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GAMING LAW REVIEW AND ECONOMICS
Volume 18, Number 2, 2014
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DOI: 10.1089/glre.2014.1824

How Availability and Accessibility of Gambling Venues Influence Problem Gambling: A Review of the Literature

Renée A. St-Pierre, Douglas M. Walker, Jeffrey Derevensky, and Rina Gupta

INTRODUCTION

Internationally, the past three decades have witnessed a rapid expansion within the gambling industry. Recent estimates reveal that as of the end of 2012, there were 464 commercial land-based and riverboat casinos operating in 17 U.S. states, with another 466 Native American tribal casinos spread across 28 states.[1] Additionally, a total of 72 charitable, First Nations, and commercial casinos are presently operating in Canada.[2] Further, as a consequence of improvements in the global economy and increased consumer spending, the expansion of the casino industry has persisted. Several jurisdictions have planned or are now contemplating the introduction or expansion of casino-style gaming in an effort to generate tax revenues, create stable employment opportunities, and stimulate economic development.[3] As an example, deliberations for sanctioning casinos in Taiwan resulted in the formal legalization of gaming in early 2009, and the number of casinos in operation in Macau more than tripled from 11 in 2002 to 34 in 2011.[4] Other North American (e.g., Florida, Kansas, Maine, Maryland, Massachusetts, New York, and Ohio) and international (e.g., Singapore, Mainland China, Vietnam, Philippines, Spain, and Japan) jurisdictions are also witnessing or projecting a significant expansion in land-based gambling.[5]

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[1] *State of States: The AGA Survey of Casino Entertainment*, American Gaming Association (2013), <http://www.americangaming.org/sites/default/files/uploads/docs/aga_sos2013.fnl.pdf> (hereinafter American Gaming Association).

[2] G. Smith, *The Nature and Scope of Gambling in Canada*, Addiction (2013, advance online publication), doi:10.1111/add.12210.

[3] P. T. Calcagno, D. M. Walker, and J. D. Jackson, *Determinants of the Probability and Timing of Commercial Casino Legalization in the United States*, 142 Pub. Choice 69–90 (2010), doi:10.1007/s11127-009-9475-2; D. M. Walker, Casinonomics: The Socioeconomic Impacts of the Casino Industry (2013).

[4] P. H. Loughlin and C. W. Pannell, *Gambling in Macau: A Brief History and Glance at Today's Modern Casinos*, 53 Focus on Geography 1–9 (2010), doi:10.1111/j.1949-8535.2010.00001.x; Y. Zhou, T. Lu, and J. J.-E. Yoo, J. J.-E. *Residents' Perceived Impacts of Gaming Development in Macau: Social Representation Perspectives*, Asia Pac. J. Tourism Res. (2013, advance online publication), doi:10.1080/10941665.2013.764913.

[5] American Gaming Association, *supra* note 1; A. Boto, *A New Legislative Framework for Online Gaming in Spain*. 4 U.N.L.V. Gaming L.J. 11–37 (2013), *available at* <http://scholars.law.unlv.edu/cgi/viewcontent.cgi?article=1048&context=glj>; A. Dien, *Can Vietnam Become a Gambling Getaway?*, Thanh Nien News, Aug. 12, 2013, <http://www.thanhniennews.com/index/pages/20130809-can-vietnam-become-a-gambling-getaway.aspx>; S. Jiménez-Murcia, F. Fernández-Aranda, R. Granero, and J. M. Menchón, *Gambling in Spain: Update on Experience, Research and Policy*, Addiction (2013, advance online publication), doi:10.1111/add.12232; E. Papineau, *The Expansion of Electronic Gambling Machines in China Through Anthropological and Public Health Lenses*, 3 Asian J. Gambling Issues & Pub. Health 1–12 (2013), doi:10.1186/2195-3007-3-3; I. Sayson, *Philippine Billionaire Razon Seeks Casino Growth*, Bloomberg Businessweek (Aug. 15, 2013), *available at* <http://www.businessweek.com/news/2013-08-15/philippine-billionaire-razon-seeks-casino-growth-southeast-asia>; Walker, *supra* note 3.

The rapid expansion of the gambling industry, however, has not been restricted to casino operations. Today, most industrialized jurisdictions regulate, license, organize, operate, or own at least one type of gambling activity, with only a minority of states and countries that continue to strictly prohibit any form of gambling. Some of the more popular forms of government-sponsored or government-regulated gambling include lottery draws and instant scratch cards, electronic gambling machines (EGMs) (e.g., slot machines, video lottery terminals [VLTs], pokies), pari-mutuel wagering (i.e., racing) and sports betting. Currently in Canada, there are over 96,000 EGMs, 222 venues for racetrack pari-mutuel wagering, and 30,090 lottery ticket outlets readily available to the population.[6] Similarly, just under 50 racetrack casinos ("racinos") and more than 12,000 non-casino gaming venues offering EGMs were legally operating in 17 U.S. states at the end of December 2012.[7]

With the advent of new emerging technologies, such as Internet and mobile (remote) wagering, the environmental landscape of gambling possibilities is further undergoing a momentous and unparalleled growth worldwide. Despite its legal prohibition in certain jurisdictions, recent reports suggest that global revenue for online gambling approached US$30 billion in 2010,[8] and that total wagers from mobile gambling exceeded US$19.5 billion worldwide in 2011.[9] In view of the relative accessibility of the Internet and mobile/smart telephones and the substantial increase in individual technological savvy, it is not surprising that the online gambling growth rate has far exceeded that of land-based gambling, with current estimates placing the expansion of Internet gambling at about four times as fast as land-based gambling.[10] Further, forecasts predict total mobile gambling wagers to increase an average of 29% annually from 2012 to 2017.[11]

Combined with the impressive growth and proliferation of land-based and remote gambling, there has been a significant increase in the advertising and promotion of game offerings. To maximize the industry's business objectives, gaming/gambling corporations have expanded internationally and actively promote their game offerings on the radio, on television, in print, via Internet pop-up messages, at points of sale and in public advertising spaces.[12] In addition to corporate advertisements, television networks (notably sports channels) have launched regular broadcasting of high-stakes poker tournaments within the past few years. The result of this proliferation of gambling advertisements and increased media coverage has been a progressive normalization of gambling as an attractive, socially acceptable, and innocuous form of entertainment.

As legal gambling has spread around the world, there continues to be concern about problem gambling, as well as other negative social and economic impacts of gambling. Of particular importance is the relationship of gambling availability with problem gambling and other related behaviors. The potential social costs of gambling continue to be a concern for jurisdictions considering the expansion of legal gambling. Since the prevalence of problem gambling is a key driver of social costs, an understanding of the relationship between gambling availability and problem gambling prevalence is critical if policymakers and researchers are to understand the overall impacts of the worldwide expansion of gambling. In this article, we review the literature on the relationship between gambling availability and problem gambling. We address the relationship between gambling type and problem gambling, as well as the availability of and access to gambling and gambling disorders. In addition, we provide an overview of the economic and social costs and benefits of legalized gambling. Finally, we address issues on the frontier of gambling research. An understanding of the present state of knowledge in this area can help promote better-informed policy in jurisdictions around the world.

OVERVIEW

Considering the vast global expansion and active promotion of gambling, exposure to legal gambling opportunities has been widely speculated as a possible

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[6]Smith, *supra* note 2.
[7]American Gaming Association, *supra* note 1.
[8]D. O. Stewart, *Online Gambling Five Years After UIGEA*. American Gaming Association (2011), <http://www.americangaming.org/sites/default/files/uploads/docs/whitepapers/final_online_gambling_white_paper_5-18-11.pdf>.
[9]W. Holden, Mobile Gambling: Casinos, Lotteries and Betting 2012–2017 (2012).
[10]P. Raventós and S. Zolezzi, *Sportsbooks and Politicians: Place your bet!*, 64 J. Bus. Res. 299–305 (2011), doi:10.1016/j.jbusres.2009.11.016.
[11]Holden, *supra* note 9.
[12]C. E. Temcheff, R. A. St. Pierre, and J. Derevensky, *Youth Gambling and Delinquency: Legislative and Social Policy Implications*, 15 Gaming L. Rev. & Econ. 539–552 (2011), doi:10.1080/glre.2011.15907.

factor associated with the potential increase in pathological and problem gambling.[13] Both early and recent research findings suggest that regional differences in the availability of gaming options are positively correlated with differences in prevalence rates of problem gambling.[14] However, the results have not been consistent across all studies. Within the extant literature, some studies have reported no concurrent link between legal gambling accessibility and rates of problem gambling,[15] while other studies have observed no significant increase or decrease in the prevalence of problem gambling following the introduction or removal of gambling venues or opportunities.[16] Although the inconsistencies in the findings may be the result of methodological and measurement issues, the disparities may also suggest that the relationship of gambling availability and accessibility with prevalence of gambling problems may not be a direct or linear one.[17] According to the adaptation hypothesis, individuals will gradually adjust and become more resistant to new and novel gambling opportunities following initial increases in the number and types of adverse reactions to those opportunities, and this adaptation will eventually result in stable or lower prevalence rates of gambling problems.[18] This consideration notwithstanding, the impact of exposure to legal gambling venues on problem gambling remains both an important population health and public policy concern, particularly since a number of adverse health, interpersonal, and social consequences associated with gambling problems have been observed.[19] These consequences include comorbid substance use problems and psychiatric conditions (e.g., depression, anxiety), disruption of family relationships, loss of employment, and criminal behavior to finance wagering activities (e.g., fraud, theft, and embezzlement).

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[13]D. A. LaPlante and H. J. Shaffer, *Understanding the Influence of Gambling Opportunities: Expanding Exposure Models to Include Adaptation*, 77 Am. J. Orthopsychiatry 616–623 (2007), doi:10.1037/0002-9432.77.4.616; H. J. Shaffer, R. A. LaBrie, and D. LaPlante, *Laying the Foundation for Quantifying Regional Exposure to Social Phenomena: Considering the Case of Legalized Gambling as a Public Health Toxin*, 18 Psychol. Addictive Behav. 40–48 (2004), doi:10.1037/0893-164X.18.1.40.

[14]G. R. Adams, A. -M. Sullivan, K. D. Horton, R. Menna, and A. M. Guilmette, *A Study of Differences in Canadian University Students' Gambling and Proximity to a Casino*, 19 J. Gambling Issues 9–17 (2007), doi:10.4309/jgi.2007.19.1; J. Pearce, K. Mason, R. Hiscock, and P. Day, *A National Study of Neighbourhood Access to Gambling Opportunities and Individual Gambling Behaviour*, 62 J. Epidemiology & Community Health 862–868 (2008), doi:10.1136/jech.2007.068114; R. Room, N. E. Turner, and A. Ialomiteanu, *Community Effects of the Opening of the Niagara Casino*, 94 Addiction 1449–1466 (1999), doi:10.1046/j.1360-0443.1999.941014492.x; B. Rush, S. Veldhuizen, E. Adlaf, (2007). *Mapping the Prevalence of Problem Gambling and its Association with Treatment Accessibility and Proximity to Gambling Venues*, 20 J. Gambling Issues 193–213 (2007), doi:10.4309/jgi.2007.20.6; J. W. Welte, G. M. Barnes, M. -C. O. Tidwell, and J. H. Hoffman, *Legal Gambling Availability and Problem Gambling among Adolescents and Young Adults*, 9 Int'l Gambling Stud. 89–99 (2009), doi:10.1080/14459790902754996; J. W. Welte, G. M. Barnes, W. F. Wieczorek, M. -C. O. Tidwell, and J. H. Hoffman, *Type of Gambling and Availability as Risk Factors for Problem Gambling: A Tobit Regression Analysis by Age and Gender*, 7 Int'l Gambling Stud. 183–198 (2007), doi:10.1080/14459790701387543; J. W. Welte, W. F. Wieczorek, G. M. Barnes, M. -C. Tidwell, and J. H. Hoffman, *The Relationship of Ecological and Geographic Factors to Gambling Behavior and Pathology*, 20 J. Gambling Stud. 405–423 (2004), doi:10.1007/s10899-004-4582-y.

