

Op-Ed/Editorials - Can Massachusetts evaluate the impact of its gambling expansion?

June 10, 2013

Throughout the world, governments have permitted and even encouraged the expansion of gambling as a method to improve the economic status

of a jurisdiction. Recently, Massachusetts - already purveyor of the country's most successful lottery - passed legislation that permits statewide gambling expansion ("Bill H03697," 2011).

Despite the promise of an improved economic situation, gambling does not come without risk. For example, in addition to the financial losses typically associated with gambling, gambling also comes with the potential to produce a variety of health and social problems (e.g., anxiety, depression, gastro-intestinal, sleep, jeopardized relationships: Petry, 2000; Petry, 2005; Pietrzak, Molina, Ladd, Kerins, & Petry, 2005; Shaffer & Korn, 2002; Shaffer & Martin, 2011).

Today, scientists cannot predict with specificity or certainty how gambling expansion will impact an exposed population. One of the primary reasons for this inability is that there have been very few prospective longitudinal studies that have focused on gambling expansion (e.g., Bondolfi, Jermann, Ferrero, Zullino, & Osiek, 2008; Jacques & Ladouceur, 2006). Prospective studies, unlike cross-sectional research, follow the **same** people over time to see how they react to environmental influences. This repeated monitoring allows researchers to determine, for example, whether new cases of gambling problems emerge - even long after they have left the exposed area - and whether communities exposed to new or expanded gambling in the past develop problems as a result. These observations are not possible with cross-sectional designs. A cross-sectional design provides only a snapshot of an individual's exposure to gambling opportunities and gambling-related outcomes - at the same time. Cross-

sectional

designs cannot determine the influence of gambling exposure or expansion at one time and the outcome of these events at another time because the study samples are different during these different observation periods. Consequently, cross-sectional

research designs fail to provide information about the emergence of new cases as well as the course and duration of gambling-related problems. Although a cross-sectional design is a good starting point for identifying relationships among the things scientists measure, to determine etiology and impact, scientists must rely on a longitudinal design.

Like many

jurisdictions before it, the Massachusetts Gaming Commission has decided, for its initial assessment of the impact of gambling expansion, to support a multi-wave,

but fully cross-sectional design. Commissioner Zuniga summarized the Commission

position, noting “[W]hat we believe is that a cross-sectional approach would be in a better position, would not help just this Commission but service providers be better informed as to how to target, design services...” (The Commonwealth of Massachusetts, Massachusetts Gaming Commission, Public Meeting #59, 2013, p. 18). This strategy represents a missed opportunity.

A considerable body of inquiry illustrates the enormous value of prospective longitudinal research designs. For example, Massachusetts has been home to one of the world’s most influential and effective prospective studies focusing on cardiovascular health - the Framingham Heart Study (Levy & Brink, 2005; National Heart Institute (U.S.), 1966). Now many decades old, this kind of prospective longitudinal study has shaped our understanding of complex events and impacts. The Nurses Health Study (e.g., Chen, Rosner, Hankinson, Colditz, & Willett, 2011), Adolescent Health Study (e.g., Kane & Frisco, 2013), and the Hull Quebec gambling impact research (Jacques & Ladouceur, 2006) projects also reveal the fundamental and enduring value of prospective research (e.g., in these instances, for breast cancer, adolescent pregnancy, and casino community impact).

Unfortunately, without prospective longitudinal studies, stakeholders are left with a black box of uncertainty about causal influence for many outcomes. By employing a cross-sectional design, Massachusetts' service providers will not be in an informed position to understand precisely the extent or causes of shifting health and social problems potentially related to gambling. Prospective studies provide the scientific vehicle for gaining a clear understanding of the extent of expanded gambling impact. A prospective longitudinal strategy, unlike multiple cross-sectional surveys, can provide fundamental information about the incidence rate (i.e., new cases) of gambling-related problems, the course and duration of those problems, and other within-individual changes that occur over time as a result of gambling expansion. In addition, prospective longitudinal research will provide information about the movement of Massachusetts's residents in and out of gambling-affected communities.

