 1987; Ohtsuka & Chan, 2009; Crockford & el-Guebaly, 1998; Dowling et al., 2005; Eisen et al., 1998; el-Guebaly & Hodgins, 2000; el-Guebaly et al., 2006; Gaboury & Ladouceur, 1989; Van Brunschot, 2009; Grant & Kim, 2002; Gupta & Derevensky, 1998; Joukhador et al., 2003, 2004; Kausch et al., 2006; Kim et al., 2006; Ladouceur et al., 2001; Ladouceur & Walker, 1996; Langhinrichsen-Rohling et al., 2004; Lawrence et al., 2009; Lester, 1994; Loo, Raylu, & Oei, 2008; McCormick et al., 1984; Ramirez et al., 1984; Miller & Currie, 2008; Mood Disorders Society of Canada, 2004; National Gambling Impact Study Commission, 1999; Nixon & Solowoniuk, 2009; Nixon et al., 2006; Nower & Blaszczynski, 2006; Parke et al., 2004; Petry, 2005; Petry & Weinstock, 2007; Petry & Steinberg, 2005; Petry et al., 2005; Powell et al., 1999; Productivity Commission, 1999; Raylu & Oei, 2004; Rush et al., 2008; Shaffer et al., 2004; Skitch & Hodgins, 2004; Slutske et al., 2000; Slutske et al., 2001; Steel & Blaszczynski, 1998; Toneatto et al., 1997; Toneatto & Nguyen, 2007; Turner et al., 2006, 2008; Volberg et al., 1997; Walters, 2001; Weatherly et al., 2004; Welte et al., 2007, 2008, 2009; Westphal & Johnson, 2007; Williams, Volberg, & Stevens, 2012; Wood, Williams, & Parke, 2012, Zimmerman et al., 2006.

The limitations of these smaller studies have led to the funding of four more recent large-scale longitudinal cohort studies of gambling and problem gambling in three jurisdictions:

The Leisure, Lifestyle, Lifecycle Project (LLLP) was funded by the Alberta Gambling Research Institute (el-Guebaly et al., 2008; el-Guebaly et al., 2014). A total of 1,808 Albertans were recruited in 2006, with representative sampling from the major regions of Alberta, Canada. Five age cohorts were established at baseline (13-15; 18-20; 23-25; 43-45; 63-65) with equal numbers in each group. A subset of 524 individuals were from a 'high risk' sample of individuals presumed to be at elevated risk for developing gambling problems because of their greater expenditure and frequency of gambling (screened to be in the 70th percentile for either expenditure or frequency). The prevalence of problem gambling in the aggregate sample at baseline was 3.6%, and the incidence of new cases from the baseline to the second year was 2.0%. All participants received a comprehensive 2-to-3 hour assessment of all variables of etiological relevance to gambling and problem gambling. LLLP had a 20-to-27 month interval between the start of each assessment period, and an 8-to-9 month period of time in which people could complete their assessment ('assessment window'). The final assessment period ended in 2011. A total of 1,030 adults completed the fourth assessment, for an overall retention rate of 76.1% and a total of 313 adolescents completed the fourth assessment, for a retention rate of 71.8% (combined retention rate of 75.1%). Results of this study will shortly be published in a final report due in February 2014.

The Quinte Longitudinal Study (QLS) was funded by the Ontario Problem Gambling Research Centre (Williams, Hann et al., 2014). A total of 4,123 Ontario adults age 17-90 were recruited in 2006 from the Quinte region in Ontario, Canada. A subset of 1,216 individuals constituted a 'high risk' sample of individuals at elevated risk for developing gambling problems by virtue of their greater expenditure on gambling; playing either slot machines or betting on horse racing in the past year; or an intention to gamble at a new slots-at-racetrack facility. The prevalence of problem gambling in the aggregate sample at baseline was 3.3% and the incidence of problem gambling in the second year was 1.4%. All participants received a comprehensive 1-to-2 hour assessment of all variables of etiological relevance to gambling and problem gambling. The QLS had 5 assessment periods, with a 12 month interval between the start of each period, and a 5-month assessment window. The final assessment period ended in 2011. An exceptionally high retention rate of 93.9% was attained in the QLS. Because of the uniqueness of this accomplishment, a 229-page *QLS Retention Manual* (McLaughlin et al., 2014) was developed to guide future longitudinal research studies. Results of the QLS are now being analyzed with a final report due in February 2014. One of the authors of the present proposal (Williams) is the lead analyst in both the QLS and LLLP studies and is developing an etiological model that works for both data sets.

The Swedish Longitudinal Gambling Study (SWELOGS) (Romild, 2012) is funded by the Swedish National Institute of Public Health. The study began in 2008/2009 with a brief 15-minute telephone prevalence survey[3] of gambling and problem gambling in a random sample of 8,165 Swedes aged 16-84 stratified by gender, age, and risk for problem gambling. A total of 6,021 of these individuals were reassessed in 2009/10 and 4,188 assessed again in 2012 (retention rate of 51.3%). The final epidemiological assessment will occur in 2014. The prevalence of problem gambling at baseline was approximately 1.5% with approximately a 0.5% rate of incidence in the second assessment.[4] In addition, a more

[3] The telephone survey data was supplemented by information taken from the Swedish population register which contains extensive information on income, taxes, education, occupation, immigration, etc.

[4] This is estimated using a CPGI5+ demarcation for problem gambling (rather than 3+ used in the SWELOGS), since this cutoff has the highest correspondence to clinically assessed problem gambling (Currie et al., 2013; Williams & Volberg, 2010, 2013).

comprehensive 60-minute telephone interview was completed with 2,400 of these individuals in 2011 with another wave of in-depth interviews completed in 2013 and a third wave planned in 2015. A case control design is being used in this In-Depth track, whereby all CPGI moderate risk and problem gamblers were selected for interviews, as were a sample of low risk and non-problem gamblers. Each CPGI moderate risk and problem gambler has 3 matched controls selected from the general population sample that match the person on basic demographics. A final feature of SWELOGS is the following up of 578 individuals from the 1997/1998 Swedish gambling prevalence study (289 problem gamblers and a matched set of controls). The SWELOGS research team has published several reports in Swedish and two peer-reviewed articles in English, one detailing the study methodology (Romild, Abbott & Volberg, 2013) and one comparing the results of the 1997/1998 prevalence survey in Sweden with the SWELOGS baseline epidemiological survey in 2009 (Abbott, Romild & Volberg, 2013).

The Victorian Gambling Study (VGS) was funded by the Victoria Department of Justice in Australia. The study began in 2008 with a telephone prevalence survey of gambling behavior in 15,000 adults in the state of Victoria, with oversampling of local government areas having higher electronic gaming machine (EGM) expenditure. The prevalence of problem gambling at baseline was 2.6% with approximately a 1.5% incidence in the second wave. There were 3 subsequent waves roughly 12 months apart in 2009/2012, 2010/2011, and 2011/2012. A 5-month assessment window was used. A total of 5,003 people took part in Wave 2, 5,618 in Wave 3, and 3,700 in Wave 4 (24.7% retention). The assessment itself consisted of a 15–25 minute telephone interview focusing on gambling practices, health and well-being, important life events in the past 12 months, and demographic information. A small group of 44 people identified as Canadian Problem Gambling Index (CPGI) 8+ problem gamblers in at least one wave participated in in-depth face-to-face interviews so as to collect some qualitative information. Reports on the first three waves of the study as well as the qualitative component are available online (Victoria Department of Justice, 2009, 2011; Victorian Responsible Gambling Foundation, 2012a, 2012b). The final results of this study are now being analyzed. Since the questionnaire used in the VGS is very similar to that employed in the SWELOGS epidemiological track, future cross-cultural analyses are planned. This is facilitated by the overlap in international advisors to the two studies (Volberg serves as an advisor to both studies along with Abbott, who is currently leading a cohort study in New Zealand).

Limitations of the Major Cohort Studies of Gambling and Problem Gambling

The results of these four large-scale longitudinal studies of gambling will shed important light on the etiology of problem gambling, the incidence of problem gambling, and the natural course and stability of problem gambling. However, the four studies have important limitations of their own.

One limitation concerns their relatively low incidence of problem gambling. Due to insufficient oversampling of people with 'at risk' characteristics, relatively few people *became* problem gamblers during the course of these studies (i.e., 34 in LLLP, ~40 in VGS, ~58 in SWELOGS, and 90 in QLS).[5] These numbers are generally adequate to establish the incidence of problem gambling in each of these

[5] This is the number of new problem gamblers occurring during the course of the study *that also completed all assessments*. These numbers are significantly higher in VGS and SWELOGS when including people who did not complete all assessments. It is also important to recognize that the number of new cases in the VGS and SWELOGS studies are only estimates based on the known incidence rates and the projected number of people scoring *5 or higher* on the Canadian Problem Gambling Index (Ferris & Wynne, 2001) which, although it has not been a traditional way of classifying problem gamblers, is now known to provide a better correspondence to clinically assessed problem gamblers relative to the traditional 8 or higher demarcation (Currie, Hodgins & Casey, 2013; Williams & Volberg, 2010, 2013).

jurisdictions[6], but they are inadequate to create a *comprehensive* etiological model of problem gambling. This is due to the fact that cross-sectional research has identified several subtypes of problem gamblers, and prior longitudinal research has tentatively identified several different trajectories of problem gambling (Blaszczynski & Nower, 2002; Ledgerwood & Petry, 2006, 2010; Milosevic & Ledgerwood, 2010; Nower et al., 2013; Turner et al., 2008; Vachon & Bagby, 2009). Cluster analysis of problem gambling subgroups and multilevel modelling of different trajectories is constrained by these relatively small sample sizes. Consequently, all of these studies have tended to avoid subgroup analysis.

Another limitation of these four studies concerns the relatively long time interval (1–2 years) between assessments combined with the *past-year* time frame in which problem gambling has been assessed. Existing research suggests that problem gambling is an unstable entity for most people (el Guebaly, et al., 2014; Romild, 2012; Victorian Responsible Gambling Foundation, 2012a; Williams, et al., 2014). For example, in the LLLP and QLS studies, about 50% of problem gamblers were problem gamblers in only a single time period. While a finer-grained chronology (e.g., six-month rather than annual assessments) would potentially show even greater instability, it is quite possible that *greater* stability would be observed *due to the reduction of measurement error*. This is because the designation of problem gambling is heavily reliant on the person's self-report and perception of their own behavior. The accuracy of this perception is compromised by incomplete recall, recency bias, self-deception, mood state, social desirability, and genuine uncertainty about whether they meet the criteria they are asked about. The fact that all the major assessment instruments for problem gambling (DSM-IV, CPGI, SOGS) ask the person about their behavior in the *past year* exacerbates these difficulties. The potential magnitude of measurement error involved is illustrated by the one month test-retest reliability of the Canadian Problem Gambling Index (r = .78) (Ferris & Wynne, 2001) (i.e., because this instrument asks about behavior in the past year, there should be very little difference in self-report with the passage of four weeks). Hence, *a shorter time interval between assessments and using a shorter time span for the person to report on their behavior* (e.g., past six months) would both serve to reduce measurement error and potentially shed further light on the true stability/instability of problem gambling.