[15]S. Sévigny, R. Ladouceur, C. Jacques, and M. Cantinotti, *Links Between Casino Proximity and Gambling Participation, Expenditure, and Pathology*, 22 Psychology Addictive Behaviors 295–301 (2008), doi:10.1037/0893-164X.22.2.295; M. Young, F. Markham, and B. Doran, *Too Close to Home? The Relationships Between Residential Distance to Venue and Gambling Outcomes*, 12 Int'l Gambling Stud. 257–273 (2012), doi:10.1080/14459795.2012.664159.

[16]R. Govoni, G. R. Frisch, N. Rupcich, and H. Getty, *First Year Impacts of Casino Gambling in a Community*, 14 J. Gambling Stud. 347–358 (1998), doi:10.1023/A:1023021009398; C. Jacques and R. Ladouceur, R. (2006). *A Prospective Study of the Impact of Opening a Casino on Gambling Behaviours: 2- and 4-year Follow-ups*, 51(12) Canadian J. Psychiatry/La Revue canadienne de psychiatrie 764–773 (2006); C. Jacques, R. Ladouceur, and F. Ferland, *Impact of Availability on Gambling: A Longitudinal Study*, 45(9) Can. J. Psychiatry / La Revue canadienne de psychiatrie 810–815 (2000); I. Lund, *Gambling Behaviour and the Prevalence of Gambling Problems in Adult EGM Gamblers when EGMs are Banned. A Natural Experiment*, 25 J. Gambling Stud. 215–225 (2009), doi:10.1007/s10899-009-9127-y.

[17]LaPlante and Shaffer, *supra* note 13; A. C. Thomas, G. Bates, S. Moore, M. Kyrios, D. Meredyth, and G. Jessop, *Gambling and the Multidimensionality of Accessibility: More Than Just Proximity to Venues*, 9 Int'l J. Mental Health & Addiction 88–101 (2011), doi:10.1007/s11469-009-9256-7.

[18]Shaffer, LaBrie, and LaPlante, *supra* note 13; H. J. Shaffer and R. Martin, *Disordered Gambling: Etiology, Trajectory, and Clinical Considerations*, 7 Ann. Rev. Clinical Psych. 483–510 (2011), doi:10.1146/annurev-clinpsy-040510-143928.

[19]D. A. Korn, *Expansion of Gambling in Canada: Implications for Health and Social Policy*, 163(1) Can. Med. Ass'n J. 61–64 (2000).

CURRENT KNOWLEDGE ON THE ASSOCIATION OF GAMBLING TYPE WITH PROBLEM GAMBLING

Several legal forms of gambling are available to gamblers in Canada and the U.S., who can wager on a multitude of betting options, depending upon the respective jurisdiction. Land-based gaming options include: lottery draws (e.g., Lotto Max, Lotto 6/49, Mega Millions, Powerball, etc.); daily draw tickets (Banco, Keno, Daily 3, Daily 4, Take 5, the Numbers Game, etc.) and instant scratch cards (e.g., Scrabble, Bingo, Sizzlin' 7s, Wheel of Fortune, etc.); non-casino EGMs; casino and racetrack casino EGMs; card games (e.g., poker and blackjack) at card rooms and casinos; table games (e.g., roulette, craps, baccarat, Keno, etc.); pari-mutuel wagering (e.g., horse racing, greyhound racing, and jai alai); sports betting in Canada through the lottery (e.g., Sport Select, PRO·LINE, Sports Action, and Mise-o-jeu) and sports wagering; and charitable gambling (e.g., bingo, raffles, break-open tickets, etc.).

A significant body of national and international research reveals that certain forms of land-based gambling (e.g., EGMs) are more strongly associated with disordered gambling behaviors.[20] Further, there is some preliminary evidence to suggest that specific forms of gambling are associated with the rapid onset of gambling problems.[21] These findings have led gambling researchers to speculate about the potentially addictive properties of certain types of gambling activities that may have a powerful impact on the development of problem gambling.

Griffiths and others have suggested that some land-based gambling games and activities contain unique structural characteristics which have the potential to induce and maintain regular or excessive gambling behavior.[22] Structural characteristics proposed to develop and maintain regular or excessive play behavior include rapid event frequencies (i.e., opportunities to gamble limited only by how fast a person can play), short pay-out intervals (i.e., brief time lapse between the initial gamble and the payment of winnings), player involvement and perceived skill features (i.e., create the illusion of control over the outcome of the game), and the incorporation of near-miss designs (i.e., create the illusion of coming close to winning a substantial prize). While problem gamblers do not represent a homogeneous group[23] and research has yet to establish which structural characteristics may be more likely to impact the "addictive" potential of particular forms of gambling relative to others,[24] the relationship between specific types of land-based gambling and regular or problematic wagering behavior cannot be discounted.

Electronic gambling machines

Within the psychological and sociological literature, there is a general assumption that electronic

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[20]D. Clarke, J. Pulford, M. Bellringer, M. Abbott, and D. C. Hodgins, *An Exploratory Study of Problem Gambling on Casino Versus Non-casino Electronic Gaming Machines*, 10 Int'l J. Mental Health & Addiction 107–121 (2012), doi:10.1007/s11469-010-9306-1; J. P. Doiron and R. M. Nicki, *Epidemiology of Problem Gambling in Prince Edward Island: A Canadian Microcosm?* 46(5) Canadian J. Psychiatry/La Revue canadienne de psychiatrie 413–417 (2001); S. M. Grüsser, B. Plöntzke, U. Albrecht, and C. P. Mörsen, *The Addictive Potential of Lottery Gambling*, 19 J. Gambling Issues 19–29 (2007), doi:10.4309/jgi.2007.19.5; V. M. Hendriks, G.-J. Meerkerk, H. A. M. Van Oers, and H. F. L. Garretsen, *The Dutch Instant Lottery: Prevalence and Correlates of At-risk Playing*, 92 Addiction 335–346 (1997), doi:10.1111/j.1360-0443.1997.tb03203.x; G. Smith, N. el-Guebaly, D. Casey, D. Hodgins, R. Williams, and D. Schopflocher, *A Longitudinal Study of Alberta Electronic Machine Gamblers*, paper presented at the 15th International Conference on Gambling & Risk Taking, Las Vegas, NV (2013); J. W. Welte, G. M. Barnes, M.-C. O. Tidwell, and J. H. Hoffman, *The Association of Form of Gambling with Problem Gambling among American Youth*, 23 Psychology of Addictive Behaviors 105–112 (2009), doi:10.1037/a0013536; Welte, Barnes, Wieczorek, Tidwell, and Hoffman, *supra* note 14; J. W. Welte, G. M. Barnes, W. F. Wieczorek, M.-C. O. Tidwell, and J. C. Parker, *Risk Factors for Pathological Gambling*, 29 Addictive Behav. 323–335 (2004), doi:10.1016/j.addbeh.2003.08.007.

[21]R. B. Breen, *Rapid Onset of Pathological Gambling in Machine Gamblers: A Replication*, 2(1) Int'l J. Mental Health & Addiction 44–49 (2004); R. B. Breen and M. Zimmerman, *Rapid Onset of Pathological Gambling in Machine Gamblers*, 18 J. Gambling Stud. 31–43 (2002), doi:10.1023/A:1014580112648.

[22]M. Griffiths, *Gambling Technologies: Prospects for Problem Gambling*, 15 J. Gambling Stud. 265–283 (1999), doi:10.1023/A:1023053630588 [hereinafter Griffiths 1999]; M. Griffiths, *Are Lottery Scratchcards a ''Hard'' Form of Gambling?*, 7 J. Gambling Issues 111–121 (2002), doi:10.4309/jgi.2002.7.8 [hereinafter Griffiths 2002]; J. Parke and M. Griffiths, *The Psychology of the Fruit Machine: The Role of Structural Characteristics (Revisited)*, 4 Int'l J. Mental Health & Addiction 151–179 (2006), doi:10.1007/s11469-006-9014-z.

[23]A. Blaszczynski and L. Nower, *A Pathways Model of Problem and Pathological Gambling*, 97 Addiction 487–499 (2002), doi:10.1046/j.1360-0443.2002.00015.x.

[24]N. Dowling, D. Smith, and T. Thomas, *Electronic Gaming Machines: Are They the ''Crack-Cocaine'' of Gambling?* 100 Addiction 33–45 (2005), doi:10.1111/j.1360-0443.2005.00962.x; Parke and Griffiths, *supra* note 22.

gaming is a "highly addictive" form of gambling, and that it contributes to the development of problem gambling more than other gambling activities.[25] Some empirical support for this assumption exists. In a study of the gambling behaviors of a representative sample of 809 adults residing in the Canadian province of Prince Edward Island, Doiron and Nicki[26] used multiple regression analyses to examine the unique associations between different forms of gambling and problem gambling. Although they observed significant relationships between participation in several "continuous-play" gambling activities where there is a short lag of time between wager and outcome (e.g., scratch cards, horse races, casino table games), Doiron and Nicki indicated that involvement in VLT play demonstrated the largest unique association to problematic gambling behavior. Similar findings have been reported in other jurisdictions. For example, Clarke et al.[27] found that of 11 gambling activities available in New Zealand, only gambling on EGMs distinguished problem gamblers from non-problem gamblers. Of interest, the authors also observed that non-casino EGM gambling demonstrated a greater unique association to current problem gambling status than casino EGM play when controlling for demographic characteristics (e.g., age, gender, ethnicity, marital status, employment status, etc.) and the total number of gambling activities engaged in. Additionally, Smith et al.[28] conducted a prospective study of a large sample of different types of gamblers (i.e., gamblers in past 12 months but not on EGMs, low frequency EGM gamblers, moderate frequency EGM gamblers, and high frequency EGM gamblers) in Alberta, Canada to investigate whether EGM play presents a greater risk for problem gambling than other gambling formats, and to examine whether the frequency of EGM play poses an elevated risk for problem gambling. Preliminary findings suggested that compared with non-EGM gamblers, EGM gamblers were more likely to be categorized as problem gamblers across all four data collection waves. The results also revealed that frequency of EGM play is associated with problem gambling status, with high frequency players more likely to be categorized as problem gamblers than low or moderate frequency players.

In another line of investigation, Breen and Zimmerman[29] compared the latency of the onset of pathological gambling symptoms for predominantly EGM gamblers versus those who gambled primarily on other forms of gambling. From their sample of 44 treatment-seeking adult pathological gamblers, they found that the progression to pathological gambling was significantly shorter for individuals who were primarily machine gamblers (mean latency = 1.08 years) than individuals who gambled predominantly on other forms of gambling (mean latency = 3.58 years). These findings were replicated by Breen[30] using a larger sample ($N = 180$) of treatment-seeking adult pathological gamblers.

