

Internet Gambling & Addiction

Howard J. Shaffer, Ph.D., C.A.S.

Harvard Medical School, Division on Addictions

January 15, 2004

Address for Correspondence: Howard J. Shaffer, Ph.D., C.A.S., Harvard Medical School, Division on Addictions, The Landmark Center, 401 Park Drive, 2nd Floor East, Boston, MA 02215; e-mail: howard_shaffer@hms.harvard.edu; phone: (617) 384-9030

Acknowledgements: The author extends special thanks to Gabriel Caro, Tony Donato, Debi LaPlante, Richard LaBrie, Sarah Nelson, Michael Stanton, Chrissy Thurmond and Christine Reilly for their important contributions to this project.

Table of Contents

Table of Contents	2
Internet Gambling & Addiction	3
Overview	3
Introduction	3
Conceptual Confusion: The Means and Objects of Addiction	4
The Internet	5
Internet Gambling	5
Electronic Gambling Devices	6
Concerns about Intemperate Use of Computer Technology	7
Internet Gambling	7
Understanding Addiction	8
Consideration of Intemperate Internet and Computer Use as an Addiction	9
Intemperate Internet or Gambling Use?	10
Addiction as Syndrome	11
Neurobiological System Non-specificity	11
Genetic Overlap	12
Shared Psychosocial Antecedents	12
Shared Psychosocial Consequences and Sequelae	13
Epidemiology of Gambling Addiction	13
Prevalence: the Distribution of Gambling and Gambling-related Disorders	13
Determinants: Addiction Risks Associated with Electronic Gambling Devices	15
The Games People Play	16
Electronic Game Effects as a Function of Internet Connectivity	16
Computer, Internet and Gambling Addiction: A Critical Consideration	18
A Plea for More Cautious Conceptual Development	18
Reducing Human Suffering While Doing No Harm	18
Conclusions	19
References	21
About the Author	27

Internet Gambling & Addiction¹

Overview

As part of a trade dispute between the government of Antigua and the United States over access to the American gambling market via remote Internet and telephone access, Mark Mendel and Robert Blumenfeld, of *Mendel Blumenfeld, LLP*, asked me to consider the following two primary issues: (1) is the nature of addiction meaningfully different for different objects of addiction, specifically Internet-related versus “local” gambling; (2) are the risk factors associated with gambling disorders in general significantly different from the risk factors that are associated with Internet gambling in particular. To render an opinion about central these questions, I will examine a variety of fundamentally related issues, for example, the nature of the Internet and its association with computers, characteristics of computers and how these change when computers communicate via Internet connections, gambling, electronic gambling devices, and the characteristics of addiction.

I will begin this review by introducing fundamental concepts and reviewing the nature of computers, the Internet and Internet connected computers that provide opportunities for Internet gambling. I also will consider the occasional adverse consequence of gambling, that is intemperate gambling or gambling addiction. I suggest that, like the experience of watching movies or looking at pornographic photographs, all gambling experiences—whether technological or strictly social—are “local.” That is, gamblers experience their gambling activities proximately, in-person and not remotely regardless of the source of the event. Each activity stimulates its own unique experience, but this experience is in-person and local. Like watching pornographic photographs or movies stored on remote Internet-linked servers, gambling associated with Internet-linked computers is fundamentally similar to gambling on computers that are not linked to the Internet. This observation leads to the logical conclusion that, with social setting factors notwithstanding, the risks for gambling on Internet linked computers are not meaningfully different from the risks associated with gambling on computers that have no remote Internet link.

Introduction

Technology can influence psychological and social processes (Kipnis, 1991). Technical advances might be related to developing, maintaining or limiting addiction. The continuing rise in popularity of the Internet for communication, education, and entertainment provides an opportunity to explore the relationship between addiction and technology. Ever since the idea emerged that objects have the capacity to influence psychological states, the idea that almost any subjectively rewarding activity (e.g., drug use, shopping, working, running, gambling) can become the object of addiction has become increasingly popular (Shaffer, 1997a, 1999b). Similarly, throughout the years, changing technology has stimulated concerns that new electronic devices (e.g., radios) or the material transmitted via a new electronic device (e.g., dance music, jazz) cause addiction or disreputable behavior (Silver, 1979). The advent of computer technology and the joining of computers via the Internet have raised concerns similar to those of previous eras. As social observers and historians have learned with other technological advances, novelty effects wear off as the population adapts to the presence of the new tools, and temporary increases in certain activities (e.g., watching color television, listening to music on the radio, drinking absinthe) tend to come under social controls – even if those activities are associated with adverse health consequences.

¹ Portions of this opinion are based upon the following publications: (Shaffer, 1996, 2002; Shaffer, Hall, & Vander Bilt, 2000).

The UCLA Internet Report (Cole et al., 2000) is one of few studies of randomly selected community samples available to illuminate the epidemiology of computer or Internet usage patterns. “The Internet has become the fastest growing electronic technology in world history. In the United States, for example, after electricity became publicly available, 46 years passed before 30 percent of American homes were wired; 38 years passed before the telephone reached 30 percent of U.S. households, and 17 years for television. *The Internet required only seven years to reach 30 percent of American households*” (Cole et al., 2000, p.5). Cole et al. found that among Internet users, the following activities were the most common.

Table 1: Top Ten Internet Activities (Cole et al., 2000)

Activity	Prevalence Among Internet Users
1. Web surfing or browsing	81.7%
2. E-mail	81.6%
3. Finding hobby information	57.2%
4. Reading news	56.6%
5. Finding entertainment information	54.3%
6. Buying online	51.7%
7. Finding travel information	45.8%
8. Using instant messaging	39.6%
9. Finding medical information	36.6%
10. Playing games	33.0%

Cole et al. observed that “Not surprisingly, the more experience users have with the Internet, the more time they spend online. The differences are large; those with more than four years of Internet experience use the Internet more than 2.5 times as much (16.2 hours a week) as those with less than one year of experience (6.1 hours a week)” (Cole et al., 2000, p. 17). Further, “After little more than five years as a widespread communication tool, the Internet is viewed as an important source of information by the vast majority of people who use the online technology. More than two-thirds of Internet users (67.3 percent) consider the technology to be an “important” or “extremely important” source of information for them, while 53.1 percent of those surveyed rank television and 46.8 percent rank radio at the same level” (Cole et al., 2000, p. 33).

Despite this popularity, some concerns about Internet use have emerged. One prospective study of Internet use examined its impact on 169 people in 73 different households during their first one to two years online (Kraut et al., 1998). Used extensively for communication, greater Internet use in this study was associated with declines in participants' communication with family members in the household and in the size of their social circle, as well as increases in their depression and loneliness. Nevertheless, with the exception of watching less television, new research reveals that Internet users may not be very different from their non-Internet user counterparts on a variety of important dimensions (Cole et al., 2000). Given this conflicting evidence, more longitudinal research is necessary to understand the impact of computer technology on cognitive and emotional patterns of experience and social activities.

Conceptual Confusion: The Means and Objects of Addiction²

Early observers (e.g., Janower, 1996) expressed concern about Internet gambling and its potential adverse consequences. From then to now, there has been a belief that the absence of sufficient policy and difficulties prosecuting those who do violate policy as the primary factors that limited governments' capacity to regulate players and protect them from the adverse conse-

² With psychoactive drug use, the object of addiction is the drug and the access or route of administration is the method or means by which the object is taken (e.g., intravenous, oral, subcutaneous). Interested readers should see Shaffer (1996) for a more complete discussion of this matter.

quences associated with Internet gambling. However, since new addiction concerns tend to surface with the development of many novel technologies that have the capacity to stir emotions (e.g., radios, televisions, and computers) it is more likely that any inability to promulgate public policy or regulate gamblers derives from conceptual limitations about the problem. In the following sections, I am going to consider this conceptual confusion by examining the Internet, Internet gambling and electronic gambling devices. This discussion reveals that gambling opportunities are ubiquitous and the devices that serve as the source of gambling are far more readily available and shared than observers of industry-related gambling might have expected.

The Internet

Recent literature on disordered computer use has focused on excessive use of the Internet (e.g., Griffiths, 1996; O'Reilly, 1996, 1997; Young, 1996a, 1999). However, Internet use represents a special category of computer use that applies to only a subset of computers and computer users. Furthermore, people do not interact with the Internet; they relate only to computers that, in turn, may interact with other computers by way of the Internet.

Since the Internet represents a series of computer links that provide a route by which users access information stored on computers, the Internet is not directly a source of information and influence. Therefore, under typical circumstances, the Internet should not be considered the source of gambling or an object of addiction. The primary object of Internet gambling or, in the instances of intemperate gambling that originates from remote computers is the experience stimulated by the material that resides on local computers or the interactive experience of accessing this information by using a local computer. In other words, the experience of using computers can be rewarding for a number of reasons. It can be rewarding because of the inherent value of the information available to the user (e.g., gambling); it also can be reinforcing because of the experience of interactivity, competence, and power often associated with directing a computer's activity. Alternatively, interaction with new technology (e.g., electronic gaming devices) might satisfy the user's propensity for novelty seeking (1996; Ebstein et al., 1996). Similarly, connecting with remote computers can offer sensation seekers (e.g., Zuckerman, 1979, 1994, 1983) the promise of a new and special "social" and emotional experiences (e.g., on-line wagering; on-line romance; the physiological "rush" associated with novel experiences).

The "object" of addiction, and consequently the experience of excessive gambling or computer use, varies significantly among people with addictive disorders. In some cases, the experience of gambling or using a computer can be the object of addiction, while in other cases it can be the mechanism for administering or gaining access to an object of addiction (e.g., gambling, sex).

Internet Gambling

It is misleading to use the category of "Internet addiction" to describe all problems with excessive computer or Internet use, as some authors have done (e.g., Young, 1996a; Young, 1999). An exclusive focus on the construct of "Internet addiction" restricts this area of inquiry and misleads clinicians by implying that this method of accessing information is actually the primary object of addiction. It is similarly misleading to suggest that Internet-based gambling is something different from gambling with electronic gambling devices in general. This nomenclature causes clinicians and public policy makers to overlook non-Internet-based addictive behaviors that involve other current (e.g., video lottery devices and slot machines as well as computer-based games) or future technologies (Keepers, 1990; Kipnis, 1997), which can be equally problematic. As I have noted before, Internet gambling can take the form of wagering on-line or wagering and playing a game that has a random number generator associated at its source. Both types of gambling require Internet connections though each of these gambling types is very dif-

ferent from the other. It also is possible for people to use the Internet to get real time information about a remote event (e.g., sporting) using an Internet connected computer while placing bets locally among a social group. Similarly, it is possible for people connected remotely to play a game of unknown outcome (e.g., X-box based golf) and bet remotely, but not use the Internet for placing these bets.