A final limitation of these four studies concerns their relatively short duration (i.e., 4 years for VGS, 5 years for LLLP and QLS, and 5.5 years for SWELOGS). The problem with this short length is that it constrains the etiological models that are developed to the subset of individuals who develop gambling problems in a 4–5.5 year time frame. Some addictions, such as nicotine and cocaine, are known to develop quite rapidly with signs of dependence appearing in the large majority of people within a few years of initial use (DiFranza, et al., 2007; Doubeni, Reed, & DiFranza; 2010; Wagner & Anthony, 2002). However, this is not true for other substances. The pioneering longitudinal research of George Vaillant was the first to document that alcohol abuse and dependence has a very slow onset for most people, sometimes taking 20 or 30 years (Vaillant 1983, 1995). Other researchers have found similar results, with different personal characteristics predicting a slow versus rapid onset of alcoholism (Schuckit et al., 1993, 1995). The most representative data on length of time to onset of substance dependence comes from the U.S. National Comorbidity Survey, which showed that only 33% of people who became alcohol dependent received this diagnosis within 4 years of initial use, and only 50% of people who eventually become dependent on cannabis developed this dependency within 4 years after initial use (Wagner & Anthony, 2002). *On the other hand, this same research showed that a 10-year time span after initial use captured the large majority of people who eventually received a diagnosis of cocaine dependence (95%), cannabis dependence (90%), and alcohol dependence (80%) (Wagner & Anthony, 2002).*

[6] When also including the incidence cases that did not complete all assessments.

The time it takes for problem gambling to develop is unknown. However, existing evidence suggests that the disorder is probably more similar to alcohol than nicotine, in that many people report being social gamblers for many years before developing problems. A robust and comprehensive etiological model of problem gambling needs to be able to capture both rapid and slow onset problem gambling and identify the variables that predict these different trajectories. The existing longitudinal studies of gambling and problem gambling are useful in identifying the variables that may predict remission, relapse, and the development of new cases of problem gambling, but it is probably overstepping the evidence to suggest they contain enough long-term data to create an overarching etiological model that identifies the different trajectories as well as features that predict sustained recovery.

Value of a Massachusetts Cohort Study of Gambling

It is important that a Massachusetts longitudinal cohort study of problem gambling build on existing research rather than duplicate what has already been done. As the prior discussion illustrates, significant progress has been made in understanding the incidence and etiology of problem gambling. However, further work is needed, and the MAGIC project represents an excellent opportunity to do this work.

While the present study will make a significant scientific contribution by building upon prior studies, it is worth recognizing that there are several other reasons why a Massachusetts longitudinal cohort study of gambling and problem gambling is warranted for its own sake:

- First, there have been no longitudinal research studies of gambling and problem gambling in Massachusetts (and no major cohort studies of gambling in the United States). There are important differences between Massachusetts and other jurisdictions in terms of demographic composition, the availability of casino gambling, current efforts to prevent problem gambling, and the time period in which incidence will be examined. It is possible that the nature, incidence, and etiology of problem gambling may be somewhat different in Massachusetts compared with other jurisdictions.
- Second, the change in gambling availability in Massachusetts during the course of this study (due to the introduction of the four major new gambling venues) will be much more dramatic than the fairly stable availability of gambling that occurred in the Alberta, Ontario, Sweden, and Victorian studies. Thus, Massachusetts presents a much better opportunity to understand the role of increased gambling availability, and casino gambling specifically, in the development of problem gambling.
- Finally, the findings of this longitudinal cohort will be synergistic with those of the Social and Economic Impacts of Gambling in Massachusetts (SEIGMA) study, producing results much richer than any stand-alone study. While the emphasis of the MAGIC project is on incidence and etiology, and the emphasis of the SEIGMA project is on social and economic impacts, both studies will produce considerable evidence pertaining to the other study's focus. The impacts identified in SEIGMA can be explored in greater depth in MAGIC and the factors contributing to incidence and relapse can be explored in greater depth in SEIGMA. The seamless nature of the MAGIC/SEIGMA integration is seen in the fact that the current SEIGMA 2013/2014 Baseline sample will constitute Wave 1 of the MAGIC study; the basic questionnaire structure of the SEIGMA population survey will be retained in the MAGIC study in future waves; and the company conducting the SEIGMA population surveys in 2013/2014, 2015, and 2018 (NORC) is the same company doing the recruitment and repeated assessments of the MAGIC cohort. (Note: it should be recognized that the synergy between the cohort study and the SEIGMA project hinges on both studies using similar high

quality methodologies so that results can be directly compared and utilized by the other study; otherwise confusing and contradictory results can occur).[7]

Innovation

The previous section has alluded to many of the specific innovations planned for the MAGIC study. In this section, these innovations are listed and described in detail.

A Cohort with High Prevalence and Incidence of Problem Gambling

Our experience in Alberta, Ontario, Sweden and Victoria suggests that following large numbers of people who do not evidence gambling problems or risky behavior at baseline is not an efficient method for assessing incidence or for establishing causal relationships between gambling expansion and changes in problem gambling prevalence. Rather, our ability to reliably quantify incidence and develop a comprehensive etiological model of problem gambling depends on the cohort containing a sufficiently large number of problem gamblers and a sufficiently large number of people who *become* problem gamblers during the time course of the study. This is a weakness of all of the existing longitudinal cohort studies of gambling and is also typically a weakness of most longitudinal studies that aspire to understand the course of rare disorders in the population.

The current 2013/2014 Baseline survey of Massachusetts residents being conducted by NORC at the University of Chicago under the auspices of the SEIGMA team shows that the prevalence rate of problem gambling (using a CPGI 5+ criterion) is approximately 1.3%. Research from other longitudinal studies of gambling would suggest that the incidence of problem gambling in Massachusetts (prior to casino openings) is likely in the range of 0.6% (perhaps increasing to 1.0% or higher after casino opening). The implication is that a purely random sample of 2,600 Massachusetts residents would probably only produce 26 problem gamblers at baseline and perhaps 15-26 new problem gamblers each year. These figures are too low for the purposes of creating an etiological model, especially when factoring in attrition.

Instead, our plan is to oversample high risk populations. In addition to a random sample of 1,300 Massachusetts residents ('*General Population* sample'), we will have a '*High Risk* sample' of 1,300 individuals who are at high risk for either having or developing problem gambling. Combined with the *General Population* sample, we predict this will produce a 'yield' of **at least 230** problem gamblers in a 5-year period. The specifics about how this High Risk sample will be recruited are presented later in this proposal.

Exceptional Retention Rates

Retention is one of the key determinants of the internal and external validity of any longitudinal study, as attrition is not usually random. Rather, males, young people, ethnic minorities, substance users, and individuals with mental health problems are known to have higher attrition (Claus et al., 2002; de Graaf et al., 2000; Eaton et al., 1992; Morrison et al., 1997). Unfortunately, these features are also the typical

[7] Evidence of this is seen in the Massachusetts Council on Compulsive Gambling's recent survey of gambling and problem gambling (MCCG, 2013). This study used an older assessment instrument based on DSM-III criteria (South Oaks Gambling Screen), cut-off points that are different than typically used today, and a non-representative method of sampling (i.e., online panels). Consequently, their prevalence rate of problem gambling (10%) was widely divergent and difficult to reconcile with that currently being obtained in the SEIGMA baseline study (1.3%).

characteristics of problem gamblers, making retention and attrition of paramount importance in the present study.

Fortunately, exceptionally high retention rates are possible in longitudinal research when using the right methods. As noted above, the Quinte Longitudinal Study (QLS) attained a 93.9% retention rate of 4,121 participants after 5 years and 5 assessments. Similarly, NORC achieved an 85% retention rate 34 years after the recruitment of NORC's National Longitudinal Surveys of Youth and a 96% retention of adolescents through six waves of data collection in the Nicotine Dependence in Adolescence study. The main principles responsible for these retention rates are described in the next section of this proposal.

Problem and Pathological Gambling Measure

Many instruments exist for the population assessment of problem gambling. Worldwide, the most commonly used instruments have been the South Oaks Gambling Screen (SOGS) (Lesieur & Blume, 1987), the Canadian Problem Gambling Index (CPGI) (Ferris & Wynne, 2001), and various operationalizations of the DSM diagnostic criteria for disordered gambling (e.g., Fisher, 2000; Gerstein et al., 1999; Kessler et al., 2008; Petry et al., 2005). One or more of these three instruments have been used in 95% of adult problem gambling prevalence surveys carried out internationally between 1975 and 2012 (Williams, Volberg, & Stevens, 2012). The reliability of these instruments is well-established through extensive and dependable evidence of internal consistency and test-retest reliability. However, there has been some criticism of their conceptual underpinnings and validity (Govoni, et al., 2001; Stinchfield, et al., 2007; Williams & Volberg, 2010).

Most importantly, there is only fair to weak correspondence between problem gamblers identified in population surveys and the subsequent classification of these same individuals in clinical interviews (Abbott, 2001; Abbott & Volberg, 1992; Ferris & Wynne, 2001; Ladouceur, Bouchard et al., 2000; Ladouceur, Jacques, et al., 2005; Murray et al., 2005). In a large scale study of 7,272 gamblers (including 977 clinically assessed problem gamblers) Williams & Volberg (2010, 2013) demonstrated that classification accuracy of the DSM-IV, SOGS, and CPGI was better than previous research had shown, suggesting that methodological problems were partly responsible for this previously identified weak relationship. Nonetheless, the overall classification accuracy of these three instruments was still only modest, and furthermore, there was significant variation in classification accuracy as a function of gender, age, and ethnicity. By comparison, a new instrument, the Problem and Pathological Gambling Measure (PPGM) (Williams & Volberg, 2010, 2013) had significantly better sensitivity, positive predictive power, diagnostic efficiency, and kappa compared to all three traditional instruments. Furthermore, classification accuracy indices did not vary as a function of age, gender, or ethnicity.

The superior performance of the PPGM is due to several factors. One is that any pattern of item endorsement that results in a score above a certain threshold is sufficient to be designated as a problem gambler in the CPGI, SOGS and DSM (i.e., despite the fact that some items are more serious and/or diagnostic than others). Consequently, it is possible to be classified as a problem/pathological gambler without actually endorsing any significant problems or harm deriving from one's gambling. Similarly, it is possible to indicate the presence of significant problems deriving from one's gambling without being classified as a problem gambler. Internationally, there is widespread agreement that for someone to be a problem gambler there needs to be evidence of both (a) significant negative consequences, and (b) impaired control (Neal, Delfabbro & O'Neil, 2005). This is explicitly required in the PPGM.

A second reason is that the PPGM assesses *all* potential harms deriving from gambling, whereas only a subset of potential problems are assessed with the traditional instruments. Mental health problems are not assessed in the DSM and only indirectly in the SOGS (i.e., feeling guilty about one's gambling). Physical health problems are not addressed in either the DSM or SOGS. School and work problems are not covered in the CPGI. Engagement in illegal activities to support gambling is not addressed in the CPGI and only partially addressed in the SOGS (i.e., passing bad checks).[8] Financial problems are not well addressed in the DSM (i.e., relies on others to provide money). Similarly, not all the signs and symptoms of impaired control are covered. For example, the CPGI does not assess whether the person has experienced any problems in cutting back or stopping gambling.

A final reason is that the PPGM endeavors to minimize false positives and false negatives. The former is accomplished by requiring the person to report gambling at least once a month in the past year to be classified as a problem gambler (no corroborating gambling behavior is required in the CPGI, SOGS or DSM). The latter is accomplished by allowing for problem gambling designation of individuals reporting sub-threshold levels of symptomatology if their gambling expenditure and frequency are equal to those of unambiguously identified problem gamblers.

In the present study, the PPGM will be our primary instrument to assess problem gambling. However, to enable comparisons to studies in other jurisdictions, including the four large-scale cohort studies discussed above, we will also include the Canadian Problem Gambling Index, which has been the dominant instrument used worldwide since 2007 (Williams, Volberg, & Stevens, 2012). *(The same rationale outlined above is the reason why the PPGM and CPGI are the two instruments used to assess problem gambling in the SEIGMA project. Using other instruments in the Massachusetts cohort study would compromise comparability).*

Focus on Etiological Factors Implicated in Prior Studies

As indicated, three of the four major longitudinal cohort studies of gambling are all in their final stages of analysis with the Final Reports due very soon. The Swedish study will collect one more wave of epidemiological data and one more in-depth wave before it ends in 2015. Collectively, these studies will identify many variables etiologically implicated in the development of problem gambling. One of the 'value added' elements of the MAGIC project will be scrutiny of the findings from these studies (as well as the several smaller longitudinal studies of gambling that exist) so as to identify variables that would merit more detailed examination in the proposed project. Because of direct involvement in all four of these studies by either Volberg or Williams, the MAGIC team has unique access to this data.