While these studies suggest a greater association with and more rapid transition to pathological gambling among EGM gamblers, the results should be interpreted in light of important limitations. First, the generalizability of the findings to all pathological gamblers remains tenuous, since most of the data were collected from non-random or non-representative samples.[31] Additionally, research on EGM play and problematic gambling behavior has generally been limited to their retrospective or concurrent relationships.[32] Further, there is some research evidence that when controlling for gambling involvement (i.e., the number gambling activities individuals participate in), the statistically significant association between EGM play and problem gambling disappears.[33]

Casino gambling

In addition to EGM gambling, casino gambling has been speculated to contribute to the development of problem gambling, since this particular form of gambling is purported to incorporate the largest number of gambling-inducing structural

[25]Dowling, Smith, and Thomas, *supra* note 24.
[26]Doiron and Nicki, *supra* note 20.
[27]Clarke, Pulford, Bellringer, Abbott, and Hodgins, *supra* note 20.
[28]Smith, el-Guebaly, Casey, Hodgins, Williams, and Schopflocher, *supra* note 20.
[29]Breen and Zimmerman, *supra* note 21.
[30]Breen, *supra* note 21.
[31]Breen, *supra* note 21; Breen and Zimmerman, *supra* note 21; Clarke, Pulford, Bellringer, Abbott, and Hodgins, *supra* note 20.
[32]Breen, *supra* note 21; Breen and Zimmerman, *supra* note 21; Clarke, Pulford, Bellringer, Abbott, and Hodgins, *supra* note 20; Doiron and Nicki, *supra* note 20.
[33]D. A. LaPlante, S. E. Nelson, R. A. LaBrie, and H. J. Shaffer, *Disordered Gambling, Type of Gambling and Gambling Involvement in the British Gambling Prevalence Survey 2007*, 21 Eur. J. Pub. Health 532–537 (2011), doi:10.1093/eurpub/ckp177.

characteristics, as well as a large number of different gambling opportunities within a single venue.[34] An early study by Fisher,[35] comparing regular casino patrons who visit casinos once a week or more to non-regular casino visitors, revealed that the prevalence of problem gambling among regular casino gamblers was more than twice that of non-regular casino patrons (14.8% vs. 6.8%). The high proportion of problem gambling observed among regular casino patrons should nevertheless be interpreted with caution; it is unclear whether the regular casino gamblers in this study's sample also participate in other betting activities that can equally present a risk for the development of problematic wagering behaviors. More robust evidence for the association of casino play with gambling pathology is provided by Welte and his colleagues.[36] Drawing from representative samples of U.S. youth (aged 14–21 years) and adults (aged 18 years and older), Welte et al.[37] found that when all forms of gambling are considered simultaneously, casino gambling had the second greatest impact on individual gambling pathology. Further, using a more sensitive data analysis methodology, Welte et al.[38] observed that casino wagering makes the largest contribution to the gambling problems of adult gamblers. Although the results from these studies suggest that casino gambling is strongly associated with disordered gambling, the methodology used does not allow for definitive conclusions to be drawn about whether one particular casino game or activity presents a greater risk to individuals for problem gambling, or whether it is the multiple opportunities to gamble afforded by casinos which poses a greater risk. Indeed, there is ample evidence to suggest that problem gamblers are more likely to engage in a larger number of gambling activities than non-problem gamblers.[39]

Lottery play

Compared with EGM and casino play, wagering on the lottery is generally considered as a "soft" form of gambling that is assumed to have few negative effects because of its low event frequency.[40] However, there is some research evidence to suggest that lottery players are not immune to disordered gambling.[41] In Germany, Grüsser et al.[42] assessed a sample of 171 regular lottery gamblers using diagnostic criteria for addiction and pathological gambling. They reported that 15.2% of regular lottery gamblers met the diagnostic criteria for pathological gambling, and that pathological lottery gamblers differed significantly from non-pathological lottery gamblers on several of the diagnostic criteria for addiction. One limitation of this study, however, was that less than half of the sample was comprised of individuals who gambled exclusively on the lottery; thus, it is unclear whether the high proportion of pathological gamblers observed in this study was an artifact of individuals' participation in more than one gambling activity, which may present a greater risk for the development of problematic wagering behaviors. In another study examining the association between specific forms of gambling and problem gambling among U.S. adults, Welte et al.[43] reported that lottery gambling made the greatest contribution to the gambling pathology of gamblers over the age of 30 years compared to younger gamblers when the frequency of play is controlled for. Further, in an early study of instant lottery play, Hendriks et al.[44] found that from their sample of 4,497 adolescent and adult Dutch scratch card players, 4.1% could be considered at-risk for some gambling problems, with an additional 0.7% classified as problem gamblers. Conversely, in a

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[34]Thomas, Bates, Moore, Kyrios, Meredyth, and Jessop, *supra* note 17.

[35]S. Fisher, *Measuring the Prevalence of Sector-specific Problem Gambling: A Study of Casino Patrons*, 16 J. Gambling Stud. 25–51 (2000), doi:10.1023/A:1009479300400.

[36]Welte, Wieczorek, Barnes, Tidwell, and Hoffman, *supra* note 14; Welte, Barnes, Wieczorek, Tidwell, and Hoffman, *supra* note 14; Welte, Barnes, Tidwell, and Hoffman, *supra* note 20.

[37]Welte, Wieczorek, Barnes, Tidwell, and Hoffman, *supra* note 14; Welte, Barnes, Tidwell, and Hoffman, *supra* note 20.

[38]Welte, Barnes, Wieczorek, Tidwell, and Hoffman, *supra* note 14.

[39]T. Holtgraves, *Gambling, Gambling Activities, and Problem Gambling*, 23 Psych. Addictive Behav. 295–302 (2009), doi:10.1037/a0014181; R. C. Kessler, I. Hwang, R. LaBrie, M. Petukhova, N. A. Sampson, Ken C. Winters, and Howard J. Shaffer, *DSM-IV Pathological Gambling in the National Comorbidity Survey Replication*, 38 Psych. Med. 1351–1360 (2008), doi:10.1017/S0033291708002900; Welte, Barnes, Wieczorek, Tidwell, and Parker, *supra* note 20.

[40]Griffiths 1999, *supra* note 22; M. Griffiths and R. Wood, *The Psychology of Lottery Gambling*, 1 Int'l Gambling Stud. 27–45 (2001), doi:10.1080/14459800108732286.

[41]V. Ariyabuddhiphongs, *Lottery Gambling: A Review*, 27 J. Gambling Stud. 15–33 (2001), doi:10.1007/s10899-010-9194-0.

[42]Grüsser, Plöntzke, Albrecht, and Mörsen, *supra* note 20.

[43]Welte, Barnes, Wieczorek, Tidwell, and Hoffman, *supra* note 14.

[44]Hendriks, G. -J. Meerkerk, H. A. M. Van Oers, and H. F. L. Garretsen, supra note 20.

later study of 9,235 Dutch regular scratch card players, DeFuentes-Merillas, Koeter, Bethlehem, Schippers, and VanDenBrink[45] reported that less than 1% of players met the diagnostic criteria for pathological gambling and that even fewer (0.09%) were uniquely scratch card pathological gamblers. One possible explanation for these differing findings is that underage gamblers were excluded from the sample in the DeFuentes-Merillas et al. study; a survey of 8,017 adolescents in the UK revealed that one percent of underage problem gamblers (ages 12–15 years old) gambled exclusively on scratch cards.[46] Additional research on the association of scratch card play with problem gambling among both youth and adults is therefore needed to clarify the contradictory findings.

THE INFLUENCE OF GAMBLING AVAILABILITY AND ACCESSIBILITY ON PROBLEM GAMBLING

Besides the unique structural characteristics of different forms of gambling which have the potential to induce and maintain regular or excessive wagering behavior, it has also been suggested that the situational characteristics of different gambling venues can also serve as a starting point for increased vulnerability in developing gambling problems.[47] Situational characteristics refer to the features of the environment that are external to the gambling activity or venue itself, such as the location of the gambling venue/outlet, the number of gambling outlets in a specified area, opening hours, the use of advertising, and consumer incentives.[48] The availability and accessibility of gambling venues are particular situational characteristics that have attracted increased theoretical and research attention over the past few decades.

Gambling availability and accessibility can be conceptualized along several different dimensions: geographical, temporal, and social accessibility.[49] *Geographical accessibility* refers to the spatial distribution of venues and gambling opportunities within a geographical area. Contained within geographic accessibility are objective measures of the number of venues and gambling opportunities per capita, as well as the distance or travel time from the gambling opportunity to home, work, or community and socializing venues. *Temporal accessibility*, conversely, is conceptualized as the hours of operation of gambling venues, or the amount of time where legal gambling opportunities have been available in a given jurisdiction. Recently, researchers have considered an interaction between geographic and temporal accessibility, called "space-time accessibility" or "geo-temporal accessibility," as a dimension of accessibility that warrants greater consideration, since gambling venues which are closer in proximity and have longer hours of operation offer far greater accessibility than those which are equally close in proximity but have shorter hours of operation, or those that offer the same hours of operations but are more distant.[50] Finally, *social accessibility* refers to the degree that a gambling product or venue is perceived as attractive and safe. Encompassed within the concept of social accessibility are the subjective judgments of conditions of entry (e.g., membership conditions and dress codes), ease of use (e.g., skill requirements of a game), and safety (e.g., cleanliness, trustworthiness, and reputation).

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[45]L. DeFuentes-Merillas, M. W. J. Koeter, J. Bethlehem, G. M. Schippers, and W. VanDenBrink, *Are Scratchcards Addictive? The Prevalence of Pathological Scratchcard Gambling Among Adult Scratchcard Buyers in the Netherlands*, 98 ADDICTION 725–731(2003), doi:10.1046/j.1360-0443.2003.00329.x.

[46]MORI Social Research Institute/International Gaming Research Unit, *Under 16s and the National Lottery: Final Report*, GAMCARE (2006), *available at* <http://www.gamcare.org.uk/pdfs/NLCreport.pdf>.

[47]M. W. Abbott and D. Clarke, (2007). *Prospective Problem Gambling Research: Contribution and Potential*, 7 INT'L GAMBLING STUD. 123–144 (2007), doi:10.1080/14459790701261714; Blaszczynski and Nower, *supra* note 23; Griffiths 1999, *supra* note 22; H. J. Shaffer, D. LaPlante, R. LaBrie, R. Kidman, A. Donato, and M. Stanton, *Toward a Syndrome Model of addiction: Multiple Expressions, Common Etiology*, 12 HARVARD REV. PSYCHIATRY 367–374 (2004), doi:10.1080/10673220490905705.

[48]Dowling, Smith, and Thomas, *supra* note 24; Griffiths 1999, *supra* note 22.

[49]D. Marshall, *The Gambling Environment and Gambler Behaviour: Evidence from Richmond-Tweed, Australia*, 5 INT'L GAMBLING STUD. 63–83 (2005), doi: 10.1080/14459790500099471; S. M. Moore, A. C. Thomas, M. Kyrios, G. Bates, and D. Meredyth, *Gambling Accessibility: A Scale to Measure Gambler Preferences*, 27 J. GAMBLING STUD. 129–143 (2011), doi:10.1007/s10899-010-9203-3; Thomas, Bates, Moore, Kyrios, Meredyth, and Jessop, *supra* note 17.

[50]Marshall, *supra* note 49; Thomas, Bates, Moore, Kyrios, Meredyth, and Jessop, *supra* note 17.

Geographical accessibility

While all dimensions of accessibility warrant consideration in the gambling literature, research examining the relationship between gambling accessibility and problem gambling has largely been restricted to geographical accessibility to date. A summary of cross-sectional and prospective studies investigating this relationship is provided in Table 1.