Electronic Gambling Devices

Electronic gambling devices (EGDs) are games of chance driven by algorithms stored on circuit boards, electronic “chips” or CD-ROM. These electronic read-only devices have a variety of referents: “EPROM” and “erasable programmable read-only memory chips” means the electronic storage medium on which the operation software for all games playable on a video lottery terminal resides. These storage media also come in the form of CD-ROM, flash RAM or other new technology. The capacity for a machine to have “memory” and follow rules distinguishes computers from mechanical machines. A Video Lottery Terminal (VLT) is one term for an electronic gambling device. Traditionally, a VLT is a video-based version of the traditional slot machine; however, with advancing technology and gambling forms, VLTs also can refer to EGDs, which is a more generic term. VLTs can take the form of electronic slot machines (e.g., video reel slot machines, spinning reel slot machines), electronic poker games, electronic lottery ticket dispensing devices, etc.

People can gamble on a variety of EGDs. For example, EGDs are readily available at local computer and toy stores. Personal computers and home-based video games (e.g., X-box) alike have casino game software that mimics the electronic slot, video poker and table games of Las Vegas style casinos. Often these games are driven similarly to casino based EGDs by using EPROM or CD-ROM storage media. Some manufacturers of home-based video games also manufacture software for casino-based electronic gaming devices. There also are hand-held battery powered EGDs that are easily accessible in retail and catalogue outlets. Although the assortment of non-casino based games does not include credit access, it is very simple for players to wager on the outcome of these games.

Some EGDs have the capacity to connect to the Internet. The best known devices are personal computers and home-based video games (e.g., Xbox with X-box live). Video lottery terminals also are well known EGDs widely used by state lotteries throughout the United States; some of these terminals transmit information to high-powered computers located remotely through Internet connections, not unlike a virtual private network (VPN) commonly used by companies to permit employees remote access to work-related information. Some Internet gambling sites have the capacity to offer computer users credit; Xbox users must offer each other credit. For example, some home-based video games also provide for other forms of Internet based gambling. I recently (December 14, 2003) observed a users’ forum discussion among members interested in wagering real money on the outcome of a computer-based golf simulation.³ In both instances, however, EGDs are present and Internet-based gambling is possible. Internet gambling does not have any “new” pathology associated with it; the same issues pertain to all types of electronic gambling behaviors.

³ The following is a recent dialogue among four different video game forum members. “Some1 should make a download so u can gamble ur own links money against other players on links.” “Yea that does seem like something that would be worth downloading.” “That would be so sweet.” “I agree gambling and golf go together like snow and skiing.”

Concerns about Intemperate Use of Computer Technology

Perhaps the most focused and energized concern surrounding the use of computer technology and the Internet has been the matter of excessive use. The growth of the Internet has been accompanied by a growing concern that excessive use is related to the development of what has been called “Internet addiction,” “Internet addiction disorder” and “pathological Internet use.” People struggling with Internet addiction report a compelling need to devote significant amounts of time to checking e-mail, participating in online chat rooms or surfing the Web, even though these activities cause them to neglect family, work or school obligations. These intemperate problems reflect a user's loss of control over Internet use, increasing involvement with the Internet and an inability to stop this involvement in spite of adverse consequences associated with such use. Similar concerns were expressed about other new technologies shortly after these were introduced. For example, listening to the radio in general and listening to dance music (e.g., jazz) in particular was once considered the cause of intemperate behavior, neglect of responsibility and degeneration of the family (e.g., Silver, 1979).

Although the rate of this behavior pattern is unknown, proponents of the Internet addiction construct suggest that the problem is growing as more people have access to the Internet and its associated computer technology (Young, 1996a, 1996b, 1998; Young & Rogers, 1998). Yet it has not been established whether excessive Internet or computer use causes or reflects psychopathology, nor whether it has meaningful adverse impacts on social patterns (Shaffer et al., 2000). It also remains to be determined whether excessive Internet or computer use represents a source for existing family problems that previously had been attributed to other sources (Oravec, 2000).

Internet Gambling

According to Janower (1996), the world's first virtual online casino, Internet Casinos, Inc. (ICI) opened on August 18, 1995 with 18 different casino games and online access to the National Indian Lottery. The governments of Antigua and Liechtenstein were among the very first to operate online gambling (Janower, 1996). Finally, Janower notes that by 1996, according to *Rolling Good Times Online* gambling magazine, there were 452 gambling-related sites on the net. By January 2, 2004, a casual Sherlock search of the Internet identified more than 377,000 web sites related to “Internet gambling.”

Like using computers, and computers connected to the Internet, many researchers have identified gambling as a potential object of addiction (e.g., National Research Council, 1999; Shaffer, Hall, & Vander Bilt, 1997). Some investigators have considered electronic gambling as a more potent form of gambling than traditional table games because some research has found that this type of gambling is disproportionately associated with gambling addiction. There are a variety of gambling types that can be associated with electronic devices that connect to the Internet. For example, in Britain, the government's gambling review body distinguished on-line betting from on-line gambling (Orford et al., 2003). On-line betting involved placing wagers using electronic devices (e.g., television, computer) that were connected to the Internet; on-line gambling, however, occurred when the bet was placed on-line and the gambling event was generated on-line by a random number generator (Orford et al., 2003). To better understand these complex and interactive issues, it is important to examine the central attributes of a variety of EGDs and then compare these characteristics to electronic gambling when the Internet is the vehicle for accessing electronic gambling sources.

In the current trade dispute with Antigua, the United States is arguing that there is a distinction between “remote” gaming (i.e., Internet gaming *only*) and “in-person” gaming (United States, 2003). This distinction rests upon the assumption that Internet-related gambling represents law enforcement, player protection and health risks not associated with in-person gambling. Some

observers, for example, think that regulating Internet gambling requires attention to legal issues that are quite different from traditional gaming regulation since the source of Internet-related chance events that drive a fair game are potentially remote from player participation and therefore the experience of the game. This supposition, however, seems unfounded. Despite the distance between the EGD player and the source of randomness, the experience of gambling is always proximate – just as with any other game of chance – and the source of the randomness always remote (e.g., software, electronics and other algorithm generators are never available to the player). Remote gambling refers to the source of the game; however, the game played is proximal, not distal. Players interact with the monitor, keyboard or other proximal device. The game is experienced in-person and in real-time just as a movie is experienced directly and immediately even though the image is stored and originates from a projector, film, and cameras in decreasing magnitudes of proximity.

Therefore, the health risks associated with Internet based gambling are not meaningfully different from other electronic gambling. Further, it might be possible for Internet-related gambling to afford increased player protection compared with in-person gambling settings; all Internet players are registered with sites and the computer servers associated with these sites can monitor gambling patterns with increased precision. Properly used, this capacity to monitor player behavior holds the potential to protect players with aberrant gambling patterns. It is worth noting, however, that the addiction risks associated with EGDs are higher than the risks associated with certain in-person table games (e.g., cards, roulette, craps). The risks for developing gambling problems associated with sports or other “event” betting likely are similar whether the player bets using Internet connected EGDs or the telephone⁴ since these events are self-contained and not subject to interactivity as are other forms of gambling. To date, there is no recognizable body of scientific evidence that establishes gambling with EGDs that are Internet connected as more hurtful than gambling with EGDs not so connected.

Understanding Addiction

From illicit substance abuse (e.g., Shaffer & Burglass, 1981) to water intoxication (Klonoff & Jurow, 1991; Pickering & Hogan, 1971; Rowntree, 1923), eating carrots (Cerny & Cerny, 1992), engaging in sexual activity (e.g., Carter & Ruiz, 1996; Shaffer, 1994a), exercising (Crossman, Jamieson, & Henderson, 1987) and eating chocolate (Macdiarmid & Heterington, 1995), the notion of addiction has been applied to many and varied human activities. While there are simple working definitions of addiction, the essence of the construct has been elusive. Thus, addiction remains a lay term, although scientists often use it. Recognizing the difficulties associated with defining addiction, Vaillant (1982) suggested that, instead of seeking a strict operational definition, clinicians and others should think of addiction like mountains and seasons: we know these things when we see them.

In spite of the obscure nature of addiction, contemporary addiction workers have come to think of it as having three primary components: (1) some element of craving or compulsion; (2) loss of control; and (3) continuing the behavior in question in spite of adverse consequences that accrue to the behavior. However, this conceptualization of addiction is not universal. Many other descriptions and definitions have been developed (e.g., Warburton, 1990). In addition, while these dimensions provide a useful map for understanding the elements of addiction, the map is not the territory (e.g., Shaffer & Robbins, 1991). Just as DSM-III and DSM-IV have provided a map for diagnosing mental disorders, these works have improved the reliability of diagnosis at the considerable expense of validity (Barron, 1998; Vaillant, 1984). For example, Alan

⁴ Contemporary telephones increasingly have Internet access and should be considered as potential EGDs.

Leshner, the former director of the National Institute on Drug Abuse, posed the question “when is addiction addiction?” (Leshner, 1999). This question cuts to the heart of the matter: when clinicians and scientists identify a behavior pattern as an addiction, even if they can identify it reliably, how do we know that “addiction” is the best explanation for the behavior pattern? Despite the benefits of the use of the concept of addiction – for example, its ability to unify disparate fields and identify common aspects of seemingly different behavior patterns – the use of this concept can mislead researchers, clinicians, and policymakers to concluding that we understand much more about the phenomenon than we actually do.

The potential for addiction emerges when (1) individuals engage in repeated interactions with a specific object or objects of addiction (e.g., psychoactive drugs, computer, games of chance), and (2) the neurobiological or social consequences of these interactions produce a desirable subjective shift that is reliable and robust (e.g., euphoria). This state of repeated activity associated with a desirable subjective shift sets that stage for the emergence of addiction. During this stage of the addiction syndrome, people teeter on a delicate balance that can shift them toward either more or less healthy behavior. Although distal antecedents of addiction (e.g., genetic risks) are well documented, the proximal antecedents that influence further development of the syndrome remain poorly identified – though these are likely to be biopsychosocial factors similar to those associated with distal influences.