[8] Illegal acts to support gambling was recently dropped as a criterion for disordered gambling in DSM-V due to its infrequent endorsement. The problem with this approach is that people with less common signs and symptoms of problem gambling may not be correctly identified. It is sometimes argued that the problems associated with gambling are sequential and hierarchical (i.e., financial problems and mental health problems tend to occur long before illegal behavior or work problems) (Strong & Kahler, 2007; Strong et al., 2003; 2004; Toce-Gerstein, Gerstein & Volberg, 2003). Consequently, if the presence of some symptoms is known, the presence or absence of others can be inferred. However, while a standard sequencing of symptomatology applies to many problem gamblers, it does not apply to all of them. Because there are multiple routes to problem gambling and multiple contexts in which it develops, there are also multiple manifestations. Work problems may precede financial problems for people with higher incomes. Female gamblers often have a different profile compared to male gamblers (Blaszczynski & Nower, 2002; Maitland & Adams, 2007; Volberg, 2003). Social problems may have more prominence than financial problems for Asian gamblers (Raylu & Oei, 2004). Furthermore, analysis of the DSM-IV has confirmed there to be a different sequential/hierarchical ordering of items as a function of both age and gender (Strong & Kahler, 2007). The point here is that the optimal assessment instrument for problem gambling is not one that requires "one shoe to fit all," but rather, one that is able to recognize and capture all of the different manifestations of the disorder.

Longer Time Span (Optional)

The present proposal is for a 5-year study. However, as indicated earlier, a *10-year time frame* would be more optimal from a scientific standpoint to establish a comprehensive etiological model of problem gambling that captures both slow and rapid onset of this condition, as well as identifying factors involved in sustained recovery. Thus, the present study team is prepared to follow the MAGIC cohort over a 10-year period if funds were available. This aligns with the stated intent in the RFP to fund the project for much longer than the five years specified in the Budget Guidelines.

Finer Grained Chronology (Optional)

As noted earlier, prior longitudinal studies of gambling have been constrained by using inter-assessment intervals of one year or more as well as assessing problem gambling in a past-year time frame. Assessing problem gambling on a more frequent basis with shorter time spans for people to report on their behavior has the potential to both reduce measurement error and shed more light on the true course of this disorder.

Logistical difficulties preclude assessing the entire sample in this way, as it typically takes several months for thousands of people to be assessed (e.g., in the current SEIGMA Baseline survey, our assessment window is six months long). Participant fatigue and the self-monitoring impact of utilizing more frequent assessments are other important considerations. A reasonable compromise is to assess a subsample of respondents twice a year, with these people having six-month time frames to report on their gambling behavior. We refer to such a sample as a '*Biannual* sample'.

The *Biannual* sample would consist of a subsample of people[9] randomly selected from the cohort that will complete assessments twice a year. These individuals will have been pre-identified to receive the first invitations to participate in each Wave so that they complete early on in the assessment period (i.e., September). This means that when they are reassessed in February/March, roughly a six-month time period will have elapsed since their previous assessment.

In recognition of the fiscal constraints under which the MGC is operating, we have not included the *Biannual* sample in our budget. However, we believe this is a very important option for the MGC to consider and we are happy to provide cost information for inclusion of a *Biannual* sample if requested.

Approach

The sample for this project consists of 2,600 adult (18+) residents of Massachusetts, divided into two groups: a *General Population* sample and a *High Risk* sample. As indicated above, an optional *Biannual* sample is a potential third group.

Cohort General Population Sample

A representative sample of 1,300 adult residents of Massachusetts aged 18 and older will be recruited for the *General Population* sample. This sample size will be sufficient to establish the incidence of problem gambling in Massachusetts over time (especially when combined with the 1,300 people in the

[9] The size of the subsample would depend on available resources but would ideally be 1,000 individuals.

High Risk sample described below, whose data will be weighted to correct for sampling biases used in the high risk recruitment).

The *General Population* sample also gives us the ability to examine (a) the development of problem gambling among the small subset of individuals who do not evidence high levels of gambling involvement prior to becoming problem gamblers (the basis of our *High Risk* recruitment strategy described below) and (b) the impacts of greater gambling availability *on things other than problem gambling*. Further to this last point, although the incidence and etiology of problem gambling needs to be the primary focus of a Massachusetts longitudinal cohort, there is scientific value in also examining how the change in gambling availability in Massachusetts influences (a) the level of gambling participation among non-gamblers and recreational gamblers; (b) the mental health status of the general population and particularly among individuals with pre-existing mental health problems; and (c) family members of problem gamblers. While all of these impacts will be directly assessed in the before/after cross-sectional population surveys being conducted in the SEIGMA project (with much larger sample sizes), the *General Population* sample of the MAGIC project will provide additional data on these issues.

Finally, the *General Population* sample will also serve a valuable function as a control group for the population against which the more experimental *High Risk* group can be compared. Additionally, due to panel aging effects, inclusion of a *General Population* sample allows us to monitor similar patterns over time across the two groups and develop weighting and analytic procedures to control for such effects.

The 1,300 people constituting the *General Population* sample will derive from a random sampling of the 10,000 people who will have completed the SEIGMA baseline assessment currently being conducted by the NORC (this survey began in September 2013 and is expected to be completed in February 2014). To date, passive consent for further contact from NORC has been obtained from more than 90% of participants.

NORC is using an Address-Based Sampling (ABS) methodology for the SEIGMA baseline assessment, which is an approach that typically achieves higher response rates than telephone sampling (reducing the potential for bias) but without the same degree of problems associated with a pure door-to-door methodology. ABS is a relatively new approach that has been made possible by the recent development of a comprehensive listing of most residential addresses in the United States by the U.S. Postal Service (Iannacchione, 2011).[10] A random sample of addresses is first selected. These addresses are then matched with landline telephone numbers (as best as possible). The next step is to mail a letter with a small cash incentive that identifies a website where the survey can be taken online. People who do not respond are sent a paper copy of the questionnaire along with return postage. Everyone who fails to complete the survey via mail or online is then called and given the opportunity to do the survey over the telephone or reminded of the online option. This overall approach is a web -> mail -> telephone. Using this approach, approximately 50% of interviews are anticipated to be completed by web, 35% by mail,

[10] There is comprehensive coverage of urban residences but less comprehensive coverage of rural addresses and people living in group quarters (dormitories, army barracks, etc.) (Iannacchione, 2011). Although ABS does not provide comprehensive coverage of institutionalized populations, these groups represent very small proportions of the overall population. For example, the incarceration rate in MA is .00218% (or 218 per 100,000 residents) (U.S. Bureau of Justice Statistics, December 2009) and the proportion of the MA population serving in the military is under 1% (Segal & Segal, 2004). The proportion of US adults living in nursing homes is ~3% (CMS Nursing Home Compendium, 2012) while ~7% of Americans aged 12 and older received treatment at a specialty facility in 2009 (http://www.nida.nih.gov/Infofacts/nationtrends.html). The approximately 400,000 **college students** in MA represent ~6% of the population but only a proportion of these students live in dormitories.

and 15% by telephone. One advantage of the ABS approach is that all households have a known probability of selection regardless of whether they have a landline, only a cell phone or no telephone at all (Iannacchione, 2011; Link et al., 2008). Another advantage is that post-stratification weighting is simplified since all of the interviews are obtained from the same sampling frame.

Cohort High Risk Sample

Another group of 1,300 individuals selected for factors that put them at risk for problem gambling will constitute the *High Risk* sample.

High Risk Criteria

There are some important considerations involved in the choice of risk factors used for selecting the *High Risk* sample. For one, the risk factors have to produce a high enough "yield" of problem gamblers. A second consideration is that the risk factors have to be ones *common to the majority of problem gamblers*. For example, research has shown that the development of problem gambling is significantly more common in certain demographic groups (i.e., males, younger people, people with non-Caucasian ancestry) and people who engage in certain types of gambling (i.e., electronic gaming machines, online gambling). However, while selecting these risk factors would produce a very high "yield" of problem gamblers, it would not be a representative group, as there are many problem gamblers who do not have any of these characteristics.

Examination of the results from the Quinte Longitudinal Study (QLS) and the Leisure, Lifestyle, and Lifecycle Project (LLLP) has shown that *the most common risk factors preceding the development of problem gambling are heavy gambling involvement and/or subclinical problem gambling symptomatology*. In other words, it is uncommon for people to become problem gamblers if their prior-year involvement in gambling was minimal and/or they reported no problem gambling symptomatology whatsoever. That being said, it is also true that the majority of people with heavy gambling involvement and/or subclinical levels of problem gambling symptomatology do not go on to become problem gamblers. Nonetheless, the "yield" of problem gambling is sufficiently high for these gambling-related risk factors (common to most people who subsequently develop problem gambling) to represent an appropriate high risk recruitment strategy.

The choice of which particular gambling-related risk factor(s) to use is the next issue. As shown in the table on the following page, different gambling-related risk factors produced different yields in the QLS over a 5-year period.

QLS Risk Factor at Baseline	Number of people with this risk factor who were problem gamblers at baseline or became problem gamblers in the subsequent 4 years divided by the total number of people with this risk factor at baseline
Being in the top 8% of the cohort in terms of number of gambling formats engaged in.	48/330 = 14.5%
Being in the top 10% of the cohort in terms of gambling frequency.	92/421 = 21.9%
Being in top 10% of the cohort in terms of net gambling expenditure.	114/421 = 27.1%
Being in the 'At Risk' Category or Higher on the Problem & Pathological Gambling Measure.	219/700 = 31.2%

Using subclinical problem gambling symptomatology (i.e., PPGM 'At Risk' and higher scores) produces the highest overall yield (*n* = 219; 31.2%) partly due to the fact it ensures capture of *all* of the problem gamblers at baseline (136 out of 219 were problem gamblers at baseline). This is an important group to capture as it allows us to examine the course of problem gambling for these individuals in subsequent years. Hence, it will be used as one of our high risk criteria. However, it would be a mistake to rely exclusively on subclinical levels of gambling problems as our high risk criterion as this might skew the sample of problem gamblers to people having sufficient insight to recognize and report difficulties associated with their gambling behavior.

Although net gambling expenditure has the second highest yield, self-report of gambling expenditure is the most unreliable of all measures of gambling involvement (Blaszczynski, Dumlao, & Lange, 1997; Volberg, 2001; Williams & Wood, 2007). This is particularly true of problem gamblers, a significant minority of which report being 'winners' rather than having net losses (statistically very improbable considering the gambling formats in which they are engaged).

Our belief is that the best strategy to both produce a high yield and to capture a diverse array of people at risk for and having problem gambling is to use the following *High Risk* inclusion criteria:

- being in the PPGM At Risk[11] or higher category, AND/OR
- an average month expenditure on gambling that is in the top 10% for the Massachusetts population, AND/OR
- a frequency of gambling that is in the top 10% for the Massachusetts population.

In the QLS, these risk factors produced a yield of 235 problem gamblers out of the 845 people having one or more of these risk factors at baseline (235/845 = 27.8%). In a sample of 1,300 people with one or more of these risk factors (i.e., our planned *High Risk* sample size), this would produce 361 problem gamblers over a period of five years (assuming 100% retention). This 'yield' is higher than we would expect to obtain in the MAGIC project because the overall level of gambling involvement in the QLS data set is quite high already (29% of the QLS sample was over-selected for higher gambling involvement) and because we will not achieve 100% retention. Nonetheless, our estimate is that this high risk recruitment strategy can be expected to yield at least *180* problem gamblers in the *High Risk* group over a course of five years. Combined with the anticipated *50* or more problem gamblers from the *General*

[11] It will suffice for this to constitute a PPGM total score of 1 or higher and/or a CPGI score of 3 or higher.