Positive associations between geographical availability of gaming options and the prevalence of problem gambling have been reported in several studies.[51] Most of these studies conducted population surveys to measure gambling pathology or problems, and then assessed the predictive role of spatial distribution of gambling venues using multivariate regression models. For example, Rush et al.[52] computed a logarithmic transformation of the linear distance from each respondent's residential location to the *nearest* commercial or charitable casino and EGM venue in Ontario, Canada. Results from their logistic regression analyses revealed that residential distance from the closest gambling venues has a marginal—yet statistically significant—predictive relationship with problem gambling in the general adult population. Similar findings have been noted in two large scale studies drawing from nationally representative samples in the United States[53] and in New Zealand.[54] The study by Welte, Wieczorek, et al.[55] examined the role of residential distance to gambling venues (i.e., casinos, card rooms, racing tracks, jai alai frontons) in predicting gambling pathology and problems, controlling for demographic and neighborhood-level characteristics. Results from a series of logistic regression analyses revealed a positive predictive relationship between casino radius and the prevalence of problem/pathological gambling, with respondents residing within 10 miles of a casino being twice as likely to be problem/pathological gamblers (odds ratio = 1.9) than those who lived farther away. Pearce et al.[56] also examined the relationship between residential distance to multiple types of gambling venues (e.g., casinos, non-casino EGMs, and betting outlets) and gambling behaviors while adjusting for demographic, neighborhood, and urbanization variables. They uncovered a positive predictive association between residential distance and problem gambling, with people residing in closest proximity to all types of gambling venues (i.e., less than 0.7 km away) being 2.05 times more likely to be problem gamblers than individuals residing at the greatest distance from these venues (i.e., more than 3.1 km away).

Evidence from multivariate regression models, however, also suggests that the predictive relationship between residential distance to gambling venues and gambling pathology may vary depending on the age of the gambler. Specifically, using the same representative sample as in the 2004 study, Welte et al.[57] observed that while the presence of casinos within 10 miles had no effect on gambling pathology for younger respondents (aged 18–29 years), residential proximity to casinos significantly predicted gambling problems for older respondents (aged 30 years or more). Of importance, the authors noted that the non-significant relationship between residential distance to casinos and problem gambling for individuals under 30 was not explained by fewer potential opportunities for casino wagering amongst younger individuals or enforcement of legal age limits. Indeed, analyses revealed that residential proximity to casinos similarly had no relationship to the gambling problems of respondents aged 21–29 as respondents aged 18–20.

Over and above distance to gambling venues, Welte et al.[58] conducted multinomial logistic regression analyses to investigate the impact of other measures of geographical accessibility on gambling problems. Unlike the studies discussed above, *geographical accessibility* was operationalized as the number of different forms of legal gambling operating within respondents' respective states. They found that, among a nationally representative sample of

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[51]Adams, Sullivan, Horton, Menna, and Guilmette, *supra* note 14; R. A. LaBrie, S. E. Nelson, D. A. LaPlante, A. J. Peller, G. Caro, and H. J. Shaffer, *Missouri Casino Self-excluders: Distributions Across Time and Space*, 23 J. Gambling Stud. 231–243 (2007), doi:10.1007/s10899-006-9037-1; Pearce, Mason, Hiscock, and Day, *supra* note 14; Rush, Veldhuizen, Adlaf, *supra* note 14; Welte, Barnes, Tidwell, and Hoffman, *supra* note 14; Welte, Barnes, Wieczorek, Tidwell, and Hoffman, *supra* note 14; Welte, Wieczorek, Barnes, Tidwell, and Hoffman, *supra* note 14.

[52]Rush, Veldhuizen, Adlaf, *supra* note 14.

[53]Welte, Wieczorek, Barnes, Tidwell, and Hoffman, *supra* note 14.

[54]Pearce, Mason, Hiscock, and Day, *supra* note 14.

[55]Welte, Wieczorek, Barnes, Tidwell, and Hoffman, *supra* note 14.

[56]Pearce, Mason, Hiscock, and Day, *supra* note 14.

[57]Welte, Barnes, Wieczorek, Tidwell, and Hoffman, *supra* note 14.

[58]Welte, Barnes, Tidwell, and Hoffman, *supra* note 14.

Table 1. Summary of Impact Studies on Accessibility and Prevalence of Disordered Gambling

Publication	*Geographical Area*	*Methodology*	*Key Findings*	*Study Limitations*
Cross-sectional studies				
Adams, G. R., Sullivan, A.-M., Horton, K. D., Menna, R., & Guilmette, A. M. (2007). A study of differences in Canadian university students' gambling and proximity to a casino. *Journal of Gambling Issues*, *19*, 9–17. doi: 10.4309/jgi.2007.19.1	Ontario, Canada	• Participants: 1,579 university students from four medium-sized campuses close to and at a distance from a casino. • Questionnaire assessed problem gambling behaviors with South Oaks Gambling Screen (SOGS). • Data analyzed using chi-square tests with Bonferroni corrections and cross-tabulations.	• Severe gambling problems reported by a greater proportion of students enrolled in universities situated near casinos (80%) compared with students enrolled in universities located at a distance from casinos (20%).	• Statistical methods used do not allow for the control of other potential confounds (e.g., number of regulated gambling opportunities available in the jurisdiction, residential distance from gambling venues).
LaBrie, R. A., Nelson, S. E., LaPlante, D. A., Peller, A. J., Caro, G., & Shaffer, H. J. (2007). Missouri casino self-excluders: Distributions across time and space. *Journal of Gambling Studies, 23*, 231–243. doi: 10.1007/s10899-006-9037-1	Missouri (MO), U.S.A.	• Participants: 5,338 self-excluders resident of the state of MO (mean age = 42.8 years) and 1,262 self-excluders resident from outside MO (mean age = 42.5 years). • Two measures examined: (1) distance of the geographic center of each self-excluder's county of residence to the *nearest* casino; and (2) number of casinos clustered with the *closest* casino. • Data analyzed using multivariate regression modelling.	• 39% of unique explained variance in self-exclusion enrolment rates was due to distance to the nearest casino. • An additional 12% of unique explained variance in self-exclusion enrolment rates accounted for by the number of casinos clustered with the nearest casino.	• No measure of problem gambling behaviors of self-excluders; problem gambling inferred from self-exclusion status.
Pearce, J., Mason, K., Hiscock, R., & Day, P. (2008). A national study of neighbourhood access to gambling opportunities and individual gambling behaviour. *Journal of Epidemiology and Community Health, 62*, 862–868. doi: 10.1136/jech.2007.068114	New Zealand	• Participants: 12,467 respondents to the 2002–2003 New Zealand Health Survey (age = 15 + years). • Travel distance to *nearest* gambling venue along the road network calculated. • Health survey assessed problem gambling behaviors with question about having spent more than a set amount of time or money on gambling. • Data analyzed using multi-step logistic regression modelling.	• People residing in closest proximity to non-casino EGM venues (i.e., less than 0.7 km away) were 2.71 times more likely to be problem gamblers than individuals residing at the greatest distance from these venues (i.e., more than 3.1 km away). • People residing in closest proximity to betting outlets (i.e., less than 0.7 km away) were 2.70 times more likely to be problem gamblers than individuals residing at the greatest distance from these venues (i.e., more than 3.1 km away). • People residing in closest proximity to all gambling venue types (i.e., less than 0.7 km away) were 2.05 times more likely to be problem gamblers than individuals residing at the greatest distance from these venues (i.e., more than 3.1 km away)	• No standardized measure of problem gambling behaviors.

(*continued*)

Table 1. (Continued)

Publication	*Geographical Area*	*Methodology*	*Key Findings*	*Study Limitations*
Rush, B., Veldhuizen, S., & Adlaf, E. (2007). Mapping the prevalence of problem gambling and its association with treatment accessibility and proximity to gambling venues. *Journal of Gambling Issues, 20*, 193–213. doi: 10.4309/jgi.2007.20.6	Ontario, Canada	• Participants: 13,184 survey respondents to the 2002 Canadian Community Health Survey (age = 15 + years). • Health survey assessed problem gambling behaviors with Canadian Problem Gambling Index (CPGI). • Study also computed a measure of distance from each respondent's residential location to the *nearest* casino and EGM venue. • Data analyzed using logistic regression modelling.	• Residential distance from the closest gambling venues has a marginally yet statistically significant predictive relationship with problem gambling.	• Statistics on strength of association between problem gambling and regional distance from the closest gambling venues not reported (i.e., odds ratio, 95% confidence interval).
Sévigny, S., Ladouceur, R., Jacques, C., & Cantinotti, M. (2008). Links between casino proximity and gambling participation, expenditure, and pathology. *Psychology of Addictive Behaviors, 22*, 295–301. doi: 10.1037/0893-164X.22.2.295	Québec, Canada	• Participants: 8,842 adults (with 4,922 subjects residing within a 100 km driving distance from Montreal, Québec, Canada casino examined separately). • Questionnaire assessed problem gambling behaviors with South Oaks Gambling Screen (SOGS) or Canadian Problem Gambling Index (CPGI). • Travel distance from residence to *nearest* casino calculated. • Data analyzed using Cochran-Armitage test.	• No statistically significant association between the travelling distance from the closest casino to participants' residence and gambling pathology or problems for overall sample. • No statistically significant relationship between travelling distance from residence to the Montreal casino and gambling pathology or problems was observed for the sub-sample.	• No attempt to control for gambling activity participation or preferences; results possibly explained by participation in other forms of gambling (e.g., EGMS conveniently located in all geographical regions) or gambling activity preferences (i.e., casino games may not be the primary or exclusive gambling activity for individuals with gambling problems in the sample).
Welte, J. W., Wieczorek, W. F., Barnes, G. M., Tidwell, M.-C., & Hoffman, J. H. (2004). The relationship of ecological and geographic factors to gambling behavior and pathology. *Journal of Gambling Studies, 20*, 405–423. doi: 10.1007/s10899-004-4582-y	U.S.A.	• Participants: 2,361 telephone interview respondents (age = 18 + years). • Interview assessed problem gambling behaviors with Diagnostic Interview Schedule (DIS) of the DSM-IV. • Two geographic measures examined: (1) distance from residence to *nearest* gambling venue; and (2) number of venues clustered within 10 miles or greater from respondent's residence. • Data analyzed using logistic regression modelling.	• Respondents residing within 10 miles of a casino were twice as likely to be problem/pathological gamblers (odds ratio = 1.9) than those who lived more than 10 miles from a casino.	• No attempt to control for possible confounds (e.g., number of gambling activities participated in, gambling activity preferences); results possibly explained by participation in multiple forms of gambling or gambling activity preferences.

(*continued*)

TABLE 1. (CONTINUED)

Publication	*Geographical Area*	*Methodology*	*Key Findings*	*Study Limitations*
Welte, J. W., Barnes, G. M., Wieczorek, W. F., Tidwell, M.-C. O., & Hoffman, J. H. (2007). Type of gambling and availability as risk factors for problem gambling: A Tobit regression analysis by age and gender. *International Gambling Studies, 7*, 183–198. doi: 10.1080/14459790701387543	U.S.A.	• Same sample and interview questions as in Welte, Wieczorek, et al. (2004). • Problem gambling behaviors also assessed with South Oaks Gambling Screen (SOGS). • Combined both problem gambling measures (DIS and SOGS) into a *problem gambling scale* (Cronbach $\alpha = 0.91$). • Data analyzed using Tobit regression modelling.	• The presence of casinos within 10 miles had no effect on gambling problems for younger respondents (aged 18–29 years). • However, statistically significant effect of having a casino within 10 miles on gambling problems for older respondents (aged 30 years or more). • For each additional casino within 10 miles, a 0.09 unit increase on the problem gambling scale was found.	• Same limitations as in Welte, Wieczorek, et al. (2004).
Welte, J. W., Barnes, G. M., Tidwell, M.-C. O., & Hoffman, J. H. (2009b). Legal gambling availability and problem gambling among adolescents and young adults. *International Gambling Studies, 9*, 89–99. doi: 10.1080/14459790902754996	U.S.A.	• Participants: 2,274 telephone interview respondents (age = 14–21 years). • Interview assessed problem gambling behaviors with South Oaks Gambling Screen Revised for Adolescents (SOGS-RA). • A measure of the number of legal gambling venues operating in respondent's state also computed. • Data analyzed using multinomial regression modelling.	• The likelihood of having current gambling problems, as opposed to never gambling, increased by 39% with each additional form of gambling operating legally in a jurisdiction for young adult respondents (ages 18–21 years). • No statistically significant effect of the number of availability of gambling activities operating in a state on problem gambling was detected for adolescents (ages 14–17 years).	• No attempt to control for possible confounds (e.g., number of gambling activities legally participated in, gambling activity preferences); results possibly explained by participation in multiple forms of gambling or gambling activity preferences.
Young, M., Markham, F., & Doran, B. (2012). Too close to home? The relationships between residential distance to venue and gambling outcomes. *International Gambling Studies, 12*, 257–273. doi: 10.1080/14459795.2012.664159	Northern Territory (NT), Australia	• Participants: 7,044 EGM gamblers residing in the NT. • Questionnaire assessed problem gambling behaviors with Canadian Problem Gambling Index (CPGI). • Travel distance from residence to *most frequented* venue calculated. • Data analyzed using logistic regression modelling.	• No statistically significant effect of travelling distance to most frequently visited EGM venue on problem gambling, even when holding other influential individual- and neighborhood-level factors constant.	• No analysis of effect of travel distance on problem gambling for subjects that had not visited an EGM venue in the past month. • No attempt to control for other possible confounds (e.g., number of other gambling venues frequented).

