

INTEGRATING GAMBLING INTO THEORIES OF RISKY BEHAVIORS:

A TIMELINE APPROACH

by

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(Under the Direction of Adam S. Goodie)

ABSTRACT

The present research aims to examine the relationship between gambling and other forms of risky behaviors, including risky sexual activity, delinquent behaviors, and substance use. Literature regarding theories of risky behaviors, namely Problem Behavior Theory and Gateway Theory, is reviewed in an effort to establish how well gambling is currently incorporated into these theories and to determine if and how gambling can be better integrated. Current findings related to gambling appear to be limited due to certain methodological issues such as questionable measures of gambling, outdated data, and underrepresented samples, which are addressed in the present work. In Study 1 and Study 2, the present research works to substantiate covariance between gambling and other risky behaviors in first an adult-aged community sample ($n=354$) and then in an older-adolescent college sample ($n=387$). In Study 3, a timeline of these behaviors in an additional older-adolescent sample ($n=570$) is created in an effort to determine temporal precedence for the sample as a whole as well as for separate groups of gamblers and nongamblers. Findings suggest that both gamblers and nongamblers display a similar progression of problem behaviors, yet there are slight variations in the order of behaviors as well as the age

of onset of certain behaviors. Additional findings of significance include the early appearance of gambling activity in the comprehensive timeline, occurring before almost all other activities, and the occurrence of alcohol use prior to, and more commonly than, tobacco use in both nongamblers and gamblers. Implications for the future integration of gambling into more comprehensive theories of risky behaviors are discussed.

INDEX WORDS: GAMBLING, PROBLEM BEHAVIORS, SUBSTANCE USE, SEXUAL ACTIVITY, RISK TAKING

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DEDICATION

I would like to dedicate my dissertation to my family, my friends, and my boyfriend, Salvador. You supported me during times of weakness, believed in my abilities when I did not, and allowed me to be crazy when sanity did not seem like an option. Without you, this dissertation would simply not exist.

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CHAPTER 1

INTRODUCTION

The recent decision to recategorize pathological gambling (PG) in the DSM-5 as an addiction-related disorder as opposed to an impulse control disorder was spawned in part by the similarities that PG has been shown to share with substance addictions, including certain personality factors, neurobiological processes, genetic predispositions, and diagnostic issues (Grant, Potenza, Weinstein, & Gorelick, 2010). The documented comorbidity of PG with substance use disorders gives further merit to the inclusion of PG in the category of addictive disorders and draws question to architecture of the interconnectedness between addictive disorders. Two main theories investigating the co-occurrence of risky behaviors include the Problem Behavior Theory (PBT; Jessor & Jessor, 1977) and the Gateway Theory (GT; Kandel, 1975). These theories are especially applicable to younger age groups as the highest rate of co-use of alcohol and tobacco occur in late adolescence and early adulthood (ages 18-24) with nearly 35% of men and 26% of women engaging in both of these activities (Falk, Yi, & Hiller-Sturmhöfel, 2006). Problem gambling also peaks during this same time period, with lifetime PG rates shown to be greater in college and adolescent populations than in adult populations (Shaffer, Hall, & Vander Bilt, 1999). Further, evidence suggests that adolescents who gamble are more likely to have experiences with substance use and delinquent behaviors (Barnes, Welte, Hoffman, & Dintcheff, 1999; Griffiths & Sutherland, 1998; Winters, Stinchfield, Botzet, & Anderson, 2002) in addition to more risky sexual activity (Petry, 2000). As such, it is important to continue to explore the relationship that gambling exhibits with other problem behaviors in order to fully support prevention and treatment efforts for PG.

Theories of Risky Behaviors

The risky behaviors of adolescents and young adults, including acts such as substance use, delinquent behavior, and sexual activity, have been of interest to researchers for the past several decades, as these types of behaviors can have serious future repercussions for those individuals and those in their social networks. The development and progression of various risky behaviors are investigated by the PBT (Jessor & Jessor, 1977) and the GT (Kandel, 1975), while the former explores shared causal mechanisms and the latter explores the temporal sequence of risky behaviors with a special focus on substance use.