Population sample, this will produce a total of approximately **230 problem gamblers**. This number should be sufficient to develop a comprehensive etiological model of problem gambling and to identify the main subgroupings and trajectories of this disorder.

High Risk Recruitment

Our intent is to recruit our *High Risk* sample from the current 10,000 SEIGMA baseline. More specifically, after random selection of 1,300 participants for the *General Population* sample, the remaining participants will be examined to determine their problem gambling status, average monthly gambling expenditure and gambling frequency. These remaining participants will be ranked according to risk profile. Participants with the highest risk score will be contacted first followed by people with progressively lower risk scores until a sample of 1,300 individuals is recruited into the study.

Supplemental High Risk Recruitment (Optional)

We anticipate that there will be approximately 230 problem gamblers identified during the course of the present study. While this will be sufficient to establish incidence and overall etiology of problem gambling, it may limit subgroup analysis. A fuller understanding of these potential differences and similarities would be valuable from both a treatment and a prevention perspective.

In response to reviewer concerns about the use of Respondent Driven Sampling (RDS), we have eliminated this element of the proposed study. While RDS has been successfully implemented in other areas of research, this approach has never been used in a gambling study and we agree that the methodology should be pilot-tested before being incorporated in this major study. If MGC is willing to increase our proposed budget to the level proposed by MGC for the first period of the study, then the addition of a pilot study of the RDS approach would be a primary recommendation. The MAGIC Research Team has already begun to consider ways in which our original design could be realized by seeking funding from other sources, such as the National Institutes of Health. Addition of a pilot study of the RDS approach would significantly increase the likelihood that we would be able to obtain such outside funding.

Cohort Biannual Sample (Optional)

The *Biannual* sample would ideally consist of 1,000 people randomly selected from the cohort that will complete assessments twice a year. These individuals will have been pre-identified to receive the first invitations to participate in each Wave so that they complete early on in the assessment period (i.e., September). This means that when they are reassessed in February/March, roughly a six-month time period will have elapsed since their previous assessment.

Wave 1 Assessment

As mentioned, our current Sept 2013 – Feb 2014 SEIGMA baseline survey will constitute the Wave 1 assessment, with 2,600 of these individuals selected for further continuation in the MAGIC study (1,300 *General Population* and 1,300 *High Risk*) in Waves 2 and beyond. As indicated earlier, in SEIGMA/MAGIC Wave 1 all participants are initially invited to complete the questionnaire via the web. People who fail to respond to this solicitation are sent the questionnaire in the mail and asked to return it when

completed. People who fail to respond to this solicitation are contacted by telephone and assessed in this manner.

The SEIGMA/MAGIC baseline questionnaire is approximately 20 minutes in length and assesses:

- Demographics
- Leisure Activity (including the recreational value of gambling)
- Physical Health
- Mental Health
- Substance Use
- Substance Abuse
- Behavioral Addiction
- Gambling Attitudes
- Gambling Availability
- Past Year Gambling Behavior (types engaged in; frequency of play; expenditure on each)
- Gambling Motivation
- Awareness and Participation in Problem Gambling Prevention programs
- Problem Gambling (self and others; using the Problem and Pathological Gambling Measure (Williams & Volberg, 2010, 2013) and the Canadian Problem Gambling Index (Ferris & Wynne, 2001))

Wave 2 Assessment

Wave 2 will occur in Sept 2014 – Jan 2015. Reassessment of the 2,600 individuals selected from Wave 1 will take place, using the same SEIGMA/MAGIC questionnaire used in Wave 1.

Similar to the Wave 1 SEIGMA/MAGIC protocol, NORC will begin by mailing these individuals an invitation to complete the survey online along with a small cash incentive ($1 bill). However, in Wave 2 an 'early bird' incentive will be added whereby respondents are offered an additional $10 if they complete the survey online within the first two weeks of data collection. This NORC-developed 'early bird' incentive technique maximizes web response and further reduces data collection costs (LeClere et al., 2012). NORC has recently fielded a series of experiments on the National Immunization Survey's Multimode Project (NIS-MM) that vary the format of mail invitations to encourage web participation. Capitalizing on the results from this research and the materials previously developed for SEIGMA, NORC will develop a MAGIC-specific invitation that includes an instructional postcard on how to log into the web survey, color and font changes to highlight the web login information, and bulleted frequently asked questions to reduce respondent burden.

An email invitation will follow the mailed invitation. If respondents do not reply to either the email or mailed invitation within three weeks, they will be mailed a hard copy self-administered questionnaire (SAQ). The initial hard copy SAQ will include a $5 bill to increase mail response rates (Messer & Dillman, 2011). NORC will build upon the 2013 SEIGMA materials to stress the importance of continued cooperation. Formatting is critical to encourage mail response since it is the only form of contact with the respondent. For both web and SAQ mailings, NORC will implement the Dillman Method (Dillman et al., 2008) to further ensure high levels of response. Under this approach, an initial invitation or SAQ is mailed, followed by a reminder postcard, and then a second invitation or SAQ.

Finally, participants will be contacted by telephone and invited to complete the survey in this modality if they have not completed the web survey or returned the hard copy SAQ within 13 weeks of initial

contact. NORC's multi-mode projection models, based on experience conducting large, multi-mode household surveys such as NIS-MM, Racial and Ethnic Approaches to Community Health Across the U.S. (REACH U.S.) and SEIGMA, indicate that these intervals between modes (i.e., 3 weeks between web and mail and 13 weeks between web and phone) are optimal to ensure high response rates and contain costs. Moreover, this multimode design maximizes representativeness of the population by capturing individuals in their preferred mode (Smyth et al., 2010), maximizes response rates compared to other web, mail, and/or telephone designs (Dillman et al., 2008), and minimizes social desirability bias (i.e., the tendency for respondents to answer questions in ways that paint themselves in a positive light) by ensuring that as many interviews as possible are completed without an interviewer (Holbrook et al., 2003; Kreuter et al., 2008).

To further minimize interviewer effects and ensure high-quality survey responses, NORC will staff the project with telephone interviewers who have experience with SEIGMA or similar projects. With more than 300 stations, NORC's telephone center optimizes consistent, high quality production with experienced and carefully supervised interviewers. All personnel will be trained in refusal conversion and respondent retention. All interviewers will go through rigorous training specific to MAGIC and will be required to pass a competency certification test.

Throughout data collection, NORC's telephone supervisors will continuously monitor interviewer productivity and adherence to project protocols. Telephone supervisors will monitor interviewers via digital recordings and score interviewers using a performance feedback system developed by NORC. On a monthly basis, supervisors will meet individually with interviewers to provide them with performance feedback and coaching.

Production will be monitored on a weekly basis. Production reports, production projections, and quality control programs are run daily to ensure that the project is evolving as expected. While NORC's experience on multimode longitudinal surveys has resulted in highly-accurate projection models and high quality procedures, unexpected events do occur. Daily review of reports ensures any issues are caught early so that corrective actions may be taken. For example, lower than expected production may be met with an additional sample draw from the SEIGMA interviews, changes in the incentive model, or refresher trainings for interviewers. The NORC and UMass Amherst teams will also meet weekly to ensure that all parties are up-to-date on protocols and actions and able to provide feedback on proposed changes.

Appendix A illustrates the case flow for Wave 2.

Wave 3 Assessment

Wave 3 will occur in Sept 2015 – Jan 2016. Two procedural changes will occur at this point.

First, the questionnaire will be expanded to approximately 35 minutes in length. All of the original questionnaire content will be retained. However, there will be additional questions added to more comprehensively assess leisure activity, physical health, mental health, substance use, substance abuse, and behavioral addictions. In addition, there will be new sections of the questionnaire to additionally assess:

- Lifetime gambling
- Context in which people gamble

- Social exposure to gambling (e.g., advertising)
- Gambling fallacies
- Personality (relevant aspects of personality)
- Stress
- Lifetime mental health
- Marital functioning
- Family functioning
- Social support
- Community involvement (social capital)
- Occupational functioning
- Illegal behavior (current and lifetime)
- Intelligence

In addition, an algorithm will be added to the questionnaire such that anyone having a significant movement in or out of problem gambling from the previous assessment will be prompted with a series of open and closed-ended questions inquiring about the chronology of this change and the factors the person believes are related to this change. Appendix C provides an overview of the questionnaire content and constructs.

Due to the increased length of the survey, a significantly larger incentive will be offered to respondents. 'Early birds' (i.e., those that complete the survey within two weeks) will receive $60 while all other respondents will be promised $40 at the completion of the survey (regardless of mode).

The second procedural change will involve a modification of our data collection techniques. Similar to Waves 1 and 2, data collection will begin with mailed invitations and emails to complete the survey online via a home computer or on a computer at a publicly available site (e.g., local library). If respondents do not complete the assessment within three weeks, NORC will attempt to contact the respondent by telephone to encourage web participation or, alternatively, if the person prefers, to schedule an appointment at one of two Massachusetts site offices to complete the survey online (NORC Boston Office or UMass Amherst Boston office; and the University of Massachusetts at Amherst). Respondents choosing this latter option will complete the survey on a NORC/UMass computer in a private office and receive a $40 debit card upon completion. The offices will be staffed with experienced field interviewers who will be available to offer assistance if necessary. However, the interview will be self-administered. This approach maximizes retention while minimizing interviewer effects since the interviewer will not be privy to the respondent's answers.

The Self-Administered Questionnaire option is eliminated beginning in Wave 3 due to the much greater length of the survey, the complicated branching algorithms for many of the new questions, and the much greater potential for participant entry omissions or errors with this format. The telephone administration option is also eliminated from Wave 3 to Wave 10 because the expanded questionnaire includes some sections that require self-administration (see Appendix C) and because self-administered surveys tend to produce more valid responding (only a small minority of participants in Wave 1 and 2 receive telephone administration).

Appendix B illustrates the case flow for Wave 3 and all future waves.

Wave 4 to Wave 10 Assessments

The 2,600 cohort participants will all be assessed in a Sept – Jan time period on an annual basis in the same manner as occurred in Wave 3 (i.e., comprehensive ~35 minute questionnaire; data collected using a web -> site office approach).

Retention

Based on our experience with four longitudinal cohort studies of gambling as well as NORC's extensive experience with several large national cohort studies, we will utilize several methods known to contribute to the highest possible retention rates:

1. *Conducting the assessment at the exact same time of year, each year.* This facilitates retention because participants learn to expect contact and survey completion in this circumscribed period. There is also scientific value of survey completion in a narrow temporal window, as (a) it decreases seasonal influences in the observed changes from year to year, and (b) it better ensures that the inter-assessment interval is close to 12 months for the large majority of participants.[12]
2. *Providing different options for survey completion.* Flexible data collection methods improve retention (Prinz et al., 2001; Salyer et al., 1998). This flexibility in assessment format and location also improves the representativeness of the sample, many of whom would not participate if more limited options had been available.
3. *Having a website.* A secure website where people can log on to do their survey provides reassurance of legitimacy; a means of communicating to the cohort and for cohort participants to communicate to the investigators; and a transparent presentation of the purpose and status of the project for the funder and the general public.
4. *Having permanent offices in the region.* This significantly increases the public profile of the project. It also allows people another option for letting the research team know about changes in their contact information.
5. *Providing incentives for participants.* Financial incentives to participants are known to improve retention (Collins et al., 2000; Prinz et al., 2001; Rudy et al., 1994). Thus, all MAGIC participants will be paid $40 per assessment. Participants will receive an extra $20 if they complete the assessment within 2 weeks of first notification.
6. *Have an easily remembered project logo (e.g. 'MAGIC').* This project logo will be used on exterior office signage; website; and all outbound communications (including incentive checks). This 'branding' allows participants to easily identify project mailings (and distinguishes them from the large volume of junk mail/email they receive).
7. *Hiring the 'right' people to recruit and maintain the cohort.* Research indicates that the degree to which participants are personally engaged with the people conducting the study is probably the most important factor in retention (Boots-Miller et al., 1998; Cotter et al., 2002; Salyer et al., 1998). It is typical for longitudinal studies to hire a large number of part-time employees who are often university students. However, (a) hiring a large number of part-time employees decreases the likelihood of the cohort developing personal engagement with the team; (b) the cohort may have

[12] Gambling tends to increase to some extent during the summer months and Christmas. Thus, because our analysis focuses on changes from year to year, it would be disadvantageous if assessments occurred in December one year, February the next year, May the next year, and perhaps December again the following year. Also, an assessment period that is spread over several months will result in widely different inter-assessment intervals between people and within the same person over the course of the study (i.e., not the 12 month period that is desired).

greater difficulty relating to university students because of differences in age and educational level; and (c) students are less likely to stay for the duration of the study. All of these factors can serve to reduce retention and hence the validity of the findings. Hence, in the present study NORC will use employees specialized in this type of work who express an intent to continue through the course of the study.