(*continued*)

TABLE 1. (CONTINUED)

Publication	*Geographical Area*	*Methodology*	*Key Findings*	*Study Limitations*
Prospective studies				
Govoni, R., Frisch, G. R., Rupcich, N., & Getty, H. (1998). First year impacts of casino gambling in a community. *Journal of Gambling Studies, 14*, 347–358. doi: 10.1023/A:1023021009398	Windsor, Ontario, Canada	• Participants: 2,682 adult residents of Windsor interviewed prior to the opening of a casino (2,581 residents interviewed one year after the casino's opening). • Telephone interview assessed problematic gambling behaviors with South Oaks Gambling Screen (SOGS). • Data were analyzed using chi-square tests.	• No statistically significant differences in rates of problem or pathological gambling were detected following the establishment of a new casino in the region.	• No clear indication if pre- and post-test samples are the same (i.e., if study used a repeated measures methodology). • Statistical methods used do not allow for the control of other potential confounds (e.g., number of regulated gambling opportunities available in jurisdiction, residential distance from gambling venues, gambling activity preferences).
Jacques, C., Ladouceur, R., & Ferland, F. (2000). Impact of availability on gambling: A longitudinal study. *The Canadian Journal of Psychiatry / La Revue canadienne de psychiatrie, 45*(9), 810–815.	Hull, Québec, Canada and Québec City, Québec, Canada	• Participants: 457 adults from Hull region (experimental groups) and 423 adults from the Québec City area (control group) interviewed before and 12 months following establishment of the casino. • Telephone interview measured problem gambling behaviors with South Oaks Gambling Screen (SOGS). • Data analyzed using repeated measures ANOVA.	• No statistically significant change in the current prevalence of pathological gambling between pre-test and post-test for Hull region (1.1% vs. 1.8%). • No statistically significant change in the current prevalence of pathological gambling between pre-test and post-test for Québec City region (0.9% vs. 0.5%).	• Statistical methods used do not allow for the control of other potential confounds (e.g., number of regulated gambling opportunities available in jurisdiction, residential distance from gambling venues, gambling activity preferences).
Jacques, C., & Ladouceur, R. (2006). A prospective study of the impact of opening a casino on gambling behaviours: 2- and 4-year follow-ups. *The Canadian Journal of Psychiatry / La Revue canadienne de psychiatrie, 51*(12), 764–773.	Hull, Québec, Canada and Québec City, Québec, Canada	• Same sample as in Jacques et al. (2000) assessed at 2 and 4 years following the establishment of the casino. • Same interview questions as in Jacques et al. (2000). • Data analyzed using 2 (region) x 2 (time) repeated measures ANOVA.	• No statistically significant changes in past-year prevalence of pathological gambling were observed at 2- and 4-year follow-ups for the Hull region compared to the Québec City region.	• Same limitations as in Jacques et al. (2000).

(*continued*)

Table 1. (Continued)

Publication	*Geographical Area*	*Methodology*	*Key Findings*	*Study Limitations*
Lund, I. (2009). Gambling behaviour and the prevalence of gambling problems in adult EGM gamblers when EGMs are banned. A natural experiment. *Journal of Gambling Studies, 25*, 215–225. doi: 10.1007/s10899-009-9127-y	Norway	• Participants: 1,293 past-year EGM gamblers assessed 2.5 months before and 5 months after ban on EGMs (age = 18–90 years). • Questionnaire measured problem gambling behaviors with 3-month adaptation of the Lie/Bet questionnaire. • Data analyzed using McNemar tests for related samples.	• Significant reduction in problem gambling prevalence following the removal of EGMs from the market, with rates in the overall sample falling from 1.0% to 0.4%.	• Non-standardized adaptation of the Lie/Bet questionnaire used. • Significant attrition rate (24%) in the sample between the two data collection points, with problem and at-risk gamblers over-represented in the post-test non-completers.
Room, R., Turner, N. E., & Ialomiteanu, A. (1999). Community effects of the opening of the Niagara casino. *Addiction, 94*, 1449–1466. doi: 10.1046/j.1360-0443.1999.941014492.x	Niagara Falls, Ontario, Canada	• Participants: 667 adults from the region surveyed before opening of the casino or in the 10 days following comprised the "before" dataset; 468 adults from original sample combined with new sample of 608 adults from the same region assessed one year following casino opening formed the "after" dataset. • Telephone survey measured problem gambling behaviors with abbreviated South Oaks Gambling Screen (SOGS). • Data analyzed using a priori *t*-tests.	• Proportion of respondents reporting problem gambling behaviors rose from 2.5% to 4.4% one year after the casino's introduction for the sample from Niagara Falls, which represents a 75% increase.	• Post-test sample comprised of a both cross-sectional and longitudinal sub-samples. • Statistical methods used do not allow for the control of other potential confounds (e.g., number of other regulated gambling opportunities available in jurisdiction, distance from the gambling venue). • Non-standardized adaptation of the SOGS used.

EGM, electronic gambling machine.

U.S. adolescents and young adults (ages 14–21 years), the number of legal gambling operations available in a jurisdiction was positively associated with problem gambling. Specifically, they observed that the likelihood of having current gambling problems, as opposed to never gambling, increased by 39% with each additional form of gambling operating legally in a jurisdiction for young adult respondents (ages 18–21 years). Conversely, no statistically significant effect of the number of gambling activities operating in a state on problem gambling was detected for adolescents (ages 14–17 years), which is likely explained by limited gambling opportunities for this age group as well as enforcement of legal age limits.

Given that a high prevalence rate of problem gambling has been observed among casino self-excluders and that self-exclusion enrollment may therefore serve as an indicator of problem gambling, LaBrie et al.[59] investigated the geographical distribution of 6,599 self-excluders from casinos within the state of Missouri over a seven year period. They found that the per capita self-exclusion enrollment rates were higher in regions with greater proximal access to casinos, and that both the distance of self-excluders from the nearest casino and the number of casinos clustered with the nearest casino were significantly correlated with self-exclusion enrollment rates. Of interest, LaBrie and his colleagues performed multivariate regression analyses to examine the predictive effects geographical availability on self-exclusion rates. They reported that 39% of unique explained variance in self-exclusion enrollment rates was due to distance to the nearest casino, with an additional 12% of unique explained variance accounted for by the number of casinos clustered with the nearest casino.

Further, in line with findings from regression models, a positive association between non-residential gambling venue proximity and disordered gambling has been established among students in Ontario, Canada using less sophisticated data analytic techniques.[60] Specifically, results from chi-square analyses revealed that attendance of educational institutions in close proximity to casino venues was significantly related to disordered gambling behavior, with severe gambling problems reported by a greater proportion of students enrolled in universities situated near casinos, compared with students enrolled in universities located at a distance from casinos (80% vs. 20%). One important weakness of Adams et al.'s study, however, is that the statistical methods used do not allow for the control of other potential confounds, such as the number of regulated gambling opportunities available in the jurisdiction and residential distance from gambling venues. It therefore remains unclear whether the observed association of spatial proximity of gambling venues to educational institutions with problem gambling is better explained by other geographical accessibility variables.

Despite positive findings from a number of studies, not all empirical research supports an association between geographical accessibility and problematic gambling behavior.[61] In a first study investigating the relationship between casino geographical proximity and gambling behavior for 8,842 respondents in Québec, Canada, Sévigny et al.[62] found no significant association between the travelling distance from the closest casino to participants' residence and gambling pathology or problems. As such, past-year prevalence rates for probable pathological gambling and problem gambling were comparable for respondents residing in close proximity to casinos and residents living at a distance. In a parallel study, Sévigny et al.[63] compared the gambling behaviors of 4,922 participants residing within a 100-km driving distance from the Montréal casino to a group of 3,920 respondents living more than 100 km from the same venue. Again, no significant relationship between travelling distance from residence to the casino and gambling pathology or problems was observed. Nevertheless, results from these two studies should be interpreted in light of certain limitations: no attempts to control for gambling activity participation or preferences were undertaken. It is possible that the non-significant relationships between travelling distance from residence to gambling venues and gambling problems reported for both samples are influenced by respondents' participation in other forms of gambling (e.g., EGMS, which are conveniently located in all geographical regions) or

[59]LaBrie, Nelson, LaPlante, Peller, Caro, and Shaffer, *supra* note 51.
[60]Adams, Sullivan, Horton, Menna, and Guilmette, *supra* note 14.
[61]Sévigny, Ladouceur, Jacques, and Cantinotti, *supra* note 15; Young, Markham, and Doran, *supra* note 15.
[62]Sévigny, Ladouceur, Jacques, and Cantinotti, *supra* note 15.
[63]*Id.*

their gambling activity preferences (i.e., casino games may not be the primary or exclusive gambling activity for individuals with gambling problems in the study's sample). Young and colleagues[64] also examined the association between travelling distance from residence to most frequented gambling venues and risk of disordered gambling among a large sample ($N = 7{,}044$) of residents from the Northern Territory of Australia. In contrast to Sévigny et al.[65] however, the authors investigated the association between geographical access and gambling pathology while holding other influential individual- and neighborhood-level factors constant. Nevertheless, even with attempts to control for possible confounds, Young et al.[66] reported no significant effect of travelling distance to most frequently visited EGM venue on problem gambling. In other words, travelling distance to respondents' most frequented gambling venue affected the degree of risk for gambling problems equally for all EGM players.

Geo-temporal accessibility

Findings from studies investigating the association between geographical availability of gaming options and the prevalence of problem gambling suggest that both distance to venue and number of legal gambling operations available in a jurisdiction influence the likelihood of problem gambling. However, results from extant empirical research also reveal that the strength of this relationship varies and that the association is not uniform across venue types.[67] Given these findings, it would appear that the relationship between geographical accessibility and gambling-related harm is dynamic and multifaceted. Conceptualizations of gambling accessibility therefore need to extend beyond spatial distribution to incorporate other non-spatial components. Indeed, several authors have argued that accessibility needs to take into account wider environmental factors which moderate effects of exposure to gambling opportunities in a jurisdiction, such as temporal changes in market offerings.[68]

A small, but growing, number of studies have attempted to investigate the relationship of geo-temporal accessibility and gambling pathology. These cross-sectional and prospective studies focus on the impact of the establishment of new venues, or the removal of existing ones, in a specified region on the prevalence rates of problem gambling over time. While significant effects of increased or decreased geo-temporal accessibility of gambling venues on problem gambling rates have been noted in some studies, research results have not been consistent (*see* Table 1). An early study by Room et al.[69] explored the impact of opening a casino in the city of Niagara Falls, Canada on gambling pathology one year later. Responses from a probability sample of 667 adults from the region surveyed either before the opening of the casino or in the 10 days following its opening comprised the "before" dataset. Additionally, survey responses of 468 respondents drawn from the original sample and reassessed approximately one year following the casino's opening were combined with those of a probability sample of 608 adults from the same region, collected one year following the establishment of the casino, to form the "after" dataset. Using a priori *t*-tests to analyze effects, Room and colleagues found that the proportion of respondents reporting problem gambling behaviors rose from 2.5% to 4.4% one year after the casino's introduction for the sample from Niagara Falls, which represents a 75% increase. This finding should nevertheless be interpreted with caution given the weaknesses in the study's design and methodology. The post-test sample was comprised of both cross-sectional and longitudinal sub-samples, and the statistical methods used do not allow for the control of other potential confounds (e.g., number of other regulated gambling opportunities available in the jurisdiction, distance from the gambling venue), which limits the possibility for drawing firm conclusions about the impact of establishing new venues on a region's problem gambling prevalence rates over time.