Problem Behavior Theory. PBT is a widely referenced model used to aid in the understanding of a variety of risky activities, most often within adolescent samples, which conceptualizes maladaptive adolescent behaviors as emerging from the interaction of three central components: a personality system, a perceived environment system, and a behavior system. The personality system focuses on individual traits and characteristics, the perceived environment system highlights the individuals' perception of approval and support from family and friends, and the behavior system catalogues the individuals' participation in both risky activities (e.g., drug use, drinking, sexual activity, etc.) and protective measures (e.g., church attendance, academic merit, etc.). It is proposed that these three components work together, in conjunction with demographic and socialization variables, to create a unified susceptibility to problem behaviors.

According to the PBT, individuals who are highly susceptible to problem behaviors can be identified as having a *psychosocial proneness* to problem behavior, or a problem behavior syndrome (PBS), which could manifest itself in a number of ways (Jessor, 1987). In other words, this view suggests that there is a common explanatory factor for various types of problem

behaviors that emerge during adolescence and that adolescents with PBS are likely to participate in one or more problem behaviors. For example, someone who has a particular blend of personality, environment, and behavior components is likely to have PBS, which may result in the individual using alcohol, participating in deviant acts, or both. In support of this theory, Jessor and Jessor identified a similar pattern of correlations between personality and environment components across various problem behaviors. The idea of one syndrome explaining a variety of problem behaviors suggests that the behavior components of PBT should ideally all belong to one underlying construct, which has gained credence from additional work in the area.

Some of the earliest support for PBS uses factor analysis to show that there is a single factor for certain problem behaviors that include both substance use (alcohol and marijuana) and other risky activities, such as delinquent acts and sexual intercourse (Donovan & Jessor, 1985). This single factor emerged for people of different sex, education level, and age (i.e., groups of adolescents and young adults) and the proportion of variance explained by the single factor ranged from 23% to 46%, depending upon the sociodemographic characteristics. This single-factor solution was further supported in a replication study that found similar levels of variance explained, which ranged from 37% for women to 47% for men (Donovan, Jessor, & Costa, 1988). PBT has also been supported cross-culturally; hierarchical regression analysis revealed that the PBT components accounted for 44% of variance for a Chinese sample in the measure of problem behaviors, reflecting delinquent acts, smoking, and problem drinking (Jessor, Turbin, Costa, Dong, Zhang, & Wang, 2003). With an even more culturally-diverse sample, path analysis using data from eight different countries reveals that the risk factors and protection factors explain 50% of the PBS variance seen across all of these eight countries (Vazsonyi, Chen, Jenkins, Burcu, Torrente, & Sheu, 2010).

Correlations among the various types of substance use are frequently reported and are particularly strong; results from structural equation modeling suggest that alcohol, tobacco, and marijuana factors have correlations between .51 and .56 (Lynskey, Fergusson, & Horwood, 1998). Further, these three types of substance use could be partially explained by a broader underlying factor that Lynskey and colleagues refer to as vulnerability to substance use, which shows strong relationships with tobacco use, alcohol use, and marijuana use with factor loadings of .69, .74, and .76, respectively. Although Lynskey and colleagues did not investigate additional problem behaviors, their findings provide evidence for the interrelatedness of various types of substance use and support the possibility of a greater overarching PBS.

Questions arise, however, when investigating this field of research on a larger scale and moving beyond the interrelatedness of different forms of substance use. A meta-analysis of the mean correlations between different types of problem behaviors cited within 43 studies spanning nearly three decades indicates that the overall mean correlation between *any* two types of problem behaviors is around 0.35 (Guilamo-Ramos, Litardo, & Jaccard, 2005). More importantly for the current study, the mean correlation for studies using adolescent samples was less than half of that ($r=0.16$). The authors state that while there is support for the notion that problem behaviors like alcohol use, marijuana use, illicit drug use, cigarette smoking, general deviant behavior, and sexual activity are associated to some degree and share *some* common variance, implicating the possible presence of a general PBS, the problem behaviors are more unique than they are alike. At the very least, some researchers show that PBS might be more accurately represented by multiple subfactors.