8. *Being attentive to the needs of each and every participant.* All participant complaints and suggestions will be responded to in a timely way. Further to this end, we will use information captured in our case management databases to build contacting profiles to more effectively engage respondents based on their past interactions with us. For example, if there are certain contact types, preferred phone numbers, better times to call, general reluctance or a higher likelihood to refuse, we want to approach respondents in a fashion tailored to their individual situations.
9. *Using staff time efficiently.* Experience in other longitudinal cohort studies suggests that roughly two-thirds of participants complete their assessment with 1 invitation, and one-third require multiple reminders. Significant time and monetary savings can be achieved by analyzing the characteristics of the cohort (i.e., procrastinators; in-office people; people needing assistance) and concentrating efforts on the people who need help and encouragement to complete the questionnaire.
10. *Maintaining contact between assessments.* Annual newsletters will be mailed out to inform participants of the importance of the project, progress to date, and reminding them to contact the office if their address changes. In addition to maintaining rapport, returned mail will allow staff to identify changed addresses well in advance of the next assessment.
11. *Having multiple means of contact.* Participants will be asked provide emails and phone numbers for themselves and up to three friends/family members that would know how to contact them if they moved.
12. *Having a small, stable and cohesive team, all of whom are highly engaged in the project with clear roles and hierarchical decision making power.* In general, success at conducting a large scale longitudinal cohort study is not due to a few critical things, but a thousand little things and the ongoing ability to quickly identify and rectify the many issues that continually arise.

Data Delivery and Quality Control

At the conclusion of each Wave, NORC will deliver to UMass Amherst a final data file that contains the cleaned and weighted questionnaire data for the given year. The data file will not contain any personal identifiers such as respondent telephone numbers, addresses, or names. Data from all data collection modes will be combined into a single analytic file that will include a variable to indicate the mode of data collection used to complete each interview. Weights will be developed to allow for within and across year analyses of gambling behavior. NORC will also prepare and deliver a codebook to document the contents of the data file. Along with the data file, NORC will deliver an annual methodology report that summarizes the sample design, data collection protocol, and any issues and resolutions that arose during data collection. An important deliverable will be development of geographic codes that allow distance measures from new gambling venues yet maintain confidentiality of subjects.

Statistical Analysis

The MAGIC cohort data, in combination with the SEIGMA cross-sectional data, will provide a rich and complex body of results for analysis. Challenges in the analysis include accounting for the stratified two-

stage cluster design of the SEIGMA study and the two-part strategy for enrollment of the MAGIC cohort. These design factors, plus the large number of co-variables that also vary by time, provide opportunities and challenges to better understanding the incidence, changes in prevalence, etiology, and progression of problem gambling. A strength of the MAGIC team is the experience the investigators have in analysis of longitudinal gambling data sets and the strong analytic background that they bring to these challenges.

A key concern expressed by the reviewers of our original proposal related to the question of how missing data would be handled. Missing data is anticipated in the MAGIC study. A consequence of missing data is (a) reduction in power to address key hypotheses and (b) the potential for bias in reporting results and interpreting conclusions. A full description of our plans for addressing missing data in the context of the multi-stage stratified cohort recruitment and anticipated waves of follow-up is not possible in the context of this proposal (Raghunathan, 2004). However, we can comment briefly on several key issues.

Data from studies such as the one proposed here will not be missing at random and we anticipate the potential for both a reduction in power and for bias in interpretation and reporting. To address the issue of a reduction in power, we will use efficient estimation strategies, including mixed models with best linear unbiased predictors. To address the issue of bias, we will use population-based weights to adjust for different covariate distributions between respondents and the population. This adjustment may be via calibration or inverse probability weighting and will include adjustments for non-response. We will conduct investigations to identify factors related to response rates including respondents' answers to specific questions at a previous wave. These factors will be used to characterize the response propensity of subjects and these probabilities will be used to classify subjects into response rate categories. Accounting for these response weights, along with weights associated with the subjects in the SEIGMA study, will allow unbiased estimates of problem gambling incidence to be constructed.

We will consider other popular missing data strategies, such as likelihood based methods and hierarchical mixed models that account for non-response when data is missing at random (Little & Rubin, 2002). Such models can provide insight but may result in biases when the probability of missing data at subsequent times depends on previous response. This can be investigated by stratifying response rates based on responses at an earlier wave. If such systematic non-response occurs, additional weights must be applied to produce unbiased population estimates. We will consider use of multiple imputation, in particular targeted analyses, when there are key missing covariate values. However, we plan to use dummy coding for the missing data patterns when possible and to model the differences directly. When more than one analytic approach exists to account for missing data, or there is dependence on missing data model assumptions, we will conduct sensitivity analyses and simulation studies to help interpret the results.

We will use a series of descriptive and inferential statistical methods in analyzing the MAGIC data. Some of the initial analyses will be design-based, and make use of sampling probabilities and weights that adjust for non-response to estimate incidence and prevalence, as noted in more detail above. These traditional approaches will account for stratification and be augmented by post-stratification and selected item imputation. Calibration will also be used (Deville & Särndal, 1992) as a model-based approach to account for multiple auxiliary variables, and avoid negative weights that can arise with general regression estimator (GREG) for survey sampling (Särndal, Swensson & Wretman, 1992). Model-based approaches will be used to address many of the analytic questions, including hierarchical and mixed models and Bayesian methods (Little, 2011, 2012). As an example, a variation on mixed models

that accounts for age and cohort effects as crossed random effects will be used to evaluate age-period-cohort effects, as proposed by Fullerton & Stern (2012; see also Yang & Land 2006).

Exploratory analysis will be conducted to assess a broad array of factors that may be risk or protective factors for problems gambling. In addition to using longitudinal data methods, we will use transition matrices to illustrate change over time and build models that predict such change. These models will be developed using principal component analysis and confirmatory factor analysis to identify important constructs, but we also plan to use simple interpretable variables for model construction (e.g., poor mental health, substance abuse, etc.). Cluster analysis will be used (without probability weighting) to identify patterns of independent variables (e.g., impulsive/antisocial pattern versus the emotionally vulnerable pattern; see Blaszczynski & Nower, 2002 as well as Windle & Scheidt, 2004) that may be related to an escalation in problem gambling risk. Logistic regression will be used in the context of transition matrices to determine:

- What combination of the independent variables maximally differentiates problem gamblers from non-problem gamblers;
- What combination of the independent variables maximally differentiates individuals who transition into problem gambling from those who do not; and
- What combination of the independent variables maximally differentiates problem gambling treatment seekers from problem gamblers who do not seek treatment?

The large sample size of 2,600 respondents (including 1,300 people oversampled for high risk) is a critical design factor that will enhance statistical power for all of the descriptive statistics and inferential analyses since we will capture a large number of critical transitions. Nevertheless, the complex design and analytic methods will be critically assessed prior to presenting results. This is necessary since the current sampling and modeling literature is still being developed. We will participate in this development, contributing new methods to address novel analytic issues, and evaluate results with extensive simulation studies. This approach will guard against false positive results and provide confidence for use of the findings in the development of problem gambling prevention and treatment efforts in Massachusetts.

Timeline and Deliverables

We present a timeline and list of deliverables, including proposed bi-annual reports to MGC, in Appendix D of this proposal.

DEMONSTRATION OF EXCELLENCE

All members of the proposed MAGIC Research Team have extensive background and expertise in gambling research, large-scale project management, and/or longitudinal research. Furthermore, all of the members of the MAGIC Research Team have been working together as a team on the SEIGMA project for the past year.

Two members of the MAGIC Research Team (Volberg and Williams) have directed or played key roles in the four large-scale longitudinal cohort studies of gambling that provide the basis for the approach recommended here. Williams is leading the development of an etiological model that applies across the two Canadian data sets while Volberg has been an advisor on the Swedish and Victorian studies, working to assure comparability across these two studies as well as with a third longitudinal cohort study of gambling presently underway in New Zealand. Both Williams and Volberg have organized entire conferences and/or sections of conferences on the existing longitudinal studies of gambling (e.g., AGRI 2012: The Causes of Problem Gambling; 15th International Conference on Gambling and Risk Taking). Most recently, in November 2013, Volberg was an invited speaker at a conference in Montreal focused on planning for a longitudinal cohort study in Quebec (Volberg, 2013). The third key member of the MAGIC Research Team at UMass Amherst is Stanek. For the past 20 years, Stanek has specialized in the analysis of longitudinal population survey data. He served as Principal Investigator on two NIH RO1 grants to develop methods for analyzing such data. As Chair of the Department of Public Health, Stanek mentors Ph.D. biostatistics students and teaches courses on mixed models and longitudinal data analysis.

Given their backgrounds and if the MAGIC Research Team is selected for the Massachusetts cohort study, there will be numerous opportunities for cross-fertilization and cross-cultural comparisons with the other gambling cohort studies as well as opportunities to improve methods in the analysis of longitudinal cohort data more generally. Funding of the MAGIC study will also provide Massachusetts and the MGC with the opportunity to be key contributors and collaborators in the international gambling regulatory community. Our plans for multiple peer-reviewed scholarly publications, supervision of graduate student theses and dissertations, and sharing of the data with other qualified researchers will assure dissemination of the findings and will place a spotlight on Massachusetts, assist the MGC in fulfilling its mission, and help realize the vision of the Expanded Gaming Act.

To advance the Massachusetts Gaming Commission's aims of understanding the impact of the introduction of casino gambling in the Commonwealth, and the pathways that lead to and away from problem gambling, UMass Amherst proposes to subcontract data collection for the Massachusetts Gambling Impact Cohort (MAGIC) study to NORC at the University of Chicago. NORC's 72 years as one of the nation's leading survey research organizations and its deep expertise recruiting and retaining longitudinal cohort samples with hard-to-reach populations mesh well with the substantive problem gambling and longitudinal analysis capabilities of UMass Amherst.

NORC brings valuable expertise to the proposed cohort study including many years of experience conducting the National Longitudinal Surveys of Youth, Cohorts 1979 and 1997 (NLSY79 and NLSY97), a large and multifaceted longitudinal survey of American youth; the Survey of Doctorate Recipients (SDR), a biennial longitudinal survey that captures demographic, education, and career history information of individuals with doctoral degrees; and multiple waves of the Transition to Nicotine Dependence in Adolescence study, which seeks to identify risk and protective factors that explain why some youth

become dependent on nicotine. Across these longitudinal cohort studies, NORC has demonstrated an exceptional ability to achieve high retention rates with 80-96% of respondents participating many years after recruitment and despite high mobility and the sometimes sensitive nature of the questions.