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[64]Young, Markham, and Doran, *supra* note 15.
[65]Sévigny, Ladouceur, Jacques, and Cantinotti, *supra* note 15.
[66]Young, Markham, and Doran, *supra* note 15.
[67]M. Young, D. Lamb, and B. Doran, *Mountains and Molehills: A Spatiotemporal Analysis of Poker Machine Expenditure in the Northern Territory of Australia*, 40 Australian Geographer 249–269 (2009), doi:10.1080/00049180903127721; Young, Markham, and Doran, *supra* note 15.
[68]LaPlante and Shaffer, *supra* note 13; Marshall, *supra* note 49; Shaffer, LaBrie, and LaPlante, *supra* note 13; J. Storer, M. Abbott, and J. Stubbs, *Access or Adaptation? A Meta-analysis of Surveys of Problem Gambling Prevalence in Australia and New Zealand with Respect to Concentration of Electronic Gaming Machines*, 9 Int'l Gambling Stud. 225–244 (2009), doi:10.1080/14459790903257981; Young, D. Lamb, and B. Doran, *supra* note 67.
[69]Room, Turner, and Ialomiteanu, *supra* note 14.

Taking a different approach, Lund[70] conducted a prospective study examining changes in levels of problem gamble following the ban of all EGMs except automatic bingo machines in Norway beginning in July 2007. Data from a sample of 1,293 past-year EGM gamblers (aged 18–90 years) surveyed approximately 2.5 months before the ban on EGMs and again five months after the removal of EGMs from the market were used for the purposes of this study. Results demonstrated significant reductions in problem gambling prevalence following the removal of EGMs from the market, with the rates in the overall sample falling from 1.0% to 0.4%. Although the results do suggest that temporal changes in market offerings are associated with problematic gambling behavior, it is important to note that the study used a non-standardized three-month adaptation of the Lie/Bet questionnaire; the prevalence of gambling problems reported by Lund may represent an over- or under-estimation of actual problem gambling as a consequence of this adaptation. Further, there was a significant attrition rate (24%) in the study's sample between the two data collection points, with problem and at-risk gamblers over-represented in the drop-out group. It is plausible that changes in the rate of problem gambling among this sub-sample may be dissimilar to the changes observed among the retained sample of respondents, which limits the generalizability of the findings to all past-year EGM gamblers.

Also using an unmixed prospective study design, Jacques et al.[71] evaluated the impact of opening a casino in the Hull, Canada area on the gambling pathology of nearby residents one year later. Survey responses were collected from a random sample of 457 adults from the Hull region before the opening of the casino and 12 months following its establishment. The same survey data was collected from a second random sample of 423 respondents from the Québec City, Canada area, a region without a casino at the time, to serve as a control group. Jacques and colleagues reported no statistically significant change in the current prevalence of pathological gambling between pre-test and post-test for either the Hull (1.1% vs. 1.8%) or the Québec City regions (0.9% vs. 0.5%). Similar findings were reported by Govoni et al.[72] (1998) in their study evaluating the one year impact of a casino opening on the levels of problem and pathological gambling for the local population of Windsor, Canada; no statistically significant differences in rates of problem or pathological gambling were detected following the establishment of a new casino in the region.

In order to explain their non-significant findings, Jacques et al.[73] argued that it would be unlikely to observe an increase in the proportion of pathological gamblers only 12 months following the establishment of a new gambling venue, and suggested that longer exposure to new gambling venues may eventually lead to increases in the observed number of pathological gamblers. They completed a follow-up study, which evaluated the same respondents from the first study two and four years after the initial post-test, to test this hypothesis.[74] Contrary to their expectations, however, no statistically significant changes in past-year prevalence of pathological gambling were observed at two- and four-year follow-ups for the Hull region compared to the Québec City region.

THE REGIONAL EXPOSURE MODEL

Clearly, participation in gambling activities is a prerequisite for the development of gambling problems. Therefore, it follows logically that as availability and accessibility of gambling opportunities increases, exposure to the products increases, and as exposure to gambling products increases, the likelihood for gambling participation will increase accordingly.[75] While concerns about an increased availability and accessibility of gambling products resulting in increased prevalence of pathological and problem gamblers have been noted in the literature, efforts to establish a direct causal link have been unsuccessful. To date, the extant body of research has revealed inconsistencies in the association of gambling availability and accessibility with problem gambling. A number of studies have documented significant positive correlations between distance to venue or number of legal gambling operations available in a jurisdiction and the prevalence of disordered gambling, as well as

[70]Lund, *supra* note 16.
[71]Jacques, Ladouceur, and Ferland, *supra* note 16.
[72]Govoni, Frisch, Rupcich, and Getty, *supra* note 16.
[73]Jacques, Ladouceur, and Ferland, *supra* note 16.
[74]Jacques and Ladouceur, *supra* note 16.
[75]Marshall, *supra* note 49.

significant effects of temporal changes in market offerings on problem gambling prevalence. Conversely, other studies have reported no concurrent link between distance to venue and rates of problem gambling, and no significant increase or decrease in the prevalence of problem gambling following the introduction or removal of gambling venues or opportunities. These inconsistencies in the findings have led certain researchers to suggest that the relationship of gambling availability and accessibility with prevalence of gambling problems may not be a direct or linear one, and have encouraged scholars to consider alternate frameworks for understanding this non-linear association.[76]

To address the need for an alternate framework, the Harvard Medical School's Division on Addictions developed a "regional exposure model"[77] (REM) explaining the curvilinear relationship between gambling availability and pathological or problem gambling. The REM considers dose, potency, and duration of gambling availability to understand gambling pathology and problems in a particular jurisdiction. Within this model, *dose* is defined as the extent of exposure in a specific region (e.g., the number of gambling venues and the number of individuals employed by gambling venues in a region). *Potency*, by contrast, is conceptualized as the source of strength of a specific social phenomenon (e.g., number of different types of gambling that are available in a jurisdiction). Finally, *duration* is operationalized as the amount of time a social phenomenon has been available to the public (e.g., number of years since the legalization of gambling in the jurisdiction). Thus, the REM encompasses several dimensions of gambling availability and accessibility to explain the prevalence of pathological or problem gambling in specific regions.

The REM operates by converting available data on dose, potency, and duration of gambling availability into standardized scores, and then combining the scores to yield an index of regional gambling availability, identified as the Regional Index of Gambling Exposure (RIGE). The purpose of a continuous measure, such as the RIGE, is to allow for ordering jurisdictions along a continuous gradient, as well as to test assumptions about correlations between regional gambling availability and prevalence of pathological or problem gambling. To illustrate the utility of the REM in understanding the association between exposure to gambling venues and the prevalence of disordered gambling, Shaffer, LaBrie, et al.[78] examined state-level data for all jurisdictions with casino gambling using the RIGE. Their analysis revealed that the state of Nevada had the greatest estimated regional exposure to casino gambling, with the prevalence of gambling problems in Nevada expected to be close to eight times higher than other casino states. However, their review of the most recent available data on the prevalence of past-year gambling problems indicated that Nevada's prevalence was not actually eight times higher than other states. Their findings therefore suggest that the relationship between exposure and problem gambling prevalence in Nevada is not linear. One potential explanation for the non-linear relationship between exposure and gambling problems in the state is described in the adaptation hypothesis: residents of Nevada have adapted to the novelty of exposure.[79] To be precise, residents of Nevada are likely to have been exposed to gambling for such an extended period of time that the availability of gambling opportunities and the proximity of venues no longer produce the same effects on gambling behaviors as they did originally. Consequently, the association between regional gambling availability and increased problem gambling prevalence plateaus and eventually levels off over time. Overall then, the REM provides a tool for quantifying exposure and/or adaptation to gambling venues to allow for a clearer understanding of the relationship between gambling availability and pathological or problem gambling in a given jurisdiction.

While the REM does provide a useful framework for understanding relationships between gambling availability and pathological or problem gambling in a given jurisdiction, it is nevertheless necessary to consider important limitations of the model. For one, the model is restricted to the examination of three exposure factors (dose, potency, duration). As such, the REM does not integrate other relevant risk and protective factors that moderate the effects of exposure on the incidence of pathological or

[76]LaPlante and Shaffer, *supra* note 13; Shaffer, LaBrie, and LaPlante, *supra* note 13; Storer, Abbott, and Stubbs, *supra* note 68.
[77]LaBrie, Nelson, LaPlante, Peller, Caro, and Shaffer, *supra* note 51; Shaffer, LaBrie, and LaPlante, *supra* note 13.
[78]Shaffer, LaBrie, and LaPlante, *supra* note 13.
[79]Shaffer, LaBrie, and LaPlante, *supra* note 13; Shaffer and Martin, *supra* note 18.

problem gambling in a jurisdiction. For example, the REM does not include community-focused harm minimization strategies (e.g., social marketing and education programs, early intervention initiatives, available treatment options) in its conceptualization of exposure effects, even though these strategies can result in the adoption of less hazardous gambling patterns within a jurisdiction.[80] In addition, the REM only considers the impact of regional exposure on the prevalence of disordered gambling in a jurisdiction. However, it fails to account for the influence of exposure to gambling opportunities elsewhere, such as in other jurisdictions as well as remote gambling venues outside of the jurisdiction.[81]

COSTS AND BENEFITS OF LEGALIZED GAMBLING

Although it is difficult to establish a direct causal link between gambling problems and accessibility of gambling venues, there have been obvious concerns regarding the reported association that calls for clarifying the role of governments, as well as for establishing appropriate policies and actions toward harm minimization. Certainly, there are economic benefits from legalized gambling, including the benefits to consumers who enjoy the activity, employment and wage effects (particularly from casinos), and tax revenues for governments. However, there has yet to be a sound, comprehensive cost-benefit analysis of legalized gambling. Given that casino gambling has been one of the more controversial forms of gambling over the past two decades, as well as one of the most studied gambling venues in terms of availability and accessibility, this discussion will focus on the example of land-based casinos in order to explore the question of costs and benefits associated with gambling availability and accessibility.

Economic benefits

There are several purported economic benefits of casinos, and these are heavily promoted by the industry, the American Gaming Association, and legislators who wish to generate economic benefits for their constituents. Most of the information provided by these groups, however, is simply a catalog of the number of employees a casino may have, or how many temporary construction jobs may be created, yet this data is not relevant to the topic of employment effects. Rather, of importance is the net effect of casinos on employment. For example, if a casino opens and hires 2,000 employees, but other local firms are unable to compete and 500 jobs are lost, then the net employment impact of the casino would be only 1,500 jobs. This issue has been articulated by a number of economists, who have noted that increased employment may or may not be associated with economic development.[82]

Perhaps the most comprehensive study on the employment and wage effects of casinos was reported by Cotti.[83] Cotti analyzed U.S. county-level data for the impact on employment and average wages as a result of a casino being located within the county. Overall, he found a modestly positive impact on county-level employment. Yet, the effect of casinos on wages was insignificant. Smaller population counties generally see greater economic benefits, in percentage terms, than more populous counties. His analysis, however, did not distinguish between counties that have a large casino industry or a small one, only whether or not the county had a casino or not. This caveat notwithstanding, Cotti's analysis provides fairly strong evidence that the "substitution effect" (or industry competition) caused by casinos has not really had a negative impact on local employment.