Massachusetts has a limited opportunity to study the impact of expanded gambling prospectively. Because of the broad expansion of gambling that already has occurred around the globe, this is one of the remaining opportunities to understand the population impact of gambling expansion. Consequently, at the Division on Addiction, we have been working to establish the first wave of a prospective, longitudinal research study of a standing Massachusetts Internet panel recruited via random household-based sampling methods. This [baseline report](#) establishes benchmarks within this panel before gambling expansion occurs within the state (Nelson, Kleschinsky, LaPlante, Gray, & Shaffer, 2013). Though our analyses of first wave data provide considerable information and insight about this panel, its gambling, and Massachusetts, this study will be most informative when we are able to investigate how and when panel members change their gambling behavior, attitudes, and problems in response to gambling expansion and exposure. To be able to detect these changes across groups of individuals and regions with precision, it would be advantageous to undertake a larger, state-representative, and longitudinal study. Even better would be the opportunity to compare longitudinal findings across studies conducted within the same jurisdiction.

Therefore, we encourage the Massachusetts' Gaming

Commission to consider revising their choice of study design to include a prospective component. Only then can they examine the fundamental elements of impact (i.e., incidence, course, duration, influence on existing cases). A highly robust analysis of expanded gambling impact will help Massachusetts' public health workers develop effective prevention and treatment programs.

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References

Bill H03697, 03697 1-157 (2011).

Bondolfi, G., Jermann, F., Ferrero, F., Zullino, D.,
& Osiek, C. (2008). Prevalence of pathological gambling in Switzerland
after the opening of casinos and the introduction of new preventive
legislation. *Acta psychiatrica
Scandinavica*, 117, 236-239. doi: 10.1111/j.1600-0447.2007.01149.x

Chen, Wendy Y, Rosner, Bernard, Hankinson, Susan E,
Colditz, Graham A, & Willett, Walter C. (2011). Moderate alcohol
consumption during adult life, drinking patterns, and breast cancer risk. *Journal
of the American Medical Association*,
306(17), 1884-1890. doi: 10.1001/jama.2011.1590

*The
Commonwealth of Massachusetts, Massachusetts Gaming Commission, Public
Meeting
#59,
160 (2013).*

Jacques, Christian, & Ladouceur, Robert. (2006). A
prospective study of the impact of opening a casino on gambling behaviours: 2-

and 4-year follow-ups. *Canadian Journal of Psychiatry*, 51(12), 764-773.

Kane, Jennifer, B., & Frisco, Michelle L. (2013). Obesity, school obesity prevalence, and adolescent childbearing among U.S. young women. *Social Science & Medicine*, 88, 108-115.

Levy, Daniel, & Brink, Susan. (2005). *A change of heart: how the Framingham heart study helped unravel the mysteries of cardiovascular disease* (1st ed.). New York: Knopf: Distributed by Random House.

National Heart Institute (U.S.). (1966). *The Framingham heart study: habits and coronary heart disease*. Bethesda, Md.,.

Nelson, Sarah E., Kleschinsky, John H., LaPlante, Debi A., Gray, Heather M., & Shaffer, Howard J. (2013). A Benchmark Study For Monitoring Exposure to New Gambling Opportunities: Final Report. Boston, MA: Division on Addiction, Cambridge Health Alliance, a teaching affiliate of Harvard Medical School.

Petry, Nancy M. (2000). Psychiatric symptoms in problem gambling and non-problem gambling substance abusers. *American Journal of Addictions*, 9, 163-171.

Petry, Nancy M. (2005). *Pathological gambling: etiology, comorbidity, and treatment* (1st ed.). Washington, DC: American Psychological Association.

Pietrzak, R. H., Molina, C. A., Ladd, G. T., Kerins, G. J., & Petry, N. M. (2005). Health and psychosocial correlates of disordered gambling in older adults. *American Journal of Geriatric Psychiatry*, 13(6), 510-519.

Shaffer, Howard J., & Korn, David A. (2002). Gambling and related mental disorders: a public health analysis. In Jonathan E. Fielding, Ross C. Brownson & Barbara Starfield (Eds.), *Annual Review of Public Health*

(Vol. 23, pp. 171-212). Palo Alto: Annual Reviews, Inc.