NORC also brings substantial problem gambling survey expertise from past studies such as the national Gambling Impact and Behavior Study (Gerstein et al., 1999) and the 2006 California Problem Gambling Prevalence Survey (Volberg, Carris & Gerstein, 2006) as well as immediately applicable knowledge gained in the MGC's 2013 cross-sectional SEIGMA Baseline population survey.

Finally, the MAGIC Research Team, including UMass and NORC, is in a unique position to leverage the 2013 SEIGMA Baseline survey to produce a panel of 2,600 respondents, 1,300 respondents with a high-risk of becoming problem gamblers and 1,300 respondents representative of the general population. Only NORC has access to the personal identifying information (e.g., name, address and other contact information) collected during the SEIGMA survey that is necessary for re-contacting the respondents. Using SEIGMA reduces recruitment costs, provides the MAGIC Research Team with the opportunity to use a rigorous recruitment method for obtaining a large number of high-risk gamblers into the cohort, and allows linking back to the SEIGMA survey to provide a sixth time point comparison for the MAGIC cohort.

In Appendix E of this proposal, we provide one-page biographical sketches for proposed key staff for the MAGIC Research Team that includes name, position, organization, and degree.

COST EFFECTIVENESS

The study proposed here will achieve significant cost efficiencies because it builds directly off of the SEIGMA study that is already underway in Massachusetts. The most obvious cost efficiency is the fact that Wave 1 of the MAGIC project has already been collected by NORC as part of the SEIGMA project (thus, the MAGIC project will actually have 6 Waves of data collection for the cost of 5).

The MAGIC Research Team also has the unique ability to leverage their experience with the 2013 SEIGMA survey in numerous ways and has gained an intimate understanding of MGC's research objectives based on this experience. Capitalizing on our understanding of both the MGC and the gaming industry in Massachusetts, the MAGIC Research Team has developed a data collection plan that builds cost efficiencies into five general areas: sampling, questionnaire/systems development, staffing, and incentives.

Sampling Cost- Efficiencies

First, we have proposed a sampling plan that eliminates the need for screening households. A strong candidate for this project must include a large sample of individuals at high risk of becoming problem gamblers. However, this target population only accounts for about 10% of the general population. A survey design that requires screening would increase data collection costs by as much as six-fold. To contain costs, NORC will capitalize on the 2013 SEIGMA sample and use this as the foundation for MAGIC to build a scientifically rigorous sample of 1,300 high-risk respondents and a control group of the 1,300 individuals from the general population.

Validated Questionnaires and Systems

Second, the MAGIC Research Team recommends fielding questionnaires that have previously been developed and validated. In Wave 2, NORC interviewers will administer the same questionnaire and use the same data collection methodology (i.e., web, mail, and telephone) as implemented in the 2013 SEIGMA survey. This nearly eliminates IT costs for systems development in Wave 2. Waves 3 through 6 will utilize a questionnaire similar to that fielded in the LLLP study in Alberta and the QLS study in Ontario. While NORC will have to build systems for this new questionnaire, previous work has validated the questionnaire making additional work to test measures unnecessary. Not only does this contain costs associated with development, it also improves analytic capacity by allowing comparisons across surveys. Moreover, NORC has developed respondent contact materials (e.g., invitations, instructions, etc.) for the 2013 SEIGMA survey and can use these as a foundation for MAGIC, minimizing time and costs devoted to materials development and enhancing the likelihood of respondent retention.

Continuity in Staffing

Third, the MAGIC Research Team has developed a staffing plan that maximizes efficiency and expertise. Four of the key members of the team (Volberg, Williams, Stanek, Johnson) will be able to transition their knowledge and working relationships built during the start-up of SEIGMA and the fielding of the SEIGMA Baseline survey to a high-functioning MAGIC team. Two other members of the MAGIC team (Houpt, Zorn) will be expanding their roles in project and data management in SEIGMA across to the MAGIC study. At NORC, continuity across the two projects in staffing of the statistics, telephone center and mail center teams will transition their knowledge and working relationships built during the 2013 SEIGMA

survey to MAGIC. This continuity, institutional memory, and stability in management staff across projects reduces the time required to manage MAGIC by nearly 15% compared to the time and cost required to hire and train a new team.

Use of Incentives

Finally, the plan for incentives to be paid to respondents has been carefully calibrated to achieve additional cost efficiencies. Incentives are a large portion of the data collection budget but their use can save money by significantly improving response rates and timeliness of response. Moreover, incentives are effective at encouraging participation in less expensive modes of data collection (i.e., web). These positive effects will reduce the number of required mailings, locating hours and prompting hours. NORC has used its proprietary cost optimization models to propose an incentive model that optimizes response rates with cost, resulting in a savings of over $100,000 compared to a similar design that achieves the same number of interviews without offering an incentive.

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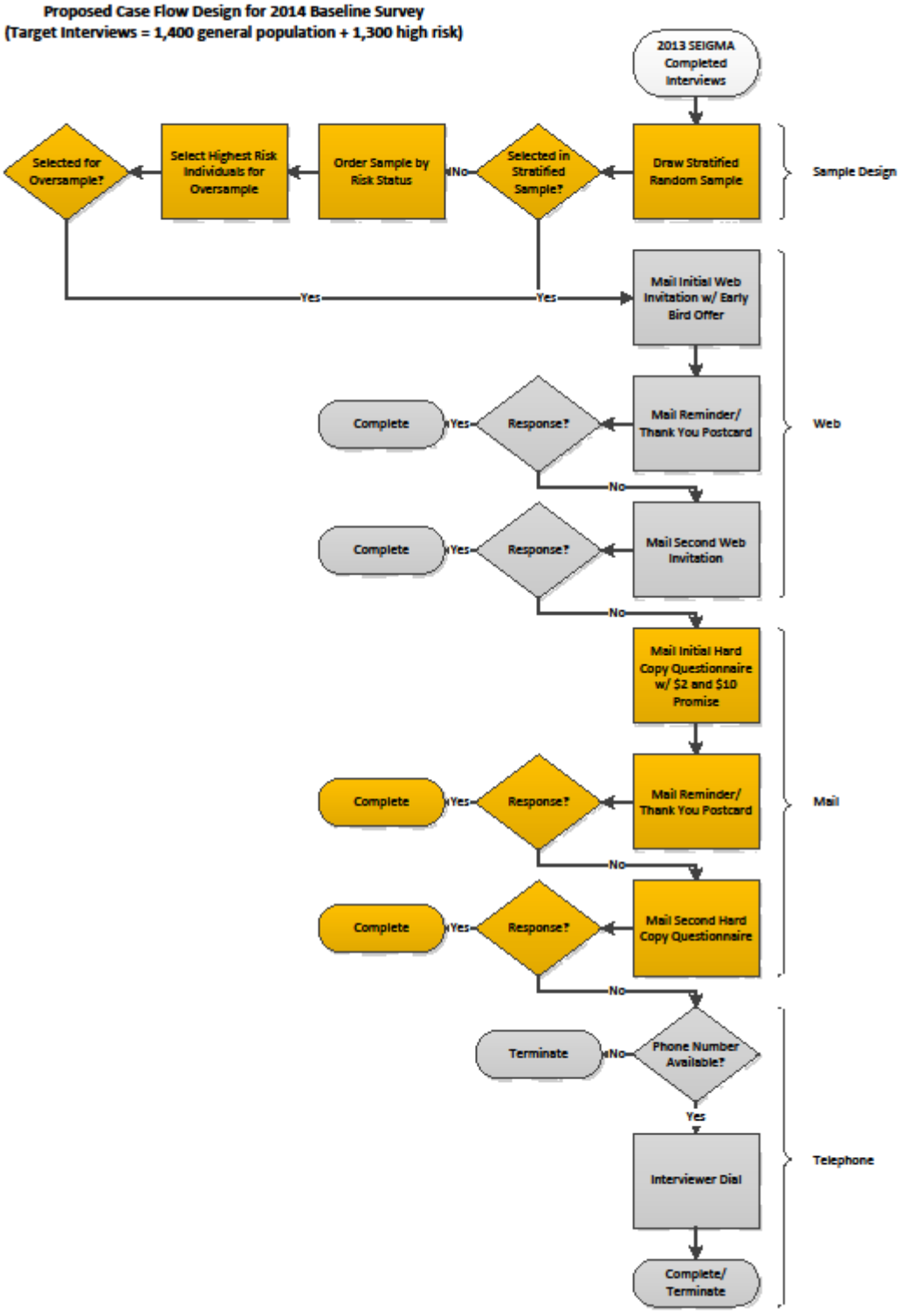
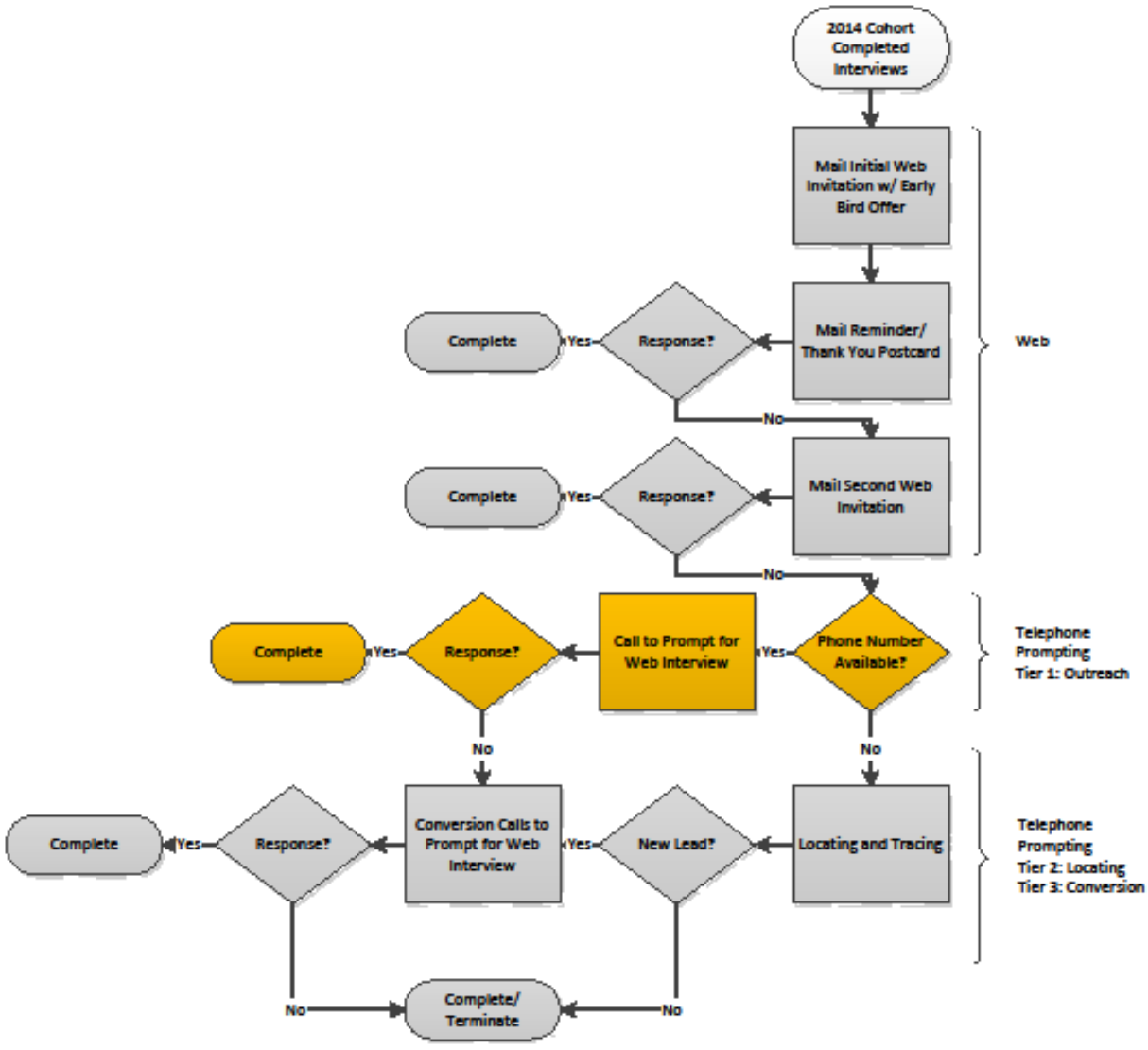
APPENDIX A: CASE FLOW FOR WAVE 2