Using a confirmatory factor analysis (CFA) method with a sample of nearly 7,300 adolescents to investigate alcohol use, smoking, marijuana use, hard drugs, sexual activity, minor

and major delinquency, direct and indirect aggression, and gambling, a one-factor model had a decidedly poor fit (Willoughby, Chalmers, & Busseri, 2004). This was especially the case for certain variables like gambling, where the model was shown to only account for 3% of the variance. Further analyses then revealed a more appropriate 3-factor model that accounted for 61% of the total amount of variance in the problem behaviors: a factor for delinquency (both minor and major), one for aggression (both direct and indirect), and one incorporating substance use and sexual activity. The three factors had strong intercorrelations, ranging between 0.39 and 0.47, but the authors report that their study provides weak evidence for the support of PBS. While the problem behaviors of marijuana use, alcohol use, minor delinquency, and direct aggression appear to represent a type of PBS, as these problematic behaviors are likely to co-occur, the other problem behaviors investigated within the study do little to support this notion.

An even more comprehensive catalogue of 45 problem behaviors indicated that these behaviors can be clustered into the four subgroups of reckless behavior, authority conflict, covert crimes, and overt crimes (LeBlanc & Bouthillier, 2003). Hierarchical analysis of the frequencies of these behaviors shows that these four individual groups are actually reflective of a general deviance construct, akin to the idea of a PBS, and that this structural grouping of deviant behaviors is similar for both boys and girls (variable weights may differ due to differences in behavior frequencies). Sexual activity, as well as alcohol and substance use, are components of the reckless behavior factor, which has a .72 loading onto the broader construct of general deviance. The authors state that their findings reveal the dual nature of deviance as *both* a uni- and multi-dimensional construct, which is a question that has continually been debated. Because of this, other theories regarding the development of substance use and related problems have been proposed and explored. One such theory is the Gateway Theory (GT) of substance use.

When comparing this theory to PBT, it has been said that “the two notions present a fundamental theoretical antithesis concerning the relative importance of common versus specific risk factors to explain the manifestations of different forms of drug use” (Kandel, Yamaguchi, & Chen, 1992, p. 454). However, this is not necessarily the case. Rather, components from each theory can come together to give us a more complete understanding of problem behaviors.

Gateway Theory. The gateway approach to risky behaviors is generally applied only to substance use and it states that individuals tend to use drugs in a particular sequence, namely moving from licit drugs like tobacco and alcohol, to illicit drugs, beginning with marijuana. Perhaps due to its obvious simplicity, this was a predominant method of thinking in the 1970s when it was originally proposed, and thus marijuana was dubbed the “gateway” drug. As Kandel states in her 1975 article, “marijuana use is a crucial step in the induction into illicit drug use” and less than 3% of the adolescent sample tried more illicit drugs (like LSD, amphetamines, and heroin) before trying marijuana (p. 913). This temporal sequence of drug use was applicable for various adolescent ages and both genders, regardless of race, but it’s important to note that those who use marijuana do not necessarily progress to the next stage. In other words, substance use cannot be conceptualized as an uncontrollable chain reaction that starts with the use of licit substances during adolescence and inevitably results in illicit drug use during adulthood. In fact, while 26% of marijuana users in Kandel’s study ended up using an illicit drug, most research shows that the majority of people who use gateway drugs, like tobacco or marijuana, are not likely to progress into the use of harder substances (Choo, Roh, & Robinson, 2008). Regardless of this fact, there is a good body of literature that provides support for the idea of a typical temporal sequence of drug use.

Longitudinal data have been used to lend support to the following sequential model of substance use, which was able to properly classify 85.1% of the male participants: (a) alcohol precedes marijuana, (b) alcohol and marijuana precedes other illicit drugs, and (c) alcohol and *either* cigarettes or marijuana precede psychoactive drugs (Kandel et al., 1992). A modified version of this sequential order was able to correctly classify 83.1% of female participants, with the only difference occurring in the first stage: Instead of alcohol preceding marijuana, *either* alcohol or cigarettes precedes marijuana use. The age of first use had an integral impact on the progression of use, such that the early adolescent consumers of alcohol or cigarettes were much more likely to progress to other types of substances than consumers who didn't initiate use of those licit substances until late adolescence. The importance of age is further highlighted by findings that show that 86% of illicit drug users have used marijuana first and that the frequency of marijuana use is significantly associated with the use of harder substances during adolescence, but this effect becomes noticeably smaller during adulthood (Fergusson, Boden, & Horwood, 2006).