Research suggests that addiction is not inextricably linked to a particular substance or behavior. For example, as I will discuss later in the section on addiction as syndrome and the genetic risk for addiction, circumstantial opportunity plays a more influential role in the development of addictive behavior than genetics (Kendler, Jacobson, Prescott, & Neale, 2003) or an individuals’ preferences for certain drugs (Harford, 1978). Further, with or without treatment, it is very common for people recovering to “hop” from one addiction (e.g., opioids) to another (e.g., cocaine, alcohol, gambling, exercise, etc.) before successfully recovering from “all” addictions. Hser et al. (1990) examined longitudinal patterns of alcohol and narcotic use and observed a decrease in alcohol consumption at the time that narcotic addiction began; likewise, during periods of decreased narcotics use, alcohol consumption rose. This hopping between addiction objects has been demonstrated for illicit drugs and nicotine (Conner, Stein, Longshore, & Stacy, 1999), alcohol abuse and bulimia (Cepik, Arikan, Boratav, & Isik, 1995), and substance abuse and pathological gambling (Blume, 1994). Finally, clinical research has shown that during early treatment for opioid dependence, as both opioid and cocaine use decreased, sedative use increased (Shaffer & LaSalvia, 1992).

There is no simple solution to the question “what is an addiction?” Therefore, when discussing a new pattern of behavior—such as Internet gambling—as a possible object of addiction, observers must include a substantial dose of scientific skepticism and uncertainty. Against this background of skepticism, the following section will discuss intemperate computer use, a relatively new behavior made possible by advancing technology, within the conceptual framework of addiction in general and addiction to gambling in particular.

Consideration of Intemperate Internet and Computer Use as an Addiction

Ever since Weil (1972) and Orford (1985) advanced the idea that many different objects have the capacity to influence psychological states, the idea that any rewarding activity (e.g., drug use, shopping, working, running etc.) can potentially become the object of addiction has become common. Now, the popular media is giving increasing attention to the idea of computer or Internet addiction (Jabs, 1996; Murray, 1996a, 1996b; Shotton, 1989). Shotton (1991) has suggested that there are potential benefits from some dependent computer users, particularly for those that have difficulty or mistrust engaging with other people. Unfortunately, there is very little scientific

work bearing on the topic of computer addiction in the professional literature; in particular, there is very little scientifically derived empirical evidence to guide a critical examination.

Approximately 66% of the American public have access to the Internet and about the same amount consider this communication vehicle have made the world a better place (Cole et al., 2000). “[B]y 1997, some 19 million Americans were using the Internet. That number tripled in one year, and then passed 100 million in 1999. Even after five years of explosive growth, Internet new enrollment remains high. In the first quarter of 2000, more than five million Americans joined the online world – roughly 55,000 new users each day, 2,289 new users each hour, or 38 new users each minute” (Cole et al., 2000, p. 5). Through the combination of an expansive number of Internet access providers, increased numbers of computer users, widespread credit card availability, and new computer technology, access to computer-based information has become easy and ordinary.

Intemperate Internet or Gambling Use?

The growth of the Internet has been accompanied by a growing concern that addiction to this new computer technology may be increasing (e.g., Griffiths, 1996; Murray, 1996a, 1996b) (O’Neill, 1995; O’Reilly, 1996, 1997; Young, 1996a; Young & Rogers, 1998). O’Reilly (1996; 1997), Young (1996a; 1998) and Young & Rogers (1998) have suggested that excessive use of the Internet is related to the development of “Internet addiction,” “Internet addiction disorder,” and “pathological Internet use.” According to Young, for example, these problems reflect a user’s loss of control over Internet use, increasing involvement with the Internet, and an inability to stop this involvement in spite of adverse consequences associated with such use. For example, people struggling with “Internet addiction” report a compelling need to devote significant amounts of time to checking e-mail, participating in on-line chat rooms, or surfing the web even though these activities cause them to neglect family, work or school obligations (e.g., Young, 1998). Since there have been no epidemiological studies of intemperate computer users, the prevalence of this pattern of behavior is unknown. However, proponents of the “Internet addiction” construct suggest that the problem is growing as more people have access to the Internet and its associated computer technology. Nevertheless, it has not been established whether excessive Internet or computer use causes or reflects psychopathology (Young & Rogers, 1998). If Internet or computer “addiction” is similar to drug addiction (e.g., cocaine or alcohol dependence), then it is likely that psychopathology disproportionately precedes excessive involvement with the technology (e.g., R. C. Kessler et al., 1996; Shaffer & Eber, 2002). Similarly, it is not clear whether this behavior represents an uncontrolled habit or an uncontrollable impulse (e.g., Davies, 1996). Finally, since scientists have not been able to establish whether using computers stimulates addiction more than using computers connected to the Internet, it has not been demonstrated that gambling on computers or gambling on computers connected to the Internet present different levels of risk for gambling-related addiction. It follows, then, that there is no evidence that using computers to gamble is less risky than using computers to gamble when these computers are connected to the Internet.

The causal complexity surrounding the construct of addiction confronts researchers and public policy makers with a formidable investigative task. Conceptual confusion about the term “addiction” makes the determination of associated psychopathology even more difficult. Although largely ignored to date, theoretical problems distract scientists who become interested in studying excessive Internet use in general and excessive Internet related gambling from developing and implementing the research necessary to clarify the nature of these phenomena. To encourage more precise operational definitions and to focus our attention on the important concepts,

I will next examine some of the basic constructs associated with the idea of computer or Internet addiction.⁵

I will consider problematic computer or Internet use and Internet based gambling within the conceptual framework of addiction. Then I will temper this theoretical enthusiasm by suggesting that scientists have not established the validity of these constructs. As the discussion above indicates, these matters encourage an extensive review of the concept of addiction that extends beyond the scope of this article; therefore, the following discourse will focus on three specific but complementary conceptual problems associated with the idea of computer or Internet addiction. First, after a brief review of the growth of computer use and corresponding concerns, I will examine some of the conceptual confusion surrounding the construct of “Internet addiction.” Second, I will consider whether the construct of “computer addiction” represents a unique primary disorder. Third, I conclude with a request for a more cautious conceptual, empirical and clinical approach to this emerging area of interest and concern.

Addiction as Syndrome

It is common for clinicians, researchers, and public policy makers to describe certain drugs or objects (e.g., games of chance) as “addictive,” tacitly implying that the cause of addiction resides in the properties of drugs or other objects. The American Psychiatric Association’s Diagnostic and Statistical Manual (American Psychiatric Association, 2000) implicitly encourages this view by treating different excessive behaviors, such as alcohol dependence and pathological gambling, as distinct disorders. However, evidence supporting a broader conceptualization of addiction is emerging. For example, neurobiological research suggests that addictive disorders might not be independent (Kendler et al., 2003): each outwardly unique addiction disorder might be a distinctive expression of the same underlying addiction syndrome. The current view of separate addictions might be similar to the view espoused in the early days of AIDS diagnosis, when rare diseases were not yet recognized as opportunistic infections of an underlying immune deficiency syndrome. The following discussion considers the empirical evidence for an addiction syndrome and organizes it into three primary areas: (1) shared neurobiological antecedents, (2) shared psychosocial antecedents, and (3) shared experiences (e.g., manifestations and sequelae). Considering addiction as a syndrome encourages the view that multiple opportunistic expressions (e.g., substance use disorders, pathological gambling) result from multidimensional susceptibility. Further, addiction to any particular object is due, in large part, to exposure, access and the capacity to produce a predictable and desirable subjective shift in mental state rather than the specific attributes of the object.

Neurobiological System Non-specificity

Psychoactive drugs (e.g., alcohol, cocaine, and heroin) and behaviors (e.g., gambling) alike have the capacity to stimulate neurobiological systems in general and the brain’s dopamine reward system in particular (Betz, Mihalic, Pinto, & Raffa, 2000; Daigle, Clark, & Landry, 1988; Hyman, 1994; Wise, 1995). Recent functional magnetic resonance imaging (fMRI) studies reveal that money and beauty energize the reward system similar to the anticipation of cocaine among users (Aharon et al., 2001; Breiter, Aharon, Kahneman, Dale, & Shizgal, 2001). Hence, scientists have implicated dopamine as one neurotransmitter that plays a primary role in the development

⁵ The language describing excessive use of computers or the Internet is not standard. This language is tentative since this new area of investigation is intellectually immature. Therefore, although I use several different but currently common terms throughout this review, I believe that there is still considerable conceptual work that remains. As the following section reveals, some constructs are more logical than are others. Later I will suggest that the validity of these constructs remains to be determined.

and maintenance of both drug and behavioral addictions. For example, scientists theorize that the “reward deficiency syndrome” is a result of dopamine system malfunction; this breakdown is complicit in vulnerability to addiction (Blum et al., 2000). Neurobiological reward activity represents the most well-known evidence that supports an addiction syndrome, but other systems deserve consideration as well. As Breiter and Gasic (Breiter & Gasic, in press) remind us, the observations of the dopamine reward system should not minimize the potential contribution of learning and memory in the hippocampus and emotional regulation in the amygdala in the development and maintenance of addiction. The observations that disparate objects stimulate similar neurobiological pathways (Potenza, 2001) suggests that, regardless of the object of addiction (e.g., psychoactive drugs, gambling, Internet-based gambling), the neurobiological circuitry of the central nervous system is the ultimate common pathway for addictive behaviors.

Genetic Overlap

There is evidence suggesting substantial genetic and environmental non-specificity across addictive behaviors (Betz et al., 2000; Chi & de Wit, 2003; Johnson et al., 2003). For example, genetic studies reveal common molecular mechanisms for drug addiction and compulsive running behavior (Nestler, Barrot, & Self, 2001; Werme, Lindholm, Thoren, Franck, & Brene, 2002; Werme, Thoren, Olson, & Brene, 2000). Similarly, pathological gambling shares a common genetic vulnerability with alcohol dependence (Slutske et al., 2000). A recent study of male twins showed that shared genetic and environmental risk factors for psychoactive substance abuse are largely substance non-specific (Kendler et al., 2003). Kendler et al. note, “We could not find evidence for genetic factors that increase risk for individuals to abuse substance A and not also to abuse substances B, C, and D...” (Kendler et al., 2003, p. 692).

Other evidence also supports the genetic risk hypothesis. For example, Merikangas et al. (1998) found that similar direct (e.g., exposure to drugs) and indirect (e.g., resultant family discord) factors augment genetic risk for both drug and alcohol abuse. In their study of female twins, Karkowski, Prescott, & Kendler (2000) found (1) genetic and environmental factors significantly influenced substance use in general and (2) no evidence of a heritability or familial environmental effect for specific substances. Similar results were found in a study of Vietnam-era drug users: with the exception of heroin—which exhibited unique substance-specific genetic risk—investigators observed a common vulnerability to multi-class drug use among study participants (Tsuang et al., 1998). Finally, Bierut et al. (1998) observed that, “Although studies support the familial transmission of alcohol and substance dependence, individuals are frequently dependent on multiple substances, raising the possibility of a general addictive tendency” (p. 987). These findings provide evidence that the genetic link to addiction does not account for vulnerability to specific objects of addiction; rather, genetics account for a general and increased risk for addiction.