Shaffer, Howard J., &
Martin, Ryan. (2011). Disordered Gambling: Etiology, Trajectory, and Clinical Considerations. *Annual Review of Clinical Psychology*, 7(April), 483-510. doi: 10.1146/annurev-clinpsy-040510-143928

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I would like to concur with the statement regarding prospective studies. Far too often, cross-sectional data have been used in this field.

An important thing to consider:

This cannot be a "before-after" study. Massachusetts already has a highly successful lottery with popular scratch tickets. These tickets have a relatively high payout rate. Massachusetts also has racing and off-track betting. In addition, slots are legal in Rhode Island and there are two casinos in Connecticut. The failure to consider this occurred in the Quebec study that evaluated the effect of introducing casinos. The province already had video machines in bars. In other words, the "horse" was already "out of the barn." Any result in Massachusetts would be measuring the impact of increasing availability in certain locations, and not the result of legalizing casinos (especially video machines) per se.

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Henry R. Leiseur, Ph.D., Psy.D.

Posted: July 8, 2013

Letter to the Editor: Can Massachusetts Evaluate the Impact of Gambling Expansion?

On June 10, 2013 the Division on Addictions (DOA) at Cambridge Health Alliance wrote an editorial critical of the Massachusetts Gaming Commission titled Can Massachusetts Evaluate the Impact of its Gambling Expansion? Their essential point was that the repeated cross-sectional design chosen to evaluate the impact of expanded gambling in Massachusetts (i.e., random sampling of the population at different time points) is inferior to a cohort design whereby a group of people is followed over time. They argue that, in contrast to repeated cross-sectional

surveys, a prospective cohort study is the preferred scientific vehicle for understanding the extent of expanded gambling impacts and they label the Commission's choice "a missed opportunity."

The Massachusetts Gaming Commission used a rigorous competitive process to select a study design that, in their view, best reflected the language of the Expanded Gaming Act: that is, conducting a baseline survey of problem gambling prevalence and existing problem gambling services and identifying the social and economic impacts of expanded gambling opportunities in Massachusetts as these evolve over time. Questions of etiology (e.g., problem duration and stability, mechanisms of change) are envisioned in the statute; not immediately but as one of the additional studies anticipated in future years of the Commission's research agenda.

Repeated cross-sectional studies represent the foundation of experimental science. The experimental approach uses the mean response of two samples selected from the population (i.e., problem gambling prevalence) to estimate the population mean under each of two conditions. In Massachusetts, the two conditions correspond to two points in time: baseline (prior to the announcement of new gambling sites) and post-test (after the gambling venues have opened). The difference in the population means provides information about the impact of the change in condition over time. Contrary to DOA's assertion, scientists need not rely on a cohort design to estimate these differences.

Before getting to the merits of selecting a cross-sectional versus cohort design, it is worth clarifying that both of these approaches are longitudinal in the sense that they go on for a number of years. It is also true that cohort study designs potentially provide richer information about the etiology and course of problem gambling. However:

- Although the impact of expanded gambling on problem gambling is an important area of investigation, problem gambling is only one of many areas that need to be examined in a comprehensive socioeconomic impact analysis. Other important areas concern the impact of expanded gambling on government revenue, public services, regulatory costs, business starts and failures, tourism, employment, property values, public attitudes, socioeconomic inequality, leisure patterns, and crime. In our view, a critique of the methodological approach to studying a single (albeit

important) variable does not merit the suggestion that the broader goals of the study cannot be met.

- Cohort designs are considerably more expensive than cross-sectional designs, and, in the present case, may not represent a good investment of resources considering that:
 - A focused investigation of the effectiveness of existing treatment and prevention services in Massachusetts (being undertaken in the present research design) addresses the issue of optimizing the delivery of these services and may be more pertinent than understanding the course of problem gambling.
 - The change in the prevalence rate of problem gambling subsequent to the introduction of expanded gambling opportunities is of more central importance and will be captured with a cross-sectional design.
 - Furthermore, knowing the geospatial and community-specific impacts of new gambling venues on problem gambling is only possible with extremely large sample sizes (possible with a cross-sectional design but prohibitively expensive with a cohort design).
- With the very large sample size being used in the present study, changes in the prevalence of problem gambling in communities receiving new gambling venues compared to changes in problem gambling in Massachusetts as a whole arguably allows for a stronger assessment of the impact of new gambling venues relative to changes observed in a small cohort without a clear control group.