APPENDIX B: CASE FLOW FOR WAVE 3 AND BEYOND

Proposed Case Flow Design for 2015 Year 2 Survey Sample
Target Interviews: 2,000



APPENDIX C: QUESTIONNAIRE CONSTRUCTS AND CONTENT

Single Assessment Only (primarily at Baseline)	Every Assessment

AREA	SUB AREA	TEST/QUESTIONS	TIME FRAME
DEMOGRAPHICS & FAMILY HISTORY	DEMOGRAPHICS	Birth date; gender; country of origin; ancestry; religion	NA
		# people in household	Current
		Household composition (including # children, ages, gender)	Current
		Education	Current
		Employment & occupation	Current
		Marital status	Current
		Home address & map coordinates of home & work address	Current
		Length of residency	NA
		Household income	Last tax year
		Household debt	Current
	RETENTION & CORROBORATION	Home and work phone numbers	Current
		Home and work e-mail	Current
		Names & numbers of 2 closest friends/relatives who would have the best idea of how to contact you	Current
PHYSICAL HEALTH	PHYSICAL FUNCTIONALITY	Physical disability or chronic health problem	Generally
	HEALTH STATUS	• General physical health • Amount of exercise • Height & weight	Since last assessment Generally
		• Medications; Purpose; Start date	
GAMBLING	LIFETIME GAMBLING	• Activities gambled on in lifetime • Age 1st gambled for money • Gambling frequency prior to 19 • Biggest win and biggest loss prior to 19 • Family history of gambling & problem gambling • Biggest lifetime win and biggest loss • Estimated lifetime expenditure • History of problem gambling • Ever received treatment	Lifetime

AREA	SUB AREA	TEST/QUESTIONS	TIME FRAME
	ATTITUDE TOWARD GAMBLING	Gambling Attitudes Scale	Current
	PAST YEAR GAMBLING BEHAVIOR	• Types engaged in since last assessment • Typical month frequency for each • Typical month spending for each • Biggest win & biggest loss • Venues patronized for horse racing and slot play since last assessment • Gambling on the Internet	Since last assessment & Typical month
	MOTIVATION FOR GAMBLING	• Reasons for playing • Reward Program membership	Current
	GAMBLING CONTEXT	• Alone or with friends • Gambling while smoking, using alcohol, or drugs	Since last assessment
	GAMBLING SOCIAL EXPOSURE	• # close friends and family members regular gamblers &/or PGs • Opportunities to gamble at workplace or school • Exposure to problem gambling prevention campaigns	since last assessment
	NEW MASSACHUSETTS GAMBLING VENUES	• Awareness of impending/existing facility • Perceived Impact of new facility • Perceived benefits and drawbacks	current
	PROBLEM GAMBLING	• Canadian Problem Gambling Index (CPGI) • Problem & Pathological Gambling Measure (PPGM) • Type of gambling causing most problems • Sought help for gambling problems • Areas where most problems are occurring (finances, work/school, family, legal, mental health, etc.) • If there has been recovery from problem gambling, a self-report of how this was accomplished	Since last assessment
	AVAILABILITY	• Proximity: distance to the nearest casino or slot parlor, bingo hall and lottery ticket outlet • Home and work Internet connection	Current
GAMBLING	GAMBLING FALLACIES	Gambling Fallacies Scale	NA

AREA	SUB AREA	TEST/QUESTIONS	TIME FRAME
PERSONALITY	INTROVERSION-EXTRAVERSION NEUROTICISM-EMOTIONAL STABILITY OPENNESS-CLOSE-MINEDEDNESS AGREEABLENESS-DISAGREEABLE CONSCIENTIOUSNESS-	• NEO-Personality Inventory-R (Short Form) + Depression, Vulnerability, Impulsivity, Excitement-Seeking subscales	Generally
STRESS		• Lifetime Stressors • Past Year Stressors • Overall stress • Overall life satisfaction • Overall happiness	Since last assessment & Current
MENTAL HEALTH	INTERNALIZING PROBLEMS EXTERNALIZING PROBLEMS THOUGHT DISORDERS	Lifetime Mental Health Composite International Diagnostic Interview – Short Form (CIDI-SF) + ASSIST + supplemental questions for • PTSD (2-20 questions) • Major Depression (2-18 questions) • Mania (1-6 questions) • Generalized Anxiety (2-8 questions) • Panic Attacks & Agoraphobia (2-10 questions) • Obsessive Compulsive (2-9 questions) • Bulimia (2-7 questions) • Schizophrenia & Delusional (2-6 questions) • Substance Abuse & Dependence (2-27 questions) • Other Addictions (2-26 questions)	Since last assessment & Generally (depending on area assessed)
SOCIAL FUNCTIONING & SUPPORT	CURRENT MARITAL FUNCTIONING	• Kansas Marital Satisfaction Scale • Sexual orientation	Current NA
	FAMILY FUNCTIONING	• Rating of family functioning	Current
	SOCIAL SUPPORTS	• Social Nonsupport subscale (8 questions) from Personality Assessment Inventory • Buckner Neighborhood Cohesion Scale • Rohrbaugh Jessor Religiosity Scale	Generally; Current (depending on area)
	COMMUNITY INVOLVEMENT	• Questions about 'social capital' (membership in community organizations; volunteerism; engagement in public affairs)	Past 12 months

AREA	SUB AREA	TEST/QUESTIONS	TIME FRAME
	RECREATIONAL ACTIVITIES	• Rank order of favorite leisure activities	Since last assessment
	OCCUPATIONAL FUNCTIONING	• Job Stress • Job Satisfaction	Since last assessment
	ILLEGAL BEHAVIOR	• Lifetime history of illegal behavior, charges, and incarceration • Antisocial Scale from Personality Assessment Inventory	Lifetime
		Illegal behavior	Since last assessment
INTELLECT	FULL SCALE IQ	Matrices subtest from Stanford Binet (4^{th} ed)	Current

APPENDIX D: TIMELINES AND DELIVERABLES

Sep 2013 – Feb 2014	WAVE 1 • SEIGMA General Population (*n* = 10,000) • 15-20 minute SEIGMA questionnaire • web -> mail -> telephone administration
Nov 20, 2013	MGC Request for Proposals to conduct cohort study of gambling in Massachusetts
Dec 20, 2013	RFP Submission from MAGIC team
Jan 10, 2014	MGC Proposal Adjudication
Feb 14, 2014	RFP Re-Submission from MAGIC team
Mar 1, 2014	Start of MAGIC project
Mar 7, 2014	Slot Parlor License Awarded
Mar – Jun 2014	MAGIC WAVE 3 Questionnaire finalization
Apr 2014	MAGIC Team Meeting at UMass Amherst
May 30, 2014	Awarding of Boston area and Western Massachusetts casino licenses
Jun/Jul 2014	MAGIC Ethics Submission and Approval from UMass and NORC Institutional Review Boards (IRBs)
Sep 2014 – Jan 2015[13]	WAVE 2 • 1,300 General Population (randomly selected from our 10,000 SEIGMA Baseline) • 1,300 High Risk (highest risk people from remaining 9,000) • ~20 minute SEIGMA self-administered questionnaire • web -> mail -> telephone administration
Nov 2014?	Awarding of Southeastern Massachusetts casino license
Feb 2015?	Slot Parlor Opened? (1250 slot machines) (11 months after announcement) (Note: a phased-in opening could start as early as Aug 2014)
Mar 30, 2015	Report to MGC and Gambling Research Advisory Committee (GRAC)
Apr 2015	MAGIC Team Meeting
Sep 30, 2015	Report to MGC and GRAC
Sep 2015 – Jan 2016	WAVE 3 • 1,300 General Population • 1,300 High Risk • ~35 minute comprehensive self-administered questionnaire • web -> site office
Mar 30, 2016	Report to MGC and GRAC
Apr 2016	MAGIC Team Meeting
July 2016?	Boston ($1B) and Western Massachusetts ($800M) casinos opening? (26 months after announcement)
Sep 30, 2016	Report to MGC
Sep 2016 – Jan 2017	WAVE 4 • Same methodology as WAVE 3
Feb 2017 – Mar 2017	*OPTIONAL(but recommended)* • 1,000 reassessments of the Biannual Subgroup (randomly selected from the 2,600) (these people pre-identified and notified first in WAVE 2 (resulting in completion in Sep/Oct); these people using a 6 month time frame for all variables
Jan - Feb 2017?	Southeastern Massachusetts casino ($500M) opening? (26 months after announcement)
Mar 30, 2017	Report to MGC and GRAC

[13] Note, Sept 2014 best time for Assessment 2 so as to keep the 1 year inter-assessment interval, and to avoid trying to re-recruit in the summer.

April 2017	MAGIC Team Meeting
Sep 30, 2017	Report to MGC and GRAC
Sep 2017 – Jan 2018	WAVE 5 • Same methodology as WAVE 4
Feb 2018 – Mar 2018	*OPTIONAL(but recommended):* 1,000 reassessments of Biannual Subgroup
Mar 30, 2018	Report to MGC and GRAC
Apr 2018	MAGIC Team Meeting
Sep 30, 2018	Report to MGC
Sep 2018 – Jan 2019	WAVE 6 • Same methodology as WAVE 5
Feb 2019 – Mar 2019	*OPTIONAL(but recommended):* 1,000 reassessments of Biannual Subgroup
Mar 30, 2019	Report to MGC
Apr 2019	MAGIC Team Meeting
Sep 30, 2019	Final Report to MGC and GRAC
Sep 2019 – Jan 2020	WAVE 7 (OPTIONAL; but recommended) • Same methodology as WAVE 6
Feb 2020 – Mar 2020	*OPTIONAL(but recommended):* 1,000 reassessments of Biannual Subgroup
Mar 30, 2020	Report to MGC and GRAC
Apr 2020	MAGIC Team Meeting
Sep 30, 2020	Report to MGC and GRAC
Sep 2020 – Jan 2021	WAVE 8 (OPTIONAL; but recommended) • Same methodology as WAVE 7
Feb 2021 – Mar 2021	*OPTIONAL(but recommended):* 1,000 reassessments of Biannual Subgroup
Mar 30, 2021	Report to MGC and GRAC
Apr 2021	MAGIC Team Meeting
Sep 30, 2021	Report to MGC and GRAC
Sep 2021 – Jan 2022	WAVE 9 (OPTIONAL; but recommended) • Same methodology as WAVE 8
Feb 2022 – Mar 2022	*OPTIONAL(but recommended):* 1,000 reassessments of Biannual Subgroup
Mar 30, 2022	Report to MGC and GRAC
Apr 2022	MAGIC Team Meeting
Sep 30, 2022	Report to MGC and GRAC
Sep 2022 – Jan 2023	WAVE 10 (OPTIONAL; but recommended) • Same methodology as WAVE 9
Feb 2023 – Mar 2023	*OPTIONAL(but recommended):* 1,000 reassessments of Biannual Subgroup
Mar 30, 2023	Report to MGC and GRAC
Apr 2023	MAGIC Team Meeting
Sep 30, 2023	Final Report to MGC

APPENDIX E: KEY PROJECT STAFF

One-page biographical sketches for proposed key members of the MAGIC Research Team that include name, position, organization, and degree are provided here.