Shared Psychosocial Antecedents

The prevalence of poly-substance abuse and dependence is well documented (R.C. Kessler et al., 1994), but the co-occurrence of chemical and behavioral expressions of addiction also is common. For example, intemperate shoppers and gamblers both evidence higher rates of substance use disorders than groups without these patterns of economic excess (Baker, 2000; Black & Moyer, 1998; Christenson et al., 1994; Feigelman, Wallisch, & Lesieur, 1998; Lejoyeux, Ades, Tassain, & Solomon, 1996; Shaffer & Korn, 2002). Conversely, compared to those without substance use disorders, individuals who are dependent on psychoactive substances are more likely to be pathological gamblers (Feigelman et al., 1998; Lesieur & Heineman, 1988; Shaffer & Korn, 2002). Research demonstrating the frequent co-occurrence of different expressions of addiction signals the presence of an underlying force responsible for addiction.

Shared Psychosocial Consequences and Sequelae

Different expressions of addiction share various manifestations and sequelae. Accordingly, Zinberg suggested that, "...the experience of addiction diminishes personality differences and makes all compulsive users seem very much alike" (Zinberg, 1984, p. 111). In addition to reducing pre-existing personality differences, various and distinct expressions of addiction also stimulate similar bio-psycho-social sequelae. Several studies support this notion. Psychosocially, people who engage in substance abuse, pathological gambling or excessive shopping commonly have recognizable sequelae (e.g., deceit, shame, guilt, dysthymia) (Black & Moyer, 1998; Christenson et al., 1994; Shaffer & Hall, 2002; Vaillant, 1983).

There is a natural history to the course of addiction that begins with risk factors and always includes exposure to potential objects of addiction (Shaffer, 1997b; Slutske, Jackson, & Sher, 2003; Vaillant, 1983). Once addictive behavior patterns emerge, there is a similar natural history across various substances. For example, Hunt (1971) presented seminal research, based on 84 studies, demonstrating remarkably similar relapse patterns for heroin, smoking, and alcohol. The observation that drugs with important biochemical differences follow the same course suggests that the object of addiction is less relevant to the course of addiction than previously thought. These patterns likely reflect the dynamics of a common underlying addiction process and therefore challenge the conventional wisdom that there are various and distinct addictive disorders (Marlatt, Baer, Donovan, & Kivlahan, 1988; Marlatt & Gordon, 1985; Prochaska, DiClemente, & Norcross, 1992; Shaffer, 1997a, 1997b, 1999a, 1999b, 2002, 2003; Shaffer & Hall, 2002). In the absence of sufficient longitudinal empirical evidence, based upon clinical evidence, I cautiously suggest that the natural histories of behavioral expressions of addiction (e.g., internet gambling) are similar to the histories of many chemical expressions of addictions.

To this point, I have discussed excessive computer and Internet use within the conceptual framework of addiction. In the remainder of this article, I add a final but important note of caution to this view by suggesting that computer, Internet and gambling addiction might not be valid constructs. These problems rarely occur in isolation. The common co-occurrence of gambling problems with other mental health disorders suggests that excessive gambling might be an expression of these coexisting circumstances; mental health disorders might emerge as a consequence of gambling; both can emerge as a function of an independent circumstance (e.g., underlying syndrome); finally, both could be causally independent.

Epidemiology of Gambling Addiction

The epidemiology of gambling (i.e., all forms of gambling) and associated disorders (e.g., pathological gambling, co-occurring mental disorders) revolves around the distribution and determinants of gambling and the factors that can influence its transition to disordered states. The distribution and onset of gambling and its associated disorders across population segments comprises the study of prevalence and incidence.

Prevalence: the Distribution of Gambling and Gambling-related Disorders

Prevalence represents the number of people with a specific disorder at a point or period in time. Incidence represents the number of people who acquire a disorder during a point or period in time. Current evidence reveals that approximately 1% of the general adult population suffers with a gambling related disorder of clinical magnitude; the extant research has shown that the rate of this disorder is consistently higher for males than females. Another 2-3% of the adult population experiences sub-clinical problems associated with gambling; again, these problems are more common among males than females. The prevalence of these disorders increases among popula-

tion segments that are younger, experience co-occurring psychological problems (e.g., substance use disorders, depression), have less education, or are from the lower socio-economic strata (Shaffer & Korn, 2002). The relevant question for this article is whether there is a significant association between using EGDs in general and EGDs connected to the Internet in particular with higher rates of gambling disorder than among the players of other games. The overall general population prevalence rate for gambling disorders has changed little since the first prevalence studies of the 1970s (Kallick, Suits, Dielman, & Hybels, 1979), suggesting that the advent and popularity of EGDs have had little impact on the prevalence of gambling disorders.

In one of the finest national studies completed to date, Sproston, Erens and Orford (2000) observed that only 0.2% of weekly British gamblers had been involved with Internet gambling. Similarly, in a United States national study, only 0.4% of the sample reported having ever gambled using the Internet (Gerstein, Murphy, Toce, Hoffmann, Palmer, Johnson, Larison, Chuchro, Bard, Engelman, Hill, Buie, Volberg, Harwood et al., 1999). Despite this limited involvement, these researchers expect the number of Internet gamblers in Britain to rise rapidly (Orford et al., 2003). Will this anticipated growth in the number of players influence the rate of Internet-related gambling addiction?

Marhsall and Wynne (2003) recently observed that men were more likely to play VLTs (7% versus 5%) and bet on horse racing (5% versus 3%); women were more likely to play bingo (12% versus 5%); they also found that Canadians who gamble on VLTs outside of casinos tend to have higher rates of gambling disorders than those who do not. Since the extant epidemiological evidence reveals that the base rate for gambling related disorders is higher for men than for women, and since men play electronic games more than women, it is reasonable to expect that the rate of problems will be higher for this and other male dominated games.

Ladd and Petry (2002) conducted one of the only empirical studies of Internet gamblers. This study examined the gambling patterns of 389 treatment seekers at The University of Connecticut health clinics. This is one of the few studies to examine the rate of Internet gambling among a cohort of treatment seekers. The investigators found that all treatment seekers had gambled during their lifetimes. Of these gamblers, 70% gambled during the past 2 months. On the basis of scores on the South Oaks Gambling Screen (SOGS), the investigators classified 10.6% as problem gamblers and 15.4% as pathological gamblers. The most common forms of gambling were lottery, slot machines, and scratch tickets. Those who reported Internet gambling comprised 8.1% of the sample. Compared to non-Internet gamblers, Internet gamblers were more likely to be younger, non-Caucasian, and have higher SOGS scores. The authors concluded that this evidence suggests the need to screen treatment seekers for gambling related problems. I concur with this interpretation of the evidence. However, it is not possible to generalize with scientific confidence about Internet gambling from this sample to the general population for several important reasons, including the fact that this study was not designed to address this issue. In addition, this research represents treatment seekers. It has long been known that treatment seekers are not representative of the general population (Berkson, 1946); trying to generalize evidence obtained from treatment seekers results in what has become known as Berkson's bias. For example, Connecticut residents are sociodemographically different from other parts of the country.

The authors were acutely aware of this potential bias in their sample. Ladd and Petry (2002) noted in their discussion that "The higher rates of Level 2 and 3 gamblers found in this study may be due to a response bias. Individuals who liked to gamble or who had a problem with gambling may have been more likely to complete the questionnaire. However, considering that 74.0% of the participants were classified as nonproblematic gamblers and that 58.2% scored 0 on the SOGS, the majority of participants who completed the questionnaires had no apparent gambling problems. Another explanation for the higher rates of disordered gambling in this population may be related to the demographics of the sample. People who seek services at UCHC dental

clinics have risk factors for disordered gambling identified in other studies of special populations, such as relatively younger age, lower income, and less education The prevalence of disordered gambling in this sample of medical and dental patients is similar to rates reported in substance abusing populations... **Because only one other known study reported on the prevalence of Internet gambling, comparisons of the rates of Internet gambling found in this study to other populations are premature**” (emphasis added, pp. 77-78). In addition, only 14 respondents reported gambling weekly on electronic devices connected to the Internet. Finally, the Ladd and Petry (2002) finding that there was an association between Internet gambling and SOGS scores fails to address the question of whether people with gambling disorders use the Internet or whether the Internet causes gambling disorders.

Determinants: Addiction Risks Associated with Electronic Gambling Devices

Determinants are factors that influence the onset, maintenance and development of gambling related problems. There are five primary determinants that influence the risks associated with any activity becoming an addiction: frequency of use, duration of action, potency, route of administration and player attributes (e.g., psycho-economics, vulnerability and resilience). Frequency of use refers to how often or how many times a person uses the object (e.g., Internet-based gambling or psychoactive drugs) within a specific time frame (e.g., 24 hours). Duration of action refers to how long the subjective effect derived from the game or drug lasts (e.g., Internet gamble 1-5 minutes; heroin 4-6 hours). Potency refers to the capacity of the drug or gamble to shift subjective experience; potency depends upon drug dose or magnitude of a wager and personal tolerance for drug use or betting. Route of administration influences the potency and the duration. For example, eating opioids (e.g., opium) yields a lower potency and slower acting effect than does intravenously injecting opium. Similarly, gambling via EGDs that cycle through a complete in seconds (e.g., video poker) is more potent and rapid acting than playing a table game (e.g., blackjack) that cycles in minutes; both of these games are more potent than playing weekly lotteries that complete a cycle in days. Despite the prevalence of sports, sports betting is less potent than rapid cycling games since these events are self-contained, of longer duration and limited in time place compared with other forms of gambling. The risks associated with sports betting derive from the “illusion of control”: the belief that the player has information that places them at an advantage. However, these risks apply similarly to sports betting that involves EGDs and EGDs connected to the Internet. Independent of the capacity to encourage the illusion of control, weekly gambling events are less potent than daily events which are less potent than events that cycle in seconds. Finally, the risk of addiction is greatly influenced by the personal attributes that a player or drug user brings to the experience. Co-occurring mental disorders can decrease resilience and exacerbate the development of addiction. Some co-occurring disorders likely present an increased likelihood that people will gamble at home (e.g., agoraphobia) instead of in public, therefore, simultaneously increasing the risks for EGDs and reducing the risks for in vivo table games.