Despite the fact that casinos are often promoted as a tool for economic development, there have been surprisingly few reported studies. In a series of published papers, Walker and Jackson[84] examined the

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[80]Storer, Abbott, and Stubbs, *supra* note 68.

[81]H. H. Y. Tong and D. Chim, *The Relationship Between Casino Proximity and Problem Gambling*, 3 Asian J. Gambling Issues & Pub. Health 1–17 (2013), doi:10.1186/2195-3007-3-2.

[82]E. L. Grinols, Gambling in America: Costs and Benefits (2004).

[83]C. Cotti, *The Effect of Casinos on Local Labor Markets: A County Level Analysis*, 2(2) J. Gambling Bus. & Econ. 17–41 (2008).

[84]D. M. Walker and J. D. Jackson, *New Goods and Economic Growth: Evidence from Legalized Gambling*, 28(2) Rev. Regional Stud. 47–69 (1998); D. M. Walker and J. D. Jackson, *Do Casinos Cause Economic Growth?*, 66 Am. J. Econ. & Sociology 593–607 (2007), doi:10.1111/j.1536-7150.2007.00528.x; D. M. Walker and J. D. Jackson, *Market-based "Disaster Relief": Katrina and the Casino Industry*, 35 Int'l J. Soc. Econ. 521–530 (2008), doi:10.1108/03068290810886920; D. M. Walker and J. D. Jackson, *Katrina and the Gulf States Casino Industry*, 4(1) J. Bus. Valuation & Econ. Loss Analysis (2009), doi:10.2202/1932-9156.1030.

impact of casino activity on U.S. state-level economic growth (i.e., increases in per capita income). Overall, their analysis suggests a positive impact from casinos on per capita income, at least at the state level.[85] This evidence is consistent with Cotti's[86] findings on employment and wages at the county level. There have also been a variety of published and unpublished "economic impact analysis" studies. The results from these studies are varied, as one might expect, since the economic impacts from casinos are likely to vary across jurisdictions and over time.

Social costs

Compared to the economic benefits of casinos, the cost side of the ledger is much less clear and much more controversial in the extant literature. In particular, the "social costs of gambling" have been an area of vigorous debate since the mid-1990s, much of it in North America. Social costs represent the major cost item in cost-benefit analyses of legalized gambling, and researchers generally agree that most of these costs are attributable to problem and pathological gamblers who engage in a variety of behaviors that cause harm to themselves, their families, and others in society. A selection of studies estimating the social costs of legal gambling has been published since 1994. The early study by Goodman[87] indicated social costs of $13,200 per year for a problem gambler. Kindt[88] suggested that social costs could be as high as $53,000 per year, while Thompson, Gazel, and Rickman[89] estimated social costs to be approximately $9,500 per year. Further, Grinols,[90] averaging social cost estimates from a variety of unpublished papers and policy reports throughout the 1990s, indicated that social costs are approximately $10,330 per pathological gambler, per year. Taken together, the enormous range and variability of estimates reported in the gambling literature suggests that these studies are likely not measuring the same construct, must be using vastly different methodologies, and are subject to significant geographical variability.

To examine this particular issue, Walker and Barnett[91] systematically reviewed the various social cost studies that had been published at that time. They argued that most of the studies were methodologically flawed because they did not actually define "social cost." Walker and Barnett suggested that it was this failure to conceptualize social costs which ultimately led researchers to use *ad hoc* methodologies in deciding which variables to include as a social cost and how to measure them. Further, they proposed that this use of *ad hoc* methodologies explains the divergence in results for social cost estimates. In an attempt to resolve this critical issue, Walker and Barnett defined social costs according to a welfare economics paradigm, considering social cost to be a reduction in societal wealth or well-being. This definition specifically excludes wealth transfers from social costs. The authors maintain that many of the items included in social cost studies should not be, since they are essentially transfers of wealth (e.g., welfare payments, bad debts, theft). As an example, they examined the detailed analysis by Thompson et al.[92] and, using the economics definition of social cost, revised the study's estimate from $9,469 down to $2,974. Of interest, Walker and Barnett also noted that most social cost studies have excluded items that should be considered social costs (such as anguish or "psychic costs" associated with divorce, suicide attempts, etc., that are attributable to pathological gambling).

Several researchers and organizations have since supported the economic perspective on social costs promoted by Walker and Barnett.[93] These include the National Research Council,[94] Clement,[95]

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[85]WALKER, *supra* note 3.
[86]Cotti, *supra* note 83.
[87]R. GOODMAN, THE LUCK OF BUSINESS: THE DEVASTATING CONSEQUENCES AND BROKEN PROMISES OF AMERICA'S GAMBLING EXPLOSION (1995).
[88]J. W. Kindt, *U.S. National Security and the Strategic Economic Base: The Business/Economic Impacts of the Legalization of Gambling Activities*, 39 ST. LOUIS U. L.J. 567 (1995).
[89]W. N. Thompson, R. Gazel, and D. Rickman, *Social and Legal Costs of Compulsive Gambling*, 1 GAMING L. REV. & ECON. 81–89 (1997), doi:10.1089/glr.1997.1.81.
[90]GRINOLS, *supra* note 82.
[91]D. M. Walker and A. H. Barnett, *The Social Costs of Gambling: An Economic Perspective*, 15 J. GAMBLING STUD. 181–212 (1999), doi:10.1023/A:1023089111024.
[92]Thompson, Gazel, and Rickman, *supra* note 89.
[93]Walker and Barnett, *supra* note 91.
[94]NATIONAL RESEARCH COUNCIL, PATHOLOGICAL GAMBLING: A CRITICAL REVIEW (1999).
[95]D. Clement, *Milking the New Buffalo*. FEDGAZETTE (Mar. 1, 2003), <http://www.minneapolisfed.org/publications_papers/pub_display.cfm?id=3842>.

Eadington,[96] and Collins and Lapsley.[97] However, despite this support for Walker and Barnett's economic perspective in the extant literature, the social costs attributable to pathological or disordered gambling remain controversial. Indeed, two Canadian symposiums dedicated exclusively to the social cost issue were held in 2000 and 2006, namely the Whistler Symposium in Whistler, British Columbia and the Alberta Gaming Research Institute conference in Banff, Alberta. Nevertheless, even following these two important conferences, much controversy still remains regarding the best approach for defining and measuring social costs.

In an effort to further clarify the social cost issue, a number of reports have been written since the publication of Walker and Barnett's[98] paper. For example, the SEIG report[99] attempted to lay a foundation for a "gold standard" on how to approach social cost studies. Nonetheless, in a response sponsored by the Canadian Gaming Association, Walker[100] argued that the SEIG report did little to provide a single, comprehensive, uncontroversial methodology for analyzing social costs. By contrast, the report by Humphreys, Soebbing, Wynne, Turvey, and Lee[101] examined social costs in Alberta, but avoided providing specific monetary estimates for social costs. Even today, there is no robust evidence of agreement among researchers on how social costs should be measured or analyzed.

Clearly, an acceptable definition of "social cost" appears beyond the reach of gambling scholars at present, as does the knowledge base necessary for developing legitimate monetary estimates of these costs. On the other hand, what is fairly well known are the different types of problems that often accompany problem and pathological gambling; psychologists and clinicians have studied disordered gambling extensively, and there is an entire literature on such behavioral problems. In the social cost literature, researchers have frequently listed a variety of negative impacts of gambling and, in some cases, have elicited information from Gamblers Anonymous members regarding the different types of problems encountered. These researchers subsequently have used the information provided by survey respondents to piece together a social cost estimate. The study by Thompson et al.[102] is one of the best examples in the literature in terms of being transparent as to how the calculations are made. Walker,[103] more recently, provided a comprehensive list of "social costs" that are often included in published studies. These include (a) income lost from missed work; (b) decreased employment productivity; (c) depression and physical illness related to stress; (c) increased suicide attempts; (d) bailout costs; (e) unrecovered loans to pathological gamblers; (f) unpaid debts and bankruptcies; (g) higher insurance premiums resulting from pathological gambler-caused fraud; (h) corruption of public officials; (i) strain on public services; (j) industry cannibalization; and (k) divorces caused by problem gambling.

Aside from the definitional problem discussed above, there are several other major problems with developing a cost profile based on the negative impacts of gambling. First, several of these are inherently immeasurable (e.g., divorce; suicide attempts), and any social cost estimate that ignores impacts such as these will necessarily be an inaccurate estimate. Perhaps most critical to the issue of developing a cost profile based on negative effects, however, is the problem of comorbidity. Research by Petry, Stinson, and Grant[104] and Westphal and

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[96]W. R. Eadington, *Measuring Costs from Permitted Gaming: Concepts and Categories in Evaluating Gambling's Consequences*, 19 J. Gambling Stud. 185–213 (2003), doi:10.1023/A:1023681315907.

[97]D. Collins and H. Lapsley, *The Social Costs and Benefits of Gambling: An Introduction to the Economic Issues*, 19 J. Gambling Stud. 123–148 (2003), doi:10.1023/A:1023677214999.

[98]Walker and Barnett, *supra* note 91.

[99]Anielski Management Inc. *The Socio-economic Impact of Gambling (SEIG) Framework: An Assessment Framework for Canada: In Search of the Gold Standard* (2008), retrieved from Inter-Provincial Consortium for the Development of Methodology to Assess the Social and Economic Impact of Gambling website: <http://hdl.handle.net/1880/45235>.

[100]D. M. Walker, *Issues to Consider in Implementing the "Socio-economic Impact of Gambling (SEIG) Framework*," Canadian Gaming Association (Aug. 27, 2008), <http://www.canadiangaming.ca/images/stories/media_releases/issues_to_consider_in_implementing_the_socio-economic_impact_of_gambling_framework.pdf>.

[101]B. R. Humphreys, B. P. Soebbing, H. J. Wynne, J. Turvey, and Y. S. Lee, *University of Alberta SEIGA Research Team: Final Report to the Alberta Gaming Research Institute on the Socio-economic Impact of Gambling in Alberta* (2011), retrieved from Alberta Gaming Research Institute website: <http://hdl.handle.net/1880/48545>.

[102]Thompson, Gazel, and Rickman, *supra* note 89.

[103]Walker, *supra* note 3.

[104]N. M. Petry, F. S. Stinson, and B. F. Grant, *Comorbidity of DSM-IV Pathological Gambling and Other Psychiatric Disorders: Results From the National Epidemiologic Survey on Alcohol and Related Conditions*, 66 J. Clinical Psychiatry 564–574 (2005), doi:10.4088/JCP.v66n0504.

Johnson[105] has shown that the majority of pathological gamblers (approximately 70% or more) have other comorbid psychiatric and/or behavioral disorders. Additional research has also suggested that, in some cases, the coexisting disorders may precede the gambling problem.[106] Clearly then, it would be inappropriate to assert that the measured "social costs of gambling" in studies such as Thompson et al.[107] and Grinols[108] are attributable entirely to disordered gambling. Walker[109] argues that the comorbidity problem effectively renders social cost estimates arbitrary and useless.