In recognition of the importance of questions of etiology, the UMass Amherst research team has always intended to collect contact information from respondents in the baseline survey which will thus serve as the foundation for a cohort study. Rather than a missed opportunity, the Commission's choice represents an extraordinary chance to monitor the impacts of casino gambling over time. With plans to make data from the study available to other researchers, the study will be an important resource for stakeholders in Massachusetts and elsewhere for many years to come.

Rachel A. Volberg, Ph.D.

Robert J. Williams, Ph.D.

Edward J. Stanek, Ph.D.

Daniel Hodge, M.A., M.P.P.

Response: July 12, 2013

Thank you for your response to the BASIS editorial. We believe that these methodological issues are an important topic and that BASIS readers will benefit from this dialogue. The key issue identified in the original editorial and clarified in your letter to the editor is recognizing the strengths and limitations of repeated cross-sectional designs compared to prospective cohort designs for measuring socioeconomic impact across time.

Your response notes that the Commission concluded that a repeated cross-sectional design best matched the goals set out in the Expanded Gaming Act: "...conducting a baseline survey of problem gambling prevalence and existing problem gambling services and identifying the social and economic impacts of expanded gambling opportunities in Massachusetts as these evolve over time." As noted in our editorial, we believe a prospective cohort study is better able to achieve those goals; in particular, we interpret the Expanded Gaming Act reference to "...impacts of expanded gaming opportunities...as these evolve over time" to mean identifying the dynamic consequences associated with expanded gambling. Only prospective longitudinal studies can identify such associations and temporal patterns.

We do not agree that the "foundation of experimental science" is repeated cross-sectional studies as your letter suggests. As methodologists have long recognized, experimental designs instead rest upon particular research principles: random assignment to groups; control groups; manipulation of an independent variable; and measurement of change in one or several dependent variables (Campbell & Stanley, 1963). In the case of measuring casino impact, neither a repeated cross-sectional design nor a prospective intensive cohort study fit that standard. Instead both designs are quasi-experimental; these designs are vulnerable to a variety of challenges to internal and external validity (e.g., history, selection, maturation, interaction of testing and exposure, etc.; Campbell & Stanley, 1963). Both quasi-experimental designs offer investigators an opportunity to interpret differences in variables across time and space from the naturally occurring "intervention" of expanded gambling. In both cases - repeated cross-sectional and prospective cohort - the environment is not well-controlled; historical events or contextual changes unrelated to gambling might influence the variables of interest.

The primary difference between the repeated cross-sectional and prospective cohort design is that one measures differences across individuals and the other measures change within individuals. With a repeated cross-sectional design, as your letter mentions, investigators can produce prevalence estimates at multiple time points. From differences between and among those estimates, the researchers then attempt to infer whether and how the intervening event, namely casino expansion, is associated with the observed differences across the estimates. Unfortunately, inter-sample differences obscure any possible conclusions. With a prospective cohort design, the same basic approach is used, but in addition to repeated prevalence rates we can observe within-individual change. This achieves four primary objectives that a cross-sectional design cannot:

- 1) It reduces noise and measurement error - each data point is compared to another from the same individual, so other variables that differ from individual to individual are controlled.

- 2) It allows for estimates of incidence (e.g., the new development of gambling problems), remission (e.g., the improvement of existing gambling problems), recurrence (e.g., the re-emergence of earlier gambling problems), and mechanisms of change (e.g., increases in casino venue gambling leading to increased problems) - cross sectional designs must rely on retrospective data to attempt to reconstruct this information.

- 3) With suitable sample retention, it eliminates the possibility that there are fundamental sample differences that account for distinctions across time points - with cross-sectional designs, because the individuals differ from time point to time point, it is possible that the samples differ in ways that affect their responses to the variables in question.