The psycho-economics of gambling is a primary driving force behind the epidemiology of gambling. People living in poverty perceive greater potential to change their lives from a gambling win than those of wealth. For example, ***people of lesser means played the lottery more than people of greater means*** (e.g., Clotfelter & Cook, 1989). The opposite also is true: people with wealth perceive little opportunity to change their lives from a gambling win—unless the magnitude of the potential win reaches a particularly meaningful level. This psycho-economic driving force is powerful: it can subdue public health and other social setting forces that encourage abstinence or moderation. Consequently, in addition to increased rates of a variety of other health risks, the poor also are at increased risk for intemperate gambling and its potential consequences (Clotfelter & Cook, 1989; Lopes, 1987). The psycho-economics of gambling is a complex de-

terminant for gambling frequency and intensity; it also has multiple correlations with many other determinants of health status (e.g., smoking and drinking). Consequently, it provides the landscape against which pro- and anti-gambling forces interact to shape gambling patterns among various population segments.

The Games People Play

Specific objects of addiction (e.g., heroin, cocaine, keno, lottery, or shopping) do not represent the necessary and sufficient cause to produce addictive behavior.⁶ If a game or other object was necessary and sufficient to cause addiction, then everyone involved with such an object would develop addiction. Nevertheless, there is reason to examine the epidemiological relationship between gambling disorders and the specific games on which people wager. By understanding the biopsychosocial influences of specific games, scientists can gain insight into determinants that facilitate or inhibit the development of gambling disorders. A research synthesis examined the extent of participation in seven different common gambling activities among general population adults, adolescents, adults in treatment and prison populations, and college students (Shaffer et al., 1997). This study found that, as expected, adolescents participate significantly more than adults in gambling activities that are most socially accessible and do not require authorization. That is, adolescents are gambling more than adults on games of skill, non-casino card games, and sports betting. Adolescents can participate in these three activities within a group of school friends, with their families, or with their friends' families. Similarly, college students are betting more than adults in the general population on non-casino card games and games of skill; these represent activities that are popular within a college setting. Not surprisingly, adults in the general population are gambling more than adolescents on casino games, the lottery, and pari-mutuel wagering. Though there are exceptions, the vendor of these adult activities generally requires authorization from a licensing bureau or certification board. Although there is evidence that adolescents engage in these three activities despite their illegal status, the vast majority of individuals who participate in these "legal" forms of gambling are adults.

Deciphering relationships among specific gaming activities and gambling disorders requires sophisticated research that focuses on the nature of the relationships that exist between an individual and the object of their addiction (e.g., pari-mutuel events, EGDs, etc.). The field of gambling research can learn a great deal from the substance abuse research field, which has discovered many important and illuminating differences among various substances and their substance-specific physiological, psychological, and socioeconomic influences on their users. For example, alcohol has "releasing" properties that tend to disinhibit users. Cocaine and gambling have anti-depressant properties because of their energizing and stimulating effects. Khantzian suggested that certain personality types are more attracted to each of these drug classes to produce a self-medicating effect (Khantzian, 1975, 1985, 1997). Similarly, Jacobs (1989) suggested that certain gambling activities (e.g., video poker machines) could produce dissociative effects that might differentially attract individuals with certain personality attributes. Much remains to be learned about the relationship between people and the games they choose to play.

Electronic Game Effects as a Function of Internet Connectivity

Electronic games delivered via the Internet do not increase the potency of electronic gaming that has a proximate source. Both Internet-connected and locally derived electronic games of chance are subject to the same frequency of play, cycle speed, potency, and duration of action. Player attributes present similar risks for playing either Internet-based (i.e., remote) or locally

⁶ I encourage interested readers to review other relevant works (Shaffer, 1996, 1997a, 1999a) for a more complete discussion of this matter.

originated games of chance. Because there is no difference in the primary risk factors associated with electronic gambling that derives from either local or remote sources, it is essential to consider the secondary factors associated with electronic gambling that can influence gambling and the risks of adverse consequences.

In addition to frequency of use, duration of action, potency, route of administration and player attributes (e.g., vulnerability and resilience), there are formal and informal social controls that can influence primary risk factors thereby adding a layer of secondary risk. Formal social controls are regulations and laws that influence gambling with EGDs. For example, in the United States, there are age restrictions to play electronic gaming devices either in-person, locally, or remotely. This decreases the likelihood that this population segment will develop problems associated with electronic gambling devices. Similarly, EGDs must be licensed; this circumstance also decreases the likelihood of adverse consequences emerging related to electronic gambling in specific venues, but might reveal some risk for Internet-based gambling if it could be demonstrated that Internet gambling is not regulated as are local venues. Despite the presence of local licensing laws or regulations, without consistent enforcement, it is difficult to determine the extent of licensing violations.

Informal social controls reflect the folkways and mores of a culture that encourage or discourage certain patterns of social behavior. For example, drinking or gambling in mixed company (i.e., males and females) reduces intemperance. Alternatively, male only drinking and gambling decreases social control and increases the likelihood of intemperance. Multiple player table games have additional informal social controls compared with games played alone. Operators and the group of players put social pressure on each player to comply with the conventions of the game. To illustrate, a blackjack player who draws a card while holding 18 will often be reprimanded by the player next in line to draw a card because the next player believes that the next card to be drawn from the deck will be his or hers. These informal social pressures shape the gambling experience and tend to provide the boundaries of play, which in turn serve to reduce intemperance. While some group behavior can encourage risky decision making (i.e., the “risky shift” phenomenon), most groups serve to slow the cycling of table games (e.g., blackjack, roulette, craps), increase social discourse and limit intemperance.

Gamblers can play electronic games in relative isolation. According to the Federal Trade Commission, online (i.e., Internet-based) gambling can be addictive because “Internet gambling is a solitary activity, people can gamble uninterrupted and undetected for hours at a time. Gambling in social isolation and using credit to gamble may be risk factors for developing gambling problems” (Federal Trade Commission, 2003). As mentioned before, solitary activities decrease informal social controls and increase the likelihood of intemperance. EGDs, whether played remotely using the Internet, or played in-person at a ground-based casino, pub, airport or convenience store, tend to be less social than table games. Like drinking alone, private gambling seems to be associated with higher levels of excessive play. Drinking and gambling are social behaviors that are most pleasurable within a social context. Privacy removes the social context and reduces the impact of both formal and informal social controls. Finally, the pace of games played alone can be much more rapid than games played in a social context. There are natural social controls exerted by the group that influence the pace of play. Gamblers with problems tend to play more rapidly than those without problems. When alone, the pace of their play can increase without the natural limits provided by a group. The absence of informal social controls is a significant risk factor for the development of addiction in general and gambling related disorders in particular. This risk can exist whether an EGD is played at home, in a casino or in a convenience store. Currently, there is no research to inform public policy makers about the extent of gamblers’ social activities when they play EGDs in the privacy of their home.

Computer, Internet and Gambling Addiction: A Critical Consideration⁷

A Plea for More Cautious Conceptual Development

Jean Rostand once said, “Nothing leads the scientist so astray as a premature truth.” Much remains unknown about the overlap among various mental disorders with excessive computer use. Even if new research satisfactorily demonstrates that the prevalence of computer addiction is relatively stable and robust, epidemiologists also must establish that this phenomenon represents a unique construct. Therefore, it is essential to ask the question, “When is computer addiction, computer addiction?” “When is gambling addiction, gambling addiction?” For example, Blaszczynski and Steel (1998) reported that of 82 consecutive treatment seekers for gambling-related problems, 93% met diagnostic criteria for at least one personality disorder, with the average patient experiencing at least four overlapping personality disorders.

As with pathological gambling, questions about co-occurring conditions and the need for exclusion criteria also exist with excessive computer use. Young and Rogers (1998) suggested that there is a link between depression and pathological Internet use but acknowledged that it is unclear whether depression is the cause or the effect of excessive computer use. Kraut et al. (1998) concluded that the direction of causation is more likely to run from use of the Internet to declines in social involvement and psychological well-being, rather than the reverse. However, since this evidence emerged from a normal group of subjects using the Internet, these results might not apply to people experiencing problems with excessive use. A pilot study of excessive Internet users revealed a high lifetime and current prevalence of co-morbid bipolar disorders, anxiety disorders, eating disorders, impulse control disorders and alcohol dependence, suggesting that excessive Internet use might be closely related to and even be an expression of these disorders (Shapira, Goldsmith, Keck, Khosla, & McElroy, 1998). Dr. Orzack, founder and director of the computer addiction service of McLean Hospital in Belmont, Massachusetts, reports that every patient seeking treatment evidenced at least one comorbid psychiatric disorder (personal communication, 2000).

It is possible that some cases of computer addiction will reflect a discrete and primary disorder. However, clinicians, theorists and investigators must clarify the construct validity of technology-related addictions if this idea is to survive and contribute to the field. Failing such an advance, it is possible that scientists and clinicians will investigate and treat behavior patterns associated with depression, alcoholism, antisocial personality disorder or other disorders while thinking that they have discovered something new. “Labeling [computer or Internet addiction] as if it were a new diagnostic entity may lead to the misdiagnosis of primary psychiatric disorders for which we have proven therapeutic interventions” (Huang & Alessi, 1996).

Reducing Human Suffering While Doing No Harm

Whether intemperate computer use permits gambling excessively or whether excessive gambling causes undue computer use (i.e., whether these problems are primary or secondary), gambling and computer use—like most human endeavors—hold the potential to inflict human suffering. When public policy and clinical guidelines for treating people struggling with an addiction rest on immature and uncertain science, however, there is potential to violate the most basic principle of medical ethics: do no harm. Without a solid empirical foundation, public policy mak-

⁷ This section derives, in part, from the following article: Shaffer, H. J., Hall, M. N., & Vander Bilt, J. (2000). “Computer addiction”: a critical consideration. *American Journal of Orthopsychiatry*, 70(2), 162-168.

ers and addiction workers alike—in spite of their benevolent motivations and the need to respond to people struggling with computer-related gambling problems—cannot know with certainty that they are not making matters worse.

Even in the more established field of substance abuse treatment, practice guidelines are relatively new and equivocal (Nathan, 1998). Similarly, public policy efforts attempting to limit the use of psychoactive substances has had questionable results at best. Because of the complex conceptual conditions reviewed earlier and the absence of rigorous empirical research, policy and practice guidelines in the area of Internet-related computer gambling are premature.

Policy makers and clinicians must avoid the possibility of inadvertently doing harm because they have not established empirically supported interventions for a problem with little construct validity. For example, if policy makers cannot distinguish primary clinical depression from the more transient depression that can follow excessive gambling that costs someone a relationship or financial gain, they might employ regulatory strategies that over- or under-respond. Similarly, a myopic paradigm can encourage clinicians to miss important signs and symptoms associated with more serious disorders (Shaffer, 1986, 1987, 1994a, 1994b). Faced with excessive computer use and gambling, public policy makers and treatment professional should consider the extraordinary influence of co-morbid conditions. To date, most public policy makers and clinicians have adopted strategies from traditional drug and alcohol addiction treatments to limit adversities associated with gambling. However, many of these approaches have little empirical evidence to support their clinical utility in the drug abuse field (Miller et al., 1995). Consequently, I encourage public policy makers and clinicians to proceed cautiously.