Considering the literature since the 1990s, there is still evident disagreement about how social costs should be treated, with ongoing debate over various measurement issues. In contrast, what can be agreed upon is that there are a variety of negative impacts which accompany gambling disorders and related problems. Although economists have not developed a good working methodology for measuring social costs of gambling, psychologists and clinicians do have a relatively well-developed understanding of the types of problems encountered by pathological/disordered gamblers. Consequently, some social cost researchers have begun to suggest that we should focus on the qualitative social cost issues, rather than trying to quantify them. This approach has been used by Humphreys et al.[110] and is certainly more fruitful than attempts to provide precise monetary estimates of social costs. Despite the fact that this approach warrants further consideration, social scientists still do not have a clear understanding of the net impact of legalized gambling. As a result of this poor understanding of the net impact of legalized gambling, policymakers continue to view casinos as a net positive, leading to the persistent expansion of casinos across North America and around the world.

NEW GAMBLING OPPORTUNITIES, NEW EMERGING CONCERNS

Although still in its infancy, there is a selection of Internet gaming options now legally available to gamblers in Canada and the U.S. Online casinos offer games comparable to those found in typical land-based casinos, such as blackjack, craps, keno, baccarat, roulette, and slot machines. These online casinos often present special incentives (i.e., bonuses to new players, free spins) on some of the games to encourage enrolment and use of a particular site. Government-owned online poker rooms have also been established in several Canadian provinces (e.g., British Columbia, Quebec, with others coming onboard in the very near future), and a number of U.S. states are actively working towards the establishment of intrastate online poker services and casino-type games following the Department of Justice decision in 2011.[111] Such sites will mimic those already in place internationally. Online poker rooms are widely popular and offer different forms of poker games and tournaments where players cannot interact but the games are typically played much faster than in actual poker games. In addition to online casinos and online poker rooms, several provinces and states currently permit the remote sale of lottery ticket subscriptions.

Several concerns about the potential "addictiveness" of online gambling have been raised since the introduction of the Internet to gambling changed some of the fundamental situational and structural characteristics of traditional land-based game offerings.[112] For one, the Internet removes barriers to gambling based on accessibility and convenience. In contrast to land-based activities, individuals can gamble on a multitude of games conveniently from the comfort of their home or workplace, 24 hours a day, seven days a week, without the need to travel.[113] Also, online gambling activities can offer more advantageous payout rates than land-based gaming, principally because of the minimal operating costs and hyper competition for clientele, making them a more attractive gaming choice for consumers.[114]

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[105]J. R. Westphal and L. J. Johnson, *Multiple Co-occurring Behaviours Among Gamblers in Treatment: Implications and Assessment*, 7 Int'l Gambling Stud. 73–99 (2007), doi:10.1080/14459790601157905.

[106]Kessler, Hwang, LaBrie, Petukhova, Sampson, Winters, and Shaffer, *supra* note 39.

[107]Thompson, Gazel, and Rickman, *supra* note 89.

[108]Grinols, *supra* note 82.

[109]Walker, *supra* note 3.

[110]Humphreys, Soebbing, Wynne, Turvey, and Lee, *supra* note 101.

[111]Holden, *supra* note 9; Stewart, *supra* note 8.

[112]M. Griffiths and A. Barnes, *Internet Gambling: An Online Empirical Study Among Student Gamblers*, 6 Int'l J. Mental Health & Addiction 194–204 (2008), doi:10.1007/s11469-007-9083-7.

[113]Griffiths 1999, *supra* note 22; M. D. Griffiths and J. Parke, *Adolescent Gambling on the Internet: A Review*, 22(1) Int'l J. Adolescent Medicine & Health 59–75 (2010).

[114]R. J. Williams and R. T. Wood, Internet Gambling: A Comprehensive Review and Synthesis of the Literature (report prepared for the Ontario Problem Gambling Research Centre, 2007).

Further, the Internet provides gamblers with a sense of anonymity, allowing the individual to wager privately without apprehension of stigmatization.[115]

Given these concerns, a small but growing body of research has begun to examine the impact of online gambling on game play patterns and problematic wagering behaviors. The results from these studies reveal that, much like land-based gambling, certain forms of Internet wagering activities are more strongly associated with more intense involvement[116] and with problem gambling.[117] For example, Griffiths and Barnes[118] conducted a survey of 473 undergraduate students aged 18–52 years to explore differences between Internet and non-Internet gamblers. They reported that Internet gamblers were significantly more likely to gamble frequently, with over 60% of Internet gamblers reporting having gambled once a week or more, compared to less than 20% of non-Internet gamblers. A prospective study of Internet gambling subscribers also revealed an association between frequency of play and betting behaviors.[119] Comparing the wagering patterns of a sub-sample of highly involved poker players to the remainder of the sample, LaPlante and her colleagues, using data supplied by an Internet operator, observed that the more involved players devoted significantly greater time (565 vs. 249 calendar days of play) and significantly more money per session (€89 vs. €25) than did less involved players.

In addition to betting behavior patterns, the association of participation in online gambling activities with problem gambling status has been examined in the literature.[120] Drawing from a large international sample of Internet ($N = 1{,}954$) and land-based gamblers ($N = 5{,}967$), Wood and Williams[121] observed that the prevalence of problem gambling was three to four times higher among Internet gamblers compared to non-Internet gamblers, and that having gambling problems best predicted participation in online wagering. However, the meaning of this relationship is not entirely clear from these results; it could be that the Internet may be a gambling medium particularly favored by those with serious gambling problems. Analysis of survey data from 1,119 online gamblers revealed that online gamblers who reported participation in two or more Internet gambling activities regularly were significantly more likely to be a problem gambler than those that did not.[122] Similarly, Welte et al.[123] observed that while Internet gamblers had a higher average number of problem gambling symptoms, they also engaged in a larger number of gambling activities. Thus, it may be that increased risk for problem gambling is more a consequence of wide-ranging participation in both land-based and online gambling opportunities rather than a direct causal relationship between Internet gambling and problem gambling. This stipulation notwithstanding, the accessibility of Internet gambling may nonetheless pose a particularly difficult challenge for individuals who experience gambling problems. Consequently, the association of the availability and accessibility of online gambling with gambling pathology or problems warrants further consideration from both scientific and public policy perspectives.

CONCLUSION

As the gambling industry continues its expansion into new jurisdictions and alternate types of venues, and as active promotion of game offers increases, there is also growing social acceptance in the value of gambling as a component of available recreation and entertainment. Current research findings seem to suggest that if an equilibrium were possible, it

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[115]M. Griffiths, *Internet Gambling: Issues, Concerns, and Recommendations*, 6 CyberPsychology & Behav. 557–568 (2003), doi:10.1089/109493103322725333 [hereinafter Griffiths 2003].

[116]Griffiths and Barnes, *supra* note 112; D. A. LaPlante, J. H. Kleschinsky, R. A. LaBrie, S. E. Nelson, and H. J. Shaffer, *Sitting at the Virtual Poker Table: A Prospective Epidemiological Study of Actual Internet Poker Gambling Behavior*, 25 Computers in Human Behav. 711–717 (2009), doi:10.1016/j.chb.2008.12.027; D. A. LaPlante, A. Schumann, R. A. LaBrie, and H. J. Shaffer, *Population Trends in Internet Sports Gambling*, 24 Computers in Human Behav. 2399–2414 (2008), doi:10.1016/j.chb.2008.02.015.

[117]A. McCormack, G. Shorter, and M. Griffiths, *An Examination of Participation in Online Gambling Activities and the Relationship with Problem Gambling*, 2 J. Behav. Addictions 31–41 (2013), doi:10.1556/JBA.2.2013.1.5; R. T. Wood and R. J. Williams, *A Comparative Profile of the Internet Gambler: Demographic Characteristics, Game-Play Patterns, and Problem Gambling Status*, 13 New Media & Society 1123–1141 (2011), doi:10.1177/1461444810397650.

[118]Griffiths and Barnes, *supra* note 112.

[119]LaPlante, Kleschinsky, LaBrie, Nelson, and Shaffer, *supra* note 116.

[120]McCormack, G. Shorter, and M. Griffiths, *supra* note 117; Wood and Williams, *supra* note 117.

[121]Wood and Williams, *supra* note 117.

[122]McCormack, G. Shorter, and M. Griffiths, *supra* note 117.

[123]Welte, Barnes, Wieczorek, Tidwell, and Parker, *supra* note 20.

would likely balance on a fulcrum. Problem and pathological gambling undoubtedly impose societal costs, and there is considerable concern that increased availability and accessibility of gambling opportunities could lead to increases in problem gambling and related costs. However, the debates regarding the direct and indirect effects of gambling, their related issues (e.g., increases in crime, bankruptcy, suicide, and physical and mental health deteriorations), along with the various required community provisions, have not yet been resolved. It remains difficult to attribute any of the reported economic, social, or population health outcomes to gambling as a primary source. The calculation of the net amount that would represent both costs and benefits is also complex and controversial, and existing estimates are generally inadequate and of limited utility. Further, the complexities in drawing cause and effect conclusions are often relegated to methodological shortcomings. Accordingly, there is little consensus today as to the true impact of gambling on communities and on the overall quality of life.

A great deal of current research has been concentrated on developing tools and methodological advances that would allow for better measurement of the costs and benefits of legalized gambling. There are efforts underway to attain consensus within the research community on the best use of a methodology that would allow for measurement and comparisons of the impact of gambling availability and accessibility on problem gambling prevalence both within and across different jurisdictions. Nevertheless, the research is still in flux and available studies offer contradictory evidence. Gambling venues and technological forms of gambling are changing rapidly, making it difficult to predict the overall impact of the availability of various game types and the effect of geographical, temporal, and social accessibility of gambling on local populations. Nonetheless, it is important to note that even though there is no robust evidence that increased availability and accessibility of gambling contribute to the prevalence of gambling pathology and problems, there is also no convincing evidence to the contrary. Indeed, the available research has not established that increased availability does not lead to increased problems.

Given the expected increase in accessibility of gaming, particularly with the advent of remote wagering opportunities, due diligence and appropriate prevention strategies need to be carried out in order to lessen and minimize the potential for harm. As discussed in detail elsewhere,[124] reduction of the impact of gambling, especially on vulnerable populations, must include working at a population level as well as on an individual level. There is evidence that setting limits and certain programs, such as self-exclusion programs can be helpful tools for those at risk. Messerlian et al.[125] identified four strategies for reducing harm among youth and underage problem gamblers, most of which can be extended to other vulnerable populations. These include social de-normalization that draws attention to the marketing strategies used by the gambling industry which influence social norms and attitudes; protection of youths and other potentially vulnerable populations from exposure to gambling products and promotion through effective international policy and government legislation, as well as through reduction in accessibility and availability; prevention through increased awareness of the risks involved and the promotion of informed decisions related to gambling practices; and harm-reduction programs that target specific groups (e.g., youth) who may be already heavily involved in gambling. Technological advances in how individuals gamble will also need to be included in present models of harm reduction.

Additional research is needed to understand the impact of availability and accessibility of the various forms of land-based gambling before definitive conclusions can be drawn. More research is also needed concerning the adequate prevention of problem gambling among all gamblers, not just those that are vulnerable. An understanding of the unique features and risk factors that distinguish gambling offers from each other is essential in guiding any attempts to provide a responsible gambling environment. Cooperation between legislators, researchers, and the industry needs to be initiated and maintained in order to guide responsible social policy.

ACKNOWLEDGMENTS

Partial financial support for this article was provided by the Fondation Mise sur toi. The authors wish to thank Neda Faregh, Ph.D. for her contribution to the early development of this article.

[124]C. Messerlian, J. Derevensky, and R. Gupta, *A Public Health Perspective for Youth Gambling*, 4 Int'l Gambling Stud. 147–160 (2004), doi:10.1080/14459790412331296974.
[125]*Id.*

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