Despite the somewhat consistent findings in the U.S., cross-cultural data give rise to problems with the GT. Data from 17 different countries focusing on tobacco, alcohol, marijuana, and other illicit drug use suggest that there is not necessarily an invariable progression of substance use across cultures (Degenhardt et al., 2010). While data from countries like the U.S. and New Zealand support the typical progression of use, there is greater variability in progression for countries where the use of certain gateway substances is less common. For example, marijuana use in Japan is comparably less common, and as such Japanese individuals are more likely to violate the typical progression and use other illicit drugs before ever trying marijuana, thereby supporting the idea that prevalence of a substance in a country can disrupt the

typical progression of use and therefore the gateway theory is not a universal standard. Conversely, other researchers fully support the GT and state that “there is a non-ignorable gateway effect of drugs lower down the ‘staircase’ on the drugs higher up,” even after controlling for several other factors (Bretteville-Jensen, Melberg, & Jones, 2008, p. 25). These researchers claim that even though the gateway effect is attenuated when controlling for unobserved factors, a gateway relationship exists nonetheless, with alcohol leading to marijuana use, marijuana use leading to amphetamine use, and amphetamine use leading to cocaine use.

Comparison of theories

PBT and GT have been identified as representing polar opposites that are unable to be unified, which is why the theories have been pitted against each other in the past in an attempt to identify the superior theory (e.g., Prince van Leeuwen, Verhulst, Reijneveld, Vollebergh, Ormel, & Huizink, 2011; Vanyukov et al., 2012). However, as recognized by proponents of GT, it is quite likely that components from both theories are working together to create the behavioral outcomes (Kandel et al., 1992). Using a similar explanatory mechanism, Choo and colleagues (2008) tested the gateway sequence and its possible relationship to various other factors, including some of those explained by PBT. Through the examination of marijuana use and hard drug use, in addition to the presence of prior types of use (alcohol/tobacco prior to marijuana, marijuana prior to hard drugs, and alcohol/tobacco/marijuana prior to hard drugs), it was found that prior alcohol or tobacco users were 1.56 times more likely to use marijuana. Yet, further statistical exploration showed that this relationship did not remain once other factors were taken into account. The same effect was demonstrated for the relationship between marijuana use and subsequent use of harder drugs, which disappeared when accounting for peer effects and adult users. Therefore, for both situations (licit use predicting marijuana use and marijuana use

predicting hard drug use) there are notable sequences, but these sequences do not necessarily represent a causal progression of substance use. Rather, the influence of control variables, such as those seen in PBT, appears to be more influential.

A comparison of the gateway theory, common liability model (similar to the PBT), and route administration model for explaining substance use lend the most support to gateway theory and common liability (Prince van Leeuwen et al., 2011). Results show that either early tobacco use or early alcohol use equally predicts the later use of marijuana and that the probability of marijuana use is increased for those adolescents who engage in *both* tobacco and alcohol use. While the aforementioned finding appears to be consistent with a gateway theory, the authors claim that the increased risk for comorbid users cannot be explained entirely by this theory. As such, they prefer the common liability model that implicates the influence of several factors, including personality, family history, as well as the “proneness to deviancy” (p. 74). The gateway approach has also been criticized for implying a causal connection between various types of drug use, but failing to actually propose anything other than circular reasoning where “the stage both is identified by the drug and identifies that drug” so that “the drug is identical to the stage” (Vanyukov et al., 2012, p. 3). Further, critics claim that the typical sequence that is identified in the gateway theory is often violated and the gateway model falls short of being medically valuable because it does not move beyond simple drug use to more severe events such as dependency or addiction. More credence is found for the common liability model, due to the model’s ability to incorporate genetic evidence and apply to drug abuse and dependence in addition to drug use (Vanyukov et al., 2012). Therefore, while the authors do not necessarily find the gateway theory to be incorrect, they find it to be redundant with more comprehensive models that take various other factors into account.