Conclusions

This article considered the following questions: (1) is the nature of addiction different for different objects of addiction, specifically Internet-related gambling?; (2) are the risk factors that lead to gambling disorders different from the risk factors that are associated with Internet gambling? To address these issues, this article reviewed the nature of addiction, gambling, computers and computers that communicate via Internet connections.

Since the biological and psychosocial risk factors for all addictions are shared and the sequelae are similar, one type of addiction is more prevalent than another at any historical moment because of access and availability in the social setting and personal interest, which, in turn, is a function of culture and psycho-economics. This is a complex matter. The prevalence of addiction to various objects is not the result of inherent characteristics associated with the specific object, but the capacity of the object to shift subjective states reliably in a desirable direction. To illustrate, the rate of heroin and cocaine dependence and pathological gambling are very similar despite the fact that these problems can be distinguished by the presence or absence of psychoactive drug use. In addition, widespread access and availability does not assure addiction. For example, Nevada residents are about 8 times more exposed to gambling than New Jersey residents and 9 times more than Iowa residents (Shaffer, LaBrie, & LaPlante, in press). However, Nevada residents do not evidence gambling disorders at 8 or 9 times the New Jersey or Iowa rate. In addition, according to one measure (i.e., the South Oaks Gambling Screen, SOGS), Nevada residents have a higher rate of gambling disorders than residents of other states (Volberg, 2002b), but not proportionately higher as would be expected from their exposure; on another measure (i.e., the National Opinion DSM-IV screen, NODS), Nevada residents have a rate of gambling disorder that is fifty percent less than the rest of the country (Volberg, 2002b). In addition, surprising to some, regardless of instrument, Nevada adolescents evidenced lower rates of the most serious form of gambling disorder (i.e., 1.1% using the DSM-IV-MR-J; 2.2.% using the SOGS-RA) compared with other locales using similar estimation techniques (Volberg, 2002a).

Two models have been offered to explain these findings: exposure and social adaptation. The exposure hypothesis suggests that gambling is a social toxin that inevitably will overcome players so that they fall victim to the influence of the toxic activity; alternatively, the social adaptation hypothesis suggests that people can and will adapt to the presence of certain toxins (e.g., either biological or social) and develop immunity (e.g., either biological or social). These adaptations lead to shifts in the meaningfulness, attractiveness and involvement in the activity. Which people adapt and which fail to adapt is an important focus of public health and psychological research.

Thus, Volberg's (2002b) SOGS data supports the exposure hypothesis and her NODS data supports the adaptation hypothesis.⁸ Additional support for the social adaptation model also comes from Volberg's Nevada study: She observed that people living in Nevada for more than 10 years had lower rates of gambling disorder than people who had lived there for 10 years or less (Volberg, 2002b). Contrary to expectation, Volberg (2002a) also found that Nevada youth also did not gamble at an earlier age or gamble at casinos more than their counterparts from less gambling exposed settings. It would be interesting to know whether these patterns were similar when Nevada gaming was new and less developed. The social adaptation model would predict higher rates during this time and the exposure model would predict lower rates because gambling was less ubiquitous then. Internet gambling is still in the early stages of development. The exposure model would predict that it will have novelty effects that can increase the rate of gambling-related disorders; this increase will continue until social adaptation forces emerge to regulate the phenomenon. As evidenced by the Nevada experience, exposure is not sufficient to predict gambling related problems.

This review leads to the opinion that gambling with EGDs is gambling with EGDs—whether these are connected to the Internet or not. Although the rates of gambling disorders vary across the different games that people play, and there is some evidence to suggest that EGDs are associated with higher rates of disorder than social games, this observation results primarily from the social setting characteristics of the games and not inherent game attributes. Further, different people are attracted to different games; given the likelihood of co-occurring disorders with gambling disorders, these personal attributes contribute to the games people choose to play. Since the vast majority of people gamble without difficulty, it is essential to understand the personal attributes of gamblers who do experience gambling related problems; these gambling problems often, but not always, serve as a proxy for other mental health conditions (e.g., depression). Addiction to alcohol, drugs and gambling increases when these objects are used in isolation; under these conditions, informal social controls are limited or absent. EGDs can be used in isolation independent of whether the device is connected to the Internet. Consequently, gambling on computers linked to the Internet and gambling on computers not linked to the Internet represent similar risks; this circumstance is most likely when the gambling software and social setting characteristics are similar.

Finally, it is premature to define “pathological Internet use” – whether for gambling purposes or not – as a unique psychiatric disorder before scientists investigate related constructs such as computer addiction, identify co-morbid psychiatric conditions, and establish the validity of this

⁸ Though investigators have suggested that (1) the SOGS is based on outdated criteria (Volberg, 1996), (2) the NODS has eclipsed the SOGS (Gerstein, Murphy, Toce, Hoffmann, Palmer, Johnson, Larison, Chuchro, Bard, Engelman, Hill, Buie, Volberg, Harwood et al., 1999; Gerstein, Murphy, Toce, Hoffmann, Palmer, Johnson, Larison, Chuchro, Bard, Engelman, Hill, Buie, Volberg, Tucker et al., 1999), and (3) “...surveys using SOGS may have resulted in inflated estimates of the true prevalence of this disorder in the community” (Abbott & Volberg, 1996, p.158), in the absence of a gold standard, it is impossible to know which estimate is more accurate (Shaffer et al., 1997; Shaffer & Korn, 2002).

construct. Research has not yet provided sufficient construct validity to determine whether pathological gambling or disordered computer or Internet use reflects unique primary psychiatric disorders or different expressions of an underlying syndrome. In the majority of cases, other more primary disorders provide better explanations of excessive computer use and gambling. Without conceptual clarity and empirical support for treatment efficacy, it also is premature to offer clinical guidelines for the treatment of computer or Internet addiction. Empirical support for the construct validity of computer addiction and Internet gambling has yet to emerge. Therefore, treatment for this disorder is also in its formative stages and workers in the field should proceed thoughtfully and with great caution.

References

- Abbott, M. W., & Volberg, R. A. (1996). The New Zealand National Survey of problem and pathological gambling. *Journal of Gambling Studies*, 12(2), 143-160.
- Aharon, I., Etcoff, N., Ariely, D., Chabris, C. F., O'Connor, E., & Breiter, H. C. (2001). Beautiful faces have variable reward value: fMRI and behavioral evidence. *Neuron*, 32, 537-551.
- American Psychiatric Association. (2000). *Diagnostic and Statistical Manual of Mental Disorders--Text Revision* (Fourth ed.). Washington, D.C.: American Psychiatric Association.
- Baker, A. (Ed.). (2000). *Serious shopping* (first ed.). London: Free Association Books.
- Barron, J. (Ed.). (1998). *Making diagnosis meaningful: enhancing evaluation and treatment of psychological disorders*. Washington, D.C.: American Psychological Association.
- Benjamin, J., Lin, L., Patterson, C., Greenberg, B. D., Murphy, D. L., & Hamer, D. H. (1996). Population and familial association between the D4 dopamine receptor gene and measures of novelty seeking. *Nature Genetics*, 12(January), 81-83.
- Berkson, J. (1946). Limitations of the application of fourfold table analysis to hospital data. *Biometrics*, 2, 47-53.
- Betz, C., Mihalic, D., Pinto, M. E., & Raffa, R. B. (2000). Could a common biochemical mechanism underlie addictions? *Journal of Clinical Pharmacy & Therapeutics February*, 25(1), 11-20.
- Bierut, L. J., Dinwiddie, S. H., Begleiter, H., Crowe, R. R., Helsselbrock, V., Nurnberger, J. I., et al. (1998). Familial transmission of substance dependence: Alcohol, marijuana, cocaine, and habitual smoking: A report from the Collaborative Study on the Genetics of Alcoholism. *Archives of General Psychiatry*, 55(11), 982-988.
- Black, W. B., & Moyer, T. (1998). Clinical features and psychiatric comorbidity of subjects with pathological gambling behavior. *Psychiatric Services*, 49, 1434-1439.
- Blaszczynski, A., & Steel, Z. (1998). Personality disorders among pathological gamblers. *Journal of Gambling Studies*, 14(1), 51-71.
- Blum, K., Braverman, E. R., Holder, M. M., Lubar, J. F., Monastra, V. J., Miller, D., et al. (2000). Reward deficiency syndrome: a biogenetic model for the diagnosis and treatment of impulsive, addictive, and compulsive behaviors. *Journal of Psychoactive Drugs*, 32(supplement), 1-112.
- Blume, S. B. (1994). Pathological gambling and switching addictions: Report of a case. *Journal of Gambling Studies*, 10(1), 87-96.
- Breiter, H. C., Aharon, I., Kahneman, D., Dale, A., & Shizgal, P. (2001). Functional imaging of neural responses to expectancy and experience of monetary gains and losses. *Neuron*, 30, 619-639.
- Breiter, H. C., & Gasic, G. P. (in press). A general circuitry processing reward / aversion information and its implications for neuropsychiatric illness. In M. Gazzaniga (Ed.), *The Cognitive Neurosciences, 3rd Edition* (Third ed.). Boston: MIT press.