Rachel A. Volberg, PhD

SEIGMA Co-Principal Investigator & Team Leader
Research Associate Professor
School of Public Health & Health Sciences
University of Massachusetts

Academic and Professional Background

- Dr. Volberg has been engaged in gambling studies since 1985, specializing initially in prevalence surveys and later expending her interests into social impact studies and, more recently, into improving methods for assessing problem gambling in clinical and community studies. From 1992 until 2012, Dr. Volberg worked primarily through her consulting firm, Gemini Research Ltd. In 2013, Dr. Volberg was appointed Research Associate Professor at the University of Massachusetts Amherst School of Public Health and Health Sciences where she leads the MGC-funded SEIGMA study.

Experience Relevant to the Present Project

- Internationally recognized gambling researcher.
- Leading authority on the social impacts of gambling; on best practices in the population assessment of gambling behavior and problem gambling; and on the conduct of large-scale longitudinal cohort studies of gambling.
- World's most experienced gambling and problem gambling epidemiologist with experience directing studies throughout North America as well as Australia, Britain, New Zealand, Norway, Singapore and Sweden.
- One of the world's best funded gambling researchers over a 28-year career (with virtually none of this funding coming directly or indirectly from the gambling industry).
- Co-investigator on three major socioeconomic impact studies of gambling including state-level studies in Louisiana and Montana and the national study conducted under contract to the National Gambling Impact Study Commission.
- Co-director of the first study of the impacts of problem gambling on families in Singapore.
- North American Regional Editor for *International Gambling Studies*, one of the main journals in the gambling studies field.
- Served on the Editorial Board of *Journal of Gambling Studies*, the oldest journal in the gambling studies field, from 1993 to 2012.
- Reviewer for funding agencies (inc. National Institutes of Health, Health Research Council of New Zealand, U.K. Gambling Commission, Gambling Research Australia) and 22 academic journals.
- Consultant and advisor to governments in Europe, Asia and North America on issues of gambling research and policy.

Robert J. Williams, PhD, R.Psych.

SEIGMA Co-Principal Investigator
Professor, Faculty of Health Sciences &
Research Coordinator, Alberta Gambling Research Institute
University of Lethbridge

Academic and Professional Background

- A clinical psychologist by training, Dr. Williams spent the first 15 years of his career as the regional psychologist for northern Manitoba and then as a clinician in the Addiction Centre in Calgary, Alberta. Since 2001, he has been an academic at the University of Lethbridge in Alberta, where he is currently a full professor in the Faculty of Health Sciences, as well as a Research Coordinator with the Alberta Gambling Research Institute.

Experience Relevant to the Present Project

- Internationally recognized gambling researcher and leading authority on the etiology and prevention of problem gambling, socioeconomic impacts of gambling, population surveys, assessment of problem gambling, indigenous gambling, and Internet gambling.
- A principal investigator on the two major Canadian longitudinal studies of gambling (LLLP & QLS) and a consultant to the SWELOGS study.
- Recently published a comprehensive review of the evidence pertaining to the prevention of problem gambling and best practices in prevention.
- Lead author on a recent book on Internet gambling.
- Produced recent comprehensive summary of what is known about gambling and problem gambling among Aboriginal peoples within North America.
- Developer of the most valid and reliable instrument for the assessment of problem gambling (Problem and Pathological Gambling Measure, PPGM).
- Developer of the only empirically effective high school curriculum for the prevention of problem gambling ('Stacked Deck').
- In addition to having provided treatment to 100s of people with addictions, has published research on the treatment of addictions.
- Led the two major socioeconomic impact studies of gambling in Canada (in Alberta and British Columbia) and was selected to lead the third one in Ontario (the purpose of this latter study changed when the gambling venue failed to open).
- Conducted a recent comprehensive summary of all 492 studies that have examined the socioeconomic impacts of gambling.
- Developed a theoretical approach and set of international guidelines for assessing the socioeconomic impacts of gambling.
- Research Coordinator (for the past 12 years) for one of the oldest and best established gambling research institutes: the Alberta Gambling Research Institute (a university-based institute funded by the Alberta government).
- Has taught a graduate level Advanced Statistics course at the University of Lethbridge for many years.

Edward J. Stanek III, PhD

SEIGMA Co-Principal Investigator
Chair, Department of Public Health
School of Public Health & Health Sciences
University of Massachusetts

Academic and Professional Background

- Dr. Stanek is a biostatistician with over 30 years of experience. Dr. Stanek joined the UMass School of Public Health & Health Sciences in 1984 and, since then, has taught a broad set of graduate courses, including survey sampling, non-parametric statistics, multivariate analysis, and longitudinal and mixed model analysis in addition to basic courses in statistical theory. He is an expert on estimating soil ingestion for risk assessment, and has conducted primary analyses of longitudinal studies and meta-analyses in this substantive area. His main research focus is inference based on sampling from finite population studies accounting for identifiability. He has received multiple NIH grants in this area and the resulting methods have lead to multiple publications.

Experience Relevant to the Present Project

- Leadership of data management teams for large-scale longitudinal studies.
- Publications in finite population data analysis, cluster randomized studies, and surveys.
- Currently the Chair of the Department of Public Health, consisting of the Division of Biostatistics and Epidemiology, the Division of Community Health Studies, and the Division of Environmental Health.
- Chair of 26 tenure-track faculty in the Department, 4 Research Professors, and an additional 22 other staff, lecturers, and Public Health and Research professionals.
- Manages a budget of over $2,500,000 in state funds, and has oversight for an additional $1,500,000 in research funds.
- Major research area is biostatistics, specializing in finite population methods for use in surveys and cluster randomized trials.
- Has received two R01 investigator-initiated grants as the Principal Investigator from the National Institutes of Health (each over $1,000,000) involving international collaborators and management of technical research and budgets.
- The current focus of Dr. Stanek's research is on coupling finite population and Bayesian inference to address practical problems that may arise from surveys, observational studies, or designed experiments. This research is directly relevant to the technical needs of the current project.
- Involvement in other large, complex longitudinal and multi-site studies (e.g., a 7-year longitudinal study of members of the Fallon Health Maintenance Organization to identify seasonal variation in serum cholesterol in collaboration with faculty and staff at the UMass Worcester Medical School and faculty in the Department of Kinesiology and Psychology at UMass, Amherst).
- Management of all data from the study, and creation of a web site to distribute the data and communicate with stakeholders and interested parties.

Amanda Houpt, MPH

SEIGMA Project Manager
School of Public Health & Health Sciences
University of Massachusetts

Academic and Professional Background

- Ms. Houpt received her Master of Public Health in Health Behavior from the University of North Carolina Gillings School of Public Health. While at UNC, she completed her Master's project in collaboration with the UCLA Art & Global Health Center, in which she worked with a team of students to adapt and plan an evaluation of an arts-based HIV prevention program. In recognition of her leadership, academic excellence and promise in the field of public health, UNC faculty awarded her the Lucy S. Morgan Fellowship and inducted her into the Theta Chapter of the Delta Omega Honor Society. Prior to completing her MPH, Ms. Houpt served as the Prevention Coordinator of the largest dual domestic violence shelter and rape crisis center in the state of Kentucky.

Experience Relevant to the Present Project

- Ms. Houpt has substantial experience in project coordination and management.
- In her role as Prevention Coordinator, she managed primary prevention efforts in eleven Kentucky and Indiana counties, including participation in a CDC-funded 5-year pilot of a youth violence prevention program. She measured program outcomes and regularly reported them to funders, facilitated monthly coalition meetings, co-wrote 3 curricula, and facilitated 300+ educational programs annually.
- While at UNC, she served as a Program Coordinator for a campus-wide violence prevention program and trained 472 students, faculty and staff to advocate for survivors of violence. She also monitored the program, wrote a train-the-trainer guide, and trained peer educators.
- Within the Department of Health Behavior, she served as the MPH Program Assistant, coordinating required student fieldwork and fulfilling all duties of the MPH Program Manager during a leave of absence.
- Ms. Houpt completed a summer practicum at the Buncombe County Department of Health in which she advised them on creating a youth-friendly service environment by conducting literature reviews and making recommendations to support the creation of a youth-friendly clinic and youth advisory council based on positive youth development principles.
- Ms. Houpt served as the Nutrition Program Coordinator for the Mason Square Health Task Force in Springfield, MA where she adapted and initiated a community-based nutrition curriculum.
- Ms. Houpt has an established record of leadership in public service, having served on the Board of Directors of Peace Education, a non-profit that trains youth in conflict resolution and peer mediation and as the Volunteer Coordinator for the 34th Annual Minority Health Conference. Additionally, she served as a founding member and facilitator of the Louisville Metro Coalition to Prevent Teen Dating Violence.

Martha Zorn, MS

SEIGMA Data Center Manager
School of Public Health & Health Sciences
University of Massachusetts

Academic and Professional Background

- Ms. Zorn has worked as a biostatistician and data manager in the School of Public Health and Health Sciences, at the University of Massachusetts, Amherst for the past 25 years. During that time, Ms. Zorn has worked on numerous research projects, including HIV research, cohort mortality studies, smoking for cancer survivors, diabetes and cystic fibrosis, community based obesity prevention among black women, improving cancer screening in low income housing sites, improving health literacy through the internet, influencing media and the public agenda on cancer and tobacco disparities, and respiratory effectiveness clinical trials. She earned her BS in Mathematics from Earlham College and her MS in Biostatistics from the University of Massachusetts, Amherst, where she was elected to the Rho Chapter of the Delta Omega Honor Society.

Experience Relevant to the Present Project

- Ms. Zorn has substantial experience in data coordination and management.
- In her role as SEIGMA Data Center Manager, Ms. Zorn has overseen the successful submission of numerous IRB and ethics protocol applications; has established guidelines for managing primary and secondary data that will be submitted by the Social and Health Impacts Team and the Economic and Fiscal Impacts Team; has supervised research assistants to prepare secondary data for posting to the secure SEIGMA website; and has assisted in the development of the public SEIGMA website.

Michael Johnson, PhD

NORC SEIGMA Project Director
Principal Research Scientist
NORC at the University of Chicago

Academic and Professional Background

- Prior to joining NORC, Dr. Johnson's positions included: Senior Research Leader at Battelle Memorial Institute; Senior Partner and Research Leader at The Gallup Organization; Chief of Evaluation and Surveillance at the California Department of Health Services, Tobacco Control Section; and Research Director at the Stanford University, School of Medicine, Health Promotion and Disease Prevention Research Center. Dr. Johnson is a leader in research and evaluation, having led the design and implementation of multiple surveillance and evaluation studies. He has led projects ranging in size from national evaluation and surveillance efforts focused on tobacco use and obesity prevention to state and county-level efforts with funding ranging from $100,000 to $30 million.

Experience Relevant to the Present Project

- As a Principal Research Scientist at NORC at the University of Chicago, Dr. Johnson brings over 20 years of experience leading national and state-level cross-sectional and longitudinal studies in the areas of high risk behavior, including gambling, tobacco use, alcohol and substance abuse.
- Currently directing projects in NORC's Substance Abuse, Mental Health and Criminal Justice Studies and Public Health departments, Dr. Johnson is responsible for general oversight of all project phases, including the development and monitoring of project schedules and budgets, monitoring data collection and delivery, and maintaining client relations.
- As the current NORC Project Director for the SEIGMA Baseline Survey, Dr. Johnson is leading the current team toward successful completion of the baseline survey.
- Dr. Johnson will continue as Project Director for the MAGIC Cohort Study, overseeing all aspects of the project, including monitoring the project budget, providing general oversight on all project tasks, and assuring the delivery of final products in a timely and efficient manner.
- This continuity of leadership between projects will provide time and intellectual efficiencies to the Massachusetts Gaming Commission (MGC) and will build upon the already excellent working relationship Dr. Johnson has established with UMass Amherst and MGC.