Applying Theories of Problem Behaviors to Gambling

The upcoming reclassification of pathological gambling to substance-related disorders gives rise to questions regarding the applicability of theories like PBT and the GT to problem gambling behaviors. PBT originally focused on a discrete set of problem behaviors, including drinking, marijuana use, delinquent behavior, and sexual intercourse. This set has since been extended, as seen with the Willoughby et al. (2004) study, to include other types of problem behaviors seen in adolescence, including tobacco use, a more extensive list of sexual activity, and gambling. Previous research has suggested that PBT should incorporate gambling problems because it could have important implications for the treatment and prevention of gambling problems in adolescents (Dickson, Derevensky, & Gupta, 2002) and qualitative data from multi-cultural focus groups indicates that individuals recognize the importance of PBT components, such as demographics, socialization, personality, and perceived environment, on their personal gambling behaviors (Zangeneh, Mann, McCreadym, & Oseni, 2009). In relation to other problem behaviors, gambling activity has been shown to have significant relationships with sexual activity, substance use, and criminal activity. In particular, research has shown that scores on the South Oaks Gambling Screen (SOGS; Lesieur & Blume, 1987) predict riskier sexual activities (i.e., more partners, sex for money, and anal sex) and there is a compounding effect with substance abuse, such that those individual who simultaneously displayed both lifetime problem gambling and substance use had larger overall scores on a measure of risky sexual activity (Petry, 2000). The relationship with substance use and adolescent gambling has been further substantiated in several studies, as well as the relationship between gambling and deviant behaviors (Barnes, Welte, Hoffman, & Dintcheff, 2005; Griffiths & Sutherland, 1998; Winters et al., 2002). Based upon these types of relationships, the incorporation of gambling into models of

other adolescent problem behaviors seems like a reasonable step to make, but some studies indicate that gambling may not fit neatly into the PBT framework.

While LeBlanc and Bouthillier's (2003) model originally included gambling behavior, it was omitted from the model because it did not have a high enough factor loading. As such, while the authors find support for a general construct of deviance, gambling behavior is *not* represented in this model. Additionally, in Willoughby et al.'s (2003) 3-factor model of problem syndrome, gambling activity did not have a high loading on *any* of the factors. However, because the model fit equally well when including the gambling component in the delinquency factor, the authors chose to incorporate it in this manner. They explored the connection between gambling and other problem behaviors more extensively by computing relative risk percentages based upon the participants' assigned status of no involvement, some involvement, or high-risk involvement in each problem behavior. Gambling involvement was assessed using the frequency of gambling as well as a subset of six items from the South Oaks Gambling Screen—Revised for Adolescents (SOGS-RA; Winters, Stinchfield, & Fulkerson, 1993) that reflect gambling consequences. In order to achieve a status of no involvement, participants must have abstained completely from gambling activity, and as such, 48% of the sample fit this status. An almost identical number of participants were identified as having some involvement in gambling (48%) by experiencing one or two of the gambling consequences, while 5% were identified as high-risk gamblers by experiencing three or more of the consequences. Taking all of the problem behaviors into account, the participants having some involvement with gambling were quite common, second only to the 49% of participants who classified as having some involvement with alcohol. Interestingly, with only 5% of participants meeting the criteria for high-risk status, gambling simultaneously represents the *least* endorsed high-risk behavior. Due to the low base rates of

high-risk gambling involvement, odds ratios provide the most accurate comparisons of the various behaviors between the three gambling statuses. Relative risk ratios reveal that high-risk gamblers, as compared to no gambling involvement or some gambling involvement, are more likely to also have high-risk involvement with all of the other investigated behaviors: alcohol (1.65 times more likely), smoking (2.18x), marijuana (1.90x), hard drugs (2.39x), sexual activity (3.92x), major delinquency (3.24x), minor delinquency (1.58x), direct aggression (1.83x), and indirect aggression (3.44x).