- Carter, D., & Ruiz, N. (1996). Discriminant validity and reliability studies on the Sexual Addiction Scale of the Disorders Screening Inventory. *Sexual Addiction & Compulsivity*, 3(4), 332-340.
- Cepik, A., Arikan, Z., Boratav, C., & Isik, E. (1995). Bulimia in a Male Alcoholic: A Symptom Substitution in Alcoholism. *International Journal of Eating Disorders*, 17(2), 201-204.
- Cerny, L., & Cerny, K. (1992). Can carrots be addictive? An extraordinary form of drug dependence. *British Journal of Addiction*, 87, 1195-1197.
- Chi, H., & de Wit, H. (2003). Mecamylamine attenuates the subjective stimulant-like effects of alcohol in social drinker. *Alcoholism: Clinical and Experimental Research*, 25(5), 780-786.
- Christenson, G. A., Faber, R. J., de Zwaan, M., Raymond, N. C., Specker, S. M., Edern, M. D., et al. (1994). Compulsive buying: descriptive characteristics and psychiatric comorbidity. *The Journal of Clinical Psychiatry*, 55(1), 5-11.
- Clotfelter, C. T., & Cook, P. J. (1989). *Selling hope: state lotteries in America*. Cambridge: Harvard University Press.
- Cole, J. I., Suman, M., Schramm, P., VanBel, D., Lunn, B., Maguire, P., et al. (2000). *The UCLA Internet report: surveying the digital future*. Los Angeles: UCLA Center for Communication Policy.
- Conner, B., Stein, J., Longshore, D., & Stacy, A. (1999). Associations between drug abuse treatment and cigarette use: Evidence of substance replacement. *Experimental and Clinical Psychopharmacology*, 7(1), 64-71.
- Crossman, J., Jamieson, J., & Henderson, L. (1987). Responses of competitive athletes to lay-offs in training: Exercise addiction or psychological relief? *Journal of Sport Behavior*, 10(1), 28-38.
- Daigle, R. D., Clark, H. W., & Landry, M. J. (1988). A primer on neurotransmitters and cocaine. *Journal of Psychoactive Drugs*, 20(3), 283-295.
- Davies, J. B. (1996). Reasons and causes: understanding substance users' explanations for their behavior. *Human Psychopharmacology*, 11, S39-S48.
- Ebstein, R. P., Novick, O., Umansky, R., Priel, B., Osher, Y., Blaine, D., et al. (1996). Dopamine D4 receptor (D4DR) exon III polymorphism associated with the human personality trait of novelty seeking. *Nature Genetics*, 12(January), 78-80.
- Federal Trade Commission. (2003). *Online gambling and kids: a bad bet*. Retrieved December 20, 2003, from <http://www.ftc.gov/gamble>
- Feigelman, W., Wallisch, L. S., & Lesieur, H. R. (1998). Problem gamblers, problem substance users, and dual problem individuals: an epidemiological study. *American Journal of Public Health*, 88(3), 467-470.
- Gerstein, D., Murphy, S., Toce, M., Hoffmann, J., Palmer, A., Johnson, R., et al. (1999). *Gambling Impact and Behavior Study: Report to the National Gambling Impact Study Commission*. Chicago: National Opinion Research Center.
- Gerstein, D., Murphy, S., Toce, M., Hoffmann, J., Palmer, A., Johnson, R., et al. (1999). *Gambling Impact and Behavior Study: Final Report to the National Gambling Impact Study Commission*. Chicago: National Opinion Research Center.
- Griffiths, M. (1996). Gambling on the Internet: A brief note. *Journal of Gambling Studies*, 12, 471-473.
- Harford, R. J. (1978). Drug preferences of multiple drug abusers. *Journal of Consulting and Clinical Psychology*, 46, 908-912.
- Hser, Y., Anglin, M., & Powers, K. (1990). Longitudinal Patterns of Alcohol use by Narcotics Addicts. *Recent Developments in Alcoholism*, 8, 145-171.
- Huang, M. P., & Alessi, N. E. (1996). The Internet and the future of psychiatry. *American Journal of Psychiatry*, 153(7), 861-869.

- Hunt, W. A., Barnett, L. W., & Branch, L. G. (1971). Relapse rates in addiction programs. *Journal of Clinical Psychology, 27*(4), 455-456.
- Hyman, S. E. (1994). Why does the brain prefer opium to broccoli? *Harvard Review of Psychiatry, 2*, 43-46.
- Jabs, C. (1996, May 21). Fatal distraction? *HOMEPC, 3*, 66-70, 76, 78.
- Jacobs, D. F. (1989). A general theory of addictions: rationale for and evidence supporting a new approach for understanding and treating addictive behaviors. In H. J. Shaffer, S. Stein, B. Gambino & T. N. Cummings (Eds.), *Compulsive gambling: theory, research & practice* (pp. 35-64). Lexington, MA: Lexington Books.
- Janower, C. R. (1996). Gambling on the Internet. *Journal of Computer-Mediated Communication, 2*(2).
- Johnson, B. A., Ait-Daoud, N., Bowden, C. L., DiClemente, C. C., Roache, J. D., Lawson, K., et al. (2003). Oral topiramate for treatment of alcohol dependence: a randomised controlled trial. *Lancet, 361*, 1677-1685.
- Kallick, M., Suits, D., Dielman, T., & Hybels, J. (1979). *A survey of American gambling attitudes and behavior* (Research report series, Survey Research Center, Institute for Social Research). Ann Arbor, MI: University of Michigan Press.
- Karkowski, L. M., Prescott, C. A., & Kendler, K. S. (2000). Multivariate assessment of factors influencing illicit substance use in twins from female-female pairs. *American Journal of Medical Genetics Neuropsychiatric Genetics, 96*, 665-670.
- Keepers, G. A. (1990). Pathological preoccupation with video games. *Journal of the American Academy of Child and Adolescent Psychiatry, 29*(1), 49-50.
- Kendler, K. S., Jacobson, K. C., Prescott, C. A., & Neale, M. C. (2003). Specificity of genetic and environmental risk factors for use and abuse/dependence of cannabis, cocaine, hallucinogens, sedatives, stimulants, and opiates in male twins. *American Journal of Psychiatry, 160*(4), 687-695.
- Kessler, R. C., McGonagle, K. A., Zhao, S., Nelson, C. B., Hughes, M., Eshleman, S., et al. (1994). Lifetime and 12-month prevalence of DSM-III-R psychiatric disorders in the United States. Results from the National Comorbidity Survey. *Archives of General Psychiatry, 51*(1), 8-19.
- Kessler, R. C., Nelson, C. B., McGonagle, K. A., Edlund, M. J., Frank, R. G., & Leaf, P. J. (1996). The epidemiology of co-occurring addictive and mental disorders: implications for prevention and service utilization. *American Journal of Orthopsychiatry, 66*(1), 17-31.
- Khantzian, E. J. (1975). Self selection and progression in drug dependence. *Psychiatry Digest, 36*, 19-22.
- Khantzian, E. J. (1985). The self-medication hypothesis of addictive disorders: Focus on heroin and cocaine dependence. *American Journal of Psychiatry, 142*(11), 1259-1264.
- Khantzian, E. J. (1997). The self-medication hypothesis of substance use disorders: A reconsideration and recent applications. *Harvard Review of Psychiatry, 4*(5), 231-244.
- Kipnis, D. (1991). The technological perspective. *Psychological Science, 2*(2), 62-69.
- Kipnis, D. (1997). Ghosts, taxonomies, and social psychology. *American Psychologist, 52*(3), 205-211.
- Klonoff, D. C., & Jurow, A. H. (1991). Acute water intoxication as a complication of urine drug testing in the workplace. *Journal of The American Medical Association, 265*(1), 84-85.
- Kraut, R., Patterson, M., Lundmark, V., Kiesler, S., Mukopadhyay, T., & Scherlis, W. (1998). Internet paradox: a social technology that reduces social involvement and psychological well-being? *American Psychologist, 53*(9), 1017-1031.
- Ladd, G. T., & Petry, N. M. (2002). Disordered gambling among university-based medical and dental patients: A focus on Internet gambling. *Psychology of Addictive Behaviors, 16*(1), 76-79.

- Lejoyeux, M., Ades, J., Tassain, V., & Solomon, J. (1996). Phenomenology and Psychopathology of Uncontrolled Buying. *American Journal of Psychiatry December*, 153(12), 1524-1529.
- Leshner, A. (1999, February 5). *Addiction is a brain disease and it matters*. Paper presented at the New Directions in Gambling Addiction Research, George Washington University.
- Lesieur, H. R., & Heineman, M. (1988). Pathological gambling among youthful multiple substance abusers in a therapeutic community. *British Journal of Addiction*, 83(7), 765-771.
- Lopes, L. L. (1987). Between hope and fear: the psychology of risk. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 20, pp. 255-295). San Diego: Academic Press.
- Macdiarmid, J. I., & Heterington, M. M. (1995). Mood modulation by food: An exploration of affect and cravings in "chocolate addicts". *British Journal of Clinical Psychology*, 34, 129-138.
- Marlatt, G. A., Baer, J. S., Donovan, D. M., & Kivlahan, D. R. (1988). Addictive behaviors: etiology and treatment. *Annual Review of Psychology*, 39, 223-252.
- Marlatt, G. A., & Gordon, J. (Eds.). (1985). *Relapse prevention*. New York: Guilford.
- Marshall, K., & Wynne, H. (2003). Fighting the odds. *Perspectives on labour and income*, 4(12), 5-13.
- Merikangas, K. R., Stolar, M., Stevens, D. E., Goulet, J., Preisig, M. A., Fenton, B., et al. (1998). Familial Transmission of Substance Use Disorders. *Archives of General Psychiatry*, 55(11), 973-979.
- Miller, W. R., Brown, J. M., Simpson, T. L., Handmaker, N. S., Bein, T. H., Luckie, L. F., et al. (1995). What works? A methodological analysis of the alcohol treatment outcome literature. In R. K. Hester & W. R. Miller (Eds.), *Handbook of alcoholism treatment approaches: effective alternatives* (Second ed., pp. 12-44). Boston: Allyn and Bacon.
- Murray, B. (1996a). Computer addictions entangle students. *The APA Monitor*, 27(6), 38-39.
- Murray, B. (1996b). Online programs are just as seductive for faculty. *The APA Monitor*, 27(6), 38.
- Nathan, P. E. (1998). Practice guidelines: not yet ideal. *American Psychologist*, 53(3), 290-299.
- National Research Council. (1999). *Pathological gambling: a critical review*. Washington D.C.: National Academy Press.
- Nestler, E. J., Barrot, M., & Self, D. W. (2001). DFosB: A sustained molecular switch for addiction. *Proceedings of the National Academy of Sciences*, 98(20), 11042-11046.
- O'Neill, M. (1995, March 8). The lure and addiction of life on line. *The New York Times*, pp. C1, C6.
- Oravec, J. A. (2000). Internet and computer technology hazards: Perspectives for family counseling. *British Journal of Guidance & Counselling*, 28(3), 309-324.
- O'Reilly, M. (1996). Internet addiction: a new disorder enters the medical lexicon. *Canadian Medical Association Journal*, 154(12), 1882-1883.
- O'Reilly, M. (1997). Can users get addicted to the Internet? *Canadian Medical Association Journal*, 157(6), 785-786.
- Orford, J. (1985). *Excessive appetites: a psychological view of addictions*. New York: John Wiley & Sons.
- Orford, J., Sproston, K., Erens, B., White, C., Mitchell, L., & with the support of GamCare. (2003). *Gambling and problem gambling in Britain*. Hove, East Sussex ; New York: Brunner-Routledge.
- Pickering, L. K., & Hogan, G. R. (1971). Voluntary water intoxication in a normal child. *Journal of Pediatrics*, 78, 316-318.
- Potenza, M. N. (2001). The neurobiology of pathological gambling. *Seminars in Clinical Neuropsychiatry*, 6(3), 217-226.
- Prochaska, J. O., DiClemente, C. C., & Norcross, J. C. (1992). In search of how people change: applications to addictive behaviors. *American Psychologist*, 47, 1102-1114.