- 4) Because it follows the same people over time, allowing for the identification of variables that precede and predict changes in other variables among the cohort, prospective longitudinal designs permit investigators to detect impact. The problems with using cross-sectional research designs to make causal or temporal claims are well-known in the research community. For example, one scientific journal advises potential authors that "... [F]ew readers will need to be reminded of the limitations of cross-sectional, self-report studies... In papers reporting such studies, authors should make it clear why this design and method are justified..."

steps are taken to control for self-report biases... no causality is claimed.”¹

Successful projects using prospective cohort designs (e.g., the Framingham Heart Study and the Nurses’ Health Study) greatly increase our understanding of the mechanisms and order of change, impacts on health, and potential causal links between variables. Just this month, for example, we learned from the Nurses’ Health Study that the mechanisms associated with differential prevalence of colorectal cancer among people with the BRAF-mutated cancer risk for those who take aspirin (Nishihara et al., 2013). Successful projects using repeated cross-sectional designs (e.g., Monitoring the Future) only claim to identify trends, not the causes of these trends or the mechanisms by which trends ebb and flow – the very things of importance to Massachusetts.

Your letter notes, “It is also true that cohort study designs potentially provide richer information about the etiology and course of problem gambling.” This is exactly our point and the intent of the legislation because the statute focuses on impact. We recognize that social impacts are only one aspect of the study and the legislation. However, it is the measurement of many socio-economic aspects that constitutes the core baseline and follow-up surveys and thus the current debate about methodological design.

Cohort designs are more expensive to implement than cross-sectional designs, but only at the outset. More importantly, designs that cannot answer central questions (i.e., impact) ultimately are the most expensive because they inevitably fail to answer the most important questions. Large sample sizes influence our capacity to draw statistical conclusions with confidence. However, sample sizes with repeated observations on the same participants gain statistical power advantages because each participant serves as his or her own control, thereby reducing the need and expense associated with repeating the same study over time.

We appreciate the hard work and dedication demonstrated by the UMASS Amherst group. The study they have commenced will provide a large amount of important information for Massachusetts. However, it will not provide the same type of information as a prospective longitudinal design. As Abbott, Volberg, Bellringer and Reith aptly noted in a comprehensive review of the gambling literature:

“With cross-sectional and retrospective studies it is exceedingly difficult to rule

out the possibility that other factors accounted for the presumed effects of increased or decreased gambling exposure. This is also the case in replication studies where different samples from the same population are assessed at different points in time. These and other studies involving assessment before and after the introduction of a new form of gambling or change in gambling availability rarely include control or comparison groups that are not similarly exposed. Thus, even when it can be demonstrated that changed exposure preceded the presumed effect, other explanations cannot be ruled out.... Lack of prospective and incidence research greatly limits understanding of how risk and other factors influence the development of problem gambling in individuals and communities” (Abbott, Volberg, Bellringer, & Reith, 2004, pp. 65-66).

We are particularly pleased to learn that prospective studies might still be considered going forward. Notably, such a design would be absolutely essential to any treatment efficacy assessment, as described in your letter. Massachusetts advanced our understanding of lifestyle impact on cardiovascular disease best with the Framingham Heart Study. We hope a chance remains for such a study to contribute similarly to our understanding of impact, duration, causality, and the mechanisms of influence as these relate to gambling expansion.

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References

Abbott, M, Volberg, R, Bellringer, M, & Reith, Gerda. (2004). A review of research on aspects of problem gambling: Auckland University of Technology, http://www.gla.ac.uk/media/media_34551_en.pdf.

Campbell, Donald T., & Stanley, Julian C. (1963). Experimental and quasi-experimental designs for research. Chicago: Rand McNally & Company.

Nishihara, Reiko, Lochhead, Paul, Kuchiba, Aya, Seungyoun, Jung, Yamauchi, Mai, Liao, Xiaoyun, . . . Ogino, Shuji. (2013). Aspirin Use and Risk of Colorectal Cancer According to BRAF Mutation Status Journal of the American Medical Association, 309(24), 2563-2571.

1 From “Guidance on whether your paper is likely to be appropriate for

submission to Work & Stress.”