Gambling behaviors in college students have also been investigated using a PBT framework, including the proximal and distal variables contained within the perceived environment component and findings reveal that 17% of the variance in SOGS scores was accounted for by the perceived environment (Wickwire, McCausland, Whelan, & Luellen, 2008). However, this study did not explore the connection between gambling and the other problem behaviors housed within PBS. Gambling has been shown to share common predictors with substance use and delinquency, including impulsivity, lack of parental supervision, and delinquency among friends (Vitaro, Brendgen, Ladouceur, & Tremblay, 2001). While gambling variables reach significant levels, they represent the weakest of the cross correlations between different problem behaviors. The correlation between drug and alcohol use with gambling frequency at age 16 was the smallest of the cross correlations, with $r=0.16$, and the correlation between delinquency and gambling problems was the greatest of the gambling relationships, with $r= 0.29$. Comparatively, the correlation for drug and alcohol use and delinquency at age 16 was much greater ($r= 0.55$). Similar cross correlations are seen for the data at age 17. Longitudinal data from the study show that delinquency at age 16 did not predict gambling frequency or gambling problems at age 17, but drug/alcohol use at age 16 did exhibit weak

predictiveness of both gambling frequency and gambling problems, with standardized betas of .07 and .09, respectively. Gambling variables at age 16 did not predict other problem behaviors at age 17, and even exhibited comparatively weak predictive power *within* behavior. In other words, while the correlations for delinquency from age 16 and 17 and drug/alcohol use from 16 to 17 are .64 and .68, respectively, the correlation for gambling frequency for that one year age difference was .55 and the correlation for gambling problems from 16 to 17 was a mere .10. The authors conclude that the data support gambling's inclusion in PBS because "gambling shares two out of three predictors with [delinquency and substance use] which, in turn, share all three predictors" (p. 186). While the idea of gambling belonging to a PBS is a feasible one, more foundational work needs to be done before such conclusions can be drawn.

Additional research on the influence of sociodemographics, individual factors, and socialization on problem behaviors, including gambling, alcohol misuse, drug use, and delinquency, found that moral disengagement, impulsivity, and delinquency were significant predictors of both gambling and alcohol use (Barnes et al., 1999). However, the cross correlations between the other types of problem behaviors and gambling seen in these two separate samples were much smaller than the correlations between those behaviors and alcohol use, with a mean correlation of $r=0.19$ between other problem behaviors and gambling and a mean correlation of $r=.40$ between those same problem behaviors and alcohol use. Further, in additional work by the same research group, moral disengagement was the only significant predictor of gambling, and this was only for male participants (Barnes et al., 2005). As the authors state, "...gambling has fewer common predictors with other problem behaviors than might be anticipated by problem behavior theory..." and "youth gambling may have some unique predictors, such as availability of gambling opportunities, in addition to the common

predictors of the other problem behaviors” (p. 172). This is further supported by additional work, which challenges the idea of a universal PBS and suggests that it is necessary to pay more attention to different subgroups of adolescents that vary according to the degree to which they engage in problem behaviors (Sullivan, Childs, & O’Connell, 2010). Looking at all participants collectively, the cross-correlations vary between the different types of behaviors, but again, gambling activity has some of the weakest correlations with other problem behaviors. While still reaching significant levels, the weakest of the correlations occur between gambling and condom use and smoking, both with $r_s = 0.13$. The greatest cross-behavior correlation for gambling is with getting into fights ($r = 0.33$).

Through the use of latent class analysis, Sullivan et al. (2010) identified four unique groups of adolescents with different levels of risk regarding substance use and other problem behaviors: non-sexually active high risk behavior youth (5% of sample), abstainers (36% of sample), experimenters (36% of sample), and high, diverse risk behavior youth (22% of sample). Those participants reporting no gambling involvement steadily decreased from abstainers (56% reporting no gambling), to experimenters (49% reporting no gambling), to non-sexually active high risk youth (42% reporting no gambling), and finally to high diverse risk behavior (31% reporting no gambling). Of all the problem behaviors, gambling had the highest percentage of involvement from those who otherwise abstain from problem behaviors. Nearly 44% of abstainers participated in gambling activity during the last year, compared with the less than 5% of the same group who report using alcohol, using marijuana, smoking cigarettes, or having sex. This lends support to the idea that gambling may be among the least discouraged problem behaviors by parents, which might lead to greater involvement during adolescence (Barnes et al., 2005), and that gambling may represent a unique type of problem behavior that does not conform

well with theories of problem behavior in adolescence. The influence of gambling severity on problem behaviors, as opposed to simply gambling involvement or frequency, may also prove to be an important factor to consider, as research has indicated that early predictors of gambling involvement may differ between at-risk gamblers and problem gamblers (Winters et al., 2002).