- Rowntree, L. G. (1923). Water intoxication. *Archives of Internal Medicine*, 32(2), 157-174.
- Shaffer, H. J. (1986). Assessment of addictive disorders: The use of clinical reflection and hypotheses testing. *Psychiatric Clinics of North America*, 9(3), 385-398.
- Shaffer, H. J. (1987). The epistemology of "addictive disease": The Lincoln-Douglas debate. *Journal of Substance Abuse Treatment*, 4(2), 103-113.
- Shaffer, H. J. (1994a). Considering two models of excessive sexual behaviors: addiction and obsessive-compulsive disorder. *Sexual Addiction & Compulsivity*, 1(1), 6-18.
- Shaffer, H. J. (1994b). Denial, ambivalence and countertransference hate. In J. D. Levin & R. Weiss (Eds.), *Alcoholism: Dynamics and Treatment* (pp. 421-437). Northdale, N.J.: Jason Aronson.
- Shaffer, H. J. (1996). Understanding the means and objects of addiction: technology, the Internet, and gambling. *Journal of Gambling Studies*, 12(4), 461-469.
- Shaffer, H. J. (1997a). The most important unresolved issue in the addictions: conceptual chaos. *Substance Use & Misuse*, 32(11), 1573-1580.
- Shaffer, H. J. (1997b). The psychology of stage change. In J. H. Lowinson, P. Ruiz, R. B. Millman & J. G. Langrod (Eds.), *Substance abuse: a comprehensive textbook* (Third ed., pp. 100-106). Baltimore: Williams & Wilkins.
- Shaffer, H. J. (1999a). On the nature and meaning of addiction. *National Forum*, 79(4), 10-14.
- Shaffer, H. J. (1999b). Strange bedfellows: a critical view of pathological gambling and addiction. *Addiction*, 94(10), 1445-1448.
- Shaffer, H. J. (2002). Is computer addiction a unique psychiatric disorder? *Psychiatric Times*, XIX(4), 35-36.
- Shaffer, H. J. (2003). Rethinking addiction: how gambling and other behavioral addictions are changing the concept and treatment of alcohol and substance use disorders. *Academy News*(2), 1,3,7.
- Shaffer, H. J., & Burglass, M. E. (Eds.). (1981). *Classic contributions in the addictions*. New York: Brunner/Mazel.
- Shaffer, H. J., & Eber, G. B. (2002). Temporal progression of cocaine dependence symptoms in the national comorbidity survey. *Addiction*, 97, 543-554.
- Shaffer, H. J., & Hall, M. N. (2002). The natural history of gambling and drinking problems among casino employees. *Journal of Social Psychology*, 142(4), 405-424.
- Shaffer, H. J., Hall, M. N., & Vander Bilt, J. (1997). *Estimating the prevalence of disordered gambling behavior in the United States and Canada: a meta-analysis*. Boston: Presidents and Fellows of Harvard College.
- Shaffer, H. J., Hall, M. N., & Vander Bilt, J. (2000). "Computer addiction": a critical consideration. *American Journal of Orthopsychiatry*, 70(2), 162-168.
- Shaffer, H. J., & Korn, D. A. (2002). Gambling and related mental disorders: a public health analysis. In *Annual Review of Public Health* (Vol. 23, pp. 171-212). Palo Alto: Annual Reviews, Inc.
- Shaffer, H. J., LaBrie, R., & LaPlante, D. (in press). Laying the foundation for quantifying regional exposure to social phenomena: considering the case of legalized gambling as a public health toxin. *Psychology of Addictive Behaviors*.
- Shaffer, H. J., & LaSalvia, T. (1992). Patterns of substance use among methadone maintenance patients: indicators of outcome. *Journal of Substance Abuse Treatment*, 9(2), 143-147.
- Shaffer, H. J., & Robbins, M. (1991). Manufacturing multiple meanings of addiction: time-limited realities. *Contemporary Family Therapy*, 13, 387-404.
- Shapira, N., Goldsmith, T. D., Keck, P. E., Khosla, U. M., & McElroy, S. L. (1998, June 1). *Psychiatric evaluation of individuals with problematic use of the Internet*. Paper presented at the Poster session of the 151st Annual Meeting of the American Psychiatric Association, Toronto, Ontario, Canada.

- Shotton, M. A. (1989). *Computer Addiction? A Study of Computer Dependency*. Basingstoke: Taylor & Francis.
- Shotton, M. A. (1991). The costs and benefits of "computer addiction". *Behaviour and Information Technology*, 10(3), 219-230.
- Silver, G. (Ed.). (1979). *The dope chronicles: 1850-1950*. San Francisco: Harper & Row.
- Slutske, W. S., Eisen, S., True, W. R., Lyons, M. J., Goldberg, J., & Tsuang, M. (2000). Common genetic vulnerability for pathological gambling and alcohol dependence in men. *Archives of General Psychiatry*, 57(7), 666-673.
- Slutske, W. S., Jackson, K. M., & Sher, K. J. (2003). The natural history of problem gambling from age 18 to 29. *Journal of Abnormal Psychology*, 112(2), 263-274.
- Sproston, K., Erens, B., & Orford, J. (2000). *Gambling behaviour in Britain: results from the British gambling prevalence survey*. London: National Centre for Social Research.
- Tsuang, M. T., Lyons, M. J., Meyer, J. M., Doyle, T., Eisen, S., Goldberg, J., et al. (1998). Co-occurrence of abuse of different drugs in men: the role of drug-specific and shared vulnerabilities. *Archives of General Psychiatry*, 55(11), 967-972.
- United States. (2003). *United States - Measures affecting the cross-border supply of gambling and betting services* (No. WT/DS285).
- Vaillant, G. E. (1982). On defining alcoholism. *British Journal of Addiction*, 77, 143-144.
- Vaillant, G. E. (1983). *The natural history of alcoholism: causes, patterns, and paths to recovery*. Cambridge: Harvard University Press.
- Vaillant, G. E. (1984). A debate on DSM-III: The disadvantages of DSM-III outweigh its advantages. *American Journal of Psychiatry*, 141(4), 542-545.
- Volberg, R. A. (1996). Prevalence studies of problem gambling in the United States. *Journal of Gambling Studies*, 12(2), 111-128.
- Volberg, R. A. (2002a). *Gambling and problem gambling among adolescents in Nevada*. Northampton, MA: Gemini Research Ltd.
- Volberg, R. A. (2002b). *Gambling and problem gambling in Nevada*. Northampton, MA: Gemini Research Ltd.
- Warburton, D. M. (Ed.). (1990). *Addiction controversies*. Chur, Switzerland: Harwood Academic Publishers.
- Weil, A. (1972). *The natural mind: a new way of looking at drugs and the higher consciousness*. Boston: Houghton Mifflin Company.
- Werme, M., Lindholm, S., Thoren, P., Franck, J., & Brene, S. (2002). Running increases ethanol preference. *Behavioural Brain Research*, 133, 301-308.
- Werme, M., Thoren, P., Olson, L., & Brene, S. (2000). Running and cocaine both upregulate dynorphin mRNA in medial caudate putamen. *European Journal of Neuroscience*, 12, 2967-2974.
- Wise, R. A. (1995). Addictive drugs and brain stimulation reward. In *Annual Review of Neuroscience* (Vol. 18, pp. 319-340).
- Young, K. S. (1996a, August 11). *Internet addiction: the emergence of a new clinical disorder*. Paper presented at the 104th annual meeting of the American Psychological Association, Toronto, Canada.
- Young, K. S. (1996b). Psychology of computer use: XL. Addictive use of the Internet: A case that breaks the stereotype. *Psychological Reports*, 79(3, Pt 1), 899-902.
- Young, K. S. (1998). *Caught in the net*. New York: John Wiley & Sons, Inc.
- Young, K. S. (1999). Internet addiction: symptoms, evaluation, and treatment. In L. VandeCreek & T. Jackson (Eds.), *Innovations in clinical practice: a source book* (Vol. 17, pp. 19-31). Sarasota, FL: Professional Resource Press.
- Young, K. S., & Rogers, R. C. (1998). The relationship between depression and internet addiction. *CyberPsychology & Behavior*, 1(1), 25-36.
- Zinberg, N. E. (1984). *Drug, set, and setting*. New Haven, CT: Yale University Press.

- Zuckerman, M. (1979). *Sensation seeking: beyond the optimal level of arousal*. Hillsdale, N.J. New York: L. Erlbaum Associates; distributed by the Halsted Press Division of Wiley.
- Zuckerman, M. (1994). *Behavioral expressions and biosocial bases of sensation seeking*. Cambridge; New York: Cambridge University Press.
- Zuckerman, M. (Ed.). (1983). *Biological bases of sensation seeking, impulsivity, and anxiety*. Hillsdale, N.J.: L. Erlbaum Associates.

About the Author

Howard J. Shaffer is an Associate Professor at Harvard Medical School and the Director of the Division on Addictions at Harvard Medical School. In addition to an active private practice, Dr. Shaffer consults internationally to a variety of organizations in business, education, human services, and government. Dr. Shaffer is a clinical psychologist licensed in the Commonwealth of Massachusetts; the National Register of Health Care Providers in Psychology also certifies him.

Dr. Shaffer served on the National Academy of Sciences, National Research Council, *Committee on the Social and Economic Impacts of Pathological Gambling*. Dr. Shaffer recently served as the editor of *The Journal of Gambling Studies*. Dr. Shaffer also is a member of many editorial boards, including *The Journal of Substance Abuse Treatment*, the *Journal of Psychoactive Drugs*, *Advances in Alcohol and Substance Abuse*, the *Psychology of Addictive Behaviors*, and *Sexual Addiction and Compulsivity: The Journal of Prevention and Treatment*. He is the creator and founder of the widely read *WAGER* (Weekly Addiction Gambling Education Report).

Dr. Shaffer's major research interests include, the social perception of addiction and disease, the philosophy of science, impulse control regulation and compulsive behaviors, adolescent gambling, addiction treatment outcome, and the natural history of addictive behaviors. Dr. Shaffer has written extensively about the treatment of addictive behaviors and the nature of addiction. His many books and monographs include *Quitting Cocaine: The Struggle Against Impulse* with Dr. Stephanie Jones, *Compulsive Gambling: Theory, Research & Practice*, edited with Dr. Blase Gambino, Sharon Stein, and Thomas Cummings. His newest book is *Youth, Gambling, and Society: Futures at Stake*, from the University of Nevada Press; this book was released during 2003. His research, writing, and teaching have shaped how the health care field conceptualizes and treats the full range of addictive behaviors.