Methodological Considerations

Efforts in the past to incorporate gambling into more comprehensive models of problem behavior have been rather unsuccessful, but this might be a reflection of methodological shortcomings, including things such as poor measures of gambling involvement, outdated data, and underrepresented populations.

Questionable Measures of Gambling. Most commonly, the frequency of gambling and the diversity of gambling types were used to assess gambling involvement for participants (e.g., Barnes et al., 1999/2005; Griffiths & Sutherland, 1998; Sullivan et al., 2010; Willoughby et al., 2004). While this approach is informative to some degree, it does not necessarily represent *problem* gambling behavior, which should be the focus in studies of problem behavior. Further, the work from Zangeneh and colleagues (2009) utilizes a focus group method, and therefore does not have a specific measure of gambling severity, and the work by LeBlanc and Bouthillier (2003) does not actually state how they measured gambling in their adjudicated sample. In addition to frequency information, the SOGS or the SOGS-RA (for use in adolescent samples) was used in other studies (Viatro et al., 2001; Wickwire et al., 2008; Winters et al., 2002). Even though the SOGS is a widely-used screening instrument, it is not based upon DSM criteria for pathological gambling and it has been criticized for various reasons, such as high false positive rates in the general population (Stinchfield, 2002). Further, other measures have been shown to be superior screening instruments for gambling severity (Fortune & Goodie, 2010).

Outdated Data. Some of the most compelling data investigating the relationship between gambling and other problem behaviors comes from the longitudinal studies of Barnes and colleagues in 2005, Vitaro and colleagues in 2001, and Winters and colleagues in 2002. While the publication dates themselves are not outdated, the data gathered from the participants during their adolescent years correspond to a time period during the early 1990s. This is also the case for LeBlanc and Bouthillier (2003), whose sample consisted of adjudicated adolescents who were in the legal system between 1992 and 1993. In Winter et al.'s (2002) study, the longitudinal data reflects three time points between 1990 and 1998. The fact that the data from these longitudinal studies is between one and two decades old is problematic due to the fact that the gambling is a dynamic activity that has been greatly influenced by advances in technology and as such the studies cited here may not have data that accurately represents the current state of adolescent gambling behaviors.

Underrepresented populations. While some of the longitudinal studies represent multiple times points reflecting a wide age range, most research in this area focuses on early adolescent samples. The focus is intended to be on problem behaviors during adolescence, but late adolescence does occur during college and only one study takes advantage of the use of a college-aged research pool (Wickwire et al., 2008). Further, it can be expected that a wider range of risky experiences will have cumulatively occurred by late adolescence, particularly when positing a discrete timeline, than during earlier adolescence, which leaves room for a diverse data set that better reflects the totality of adolescence, along with the potential for more powerful statistical comparisons.

Current Direction

The current studies aim to take a more in-depth look at the sequence of risky behaviors, by incorporating gambling behaviors, substance use (including tobacco, alcohol, and drugs), sexual activity, and deviant acts. LeBlanc and Bouthillier (2003) indicate that “general deviance syndrome appears as the co-occurrence of various deviant behaviors at a specific point during the life course, but also as a sequence of initiations of different deviant behaviors” (p. 101-102). This is an important point that needs to be more thoroughly explored, especially as it applies to the connection between substance addictions and the newest affiliate of the addiction inventory, pathological gambling. As such, Study 1 and Study 2 serve to establish the covariance of problem behaviors, including substance use, deviant acts, and sexual activity, with gambling behaviors. In doing so, these two studies will simultaneously address the methodological considerations regarding questionable measures of gambling, outdated data, and underrepresented populations, observed in the current body of literature.

Additionally, Study 3 will serve to establish a timeline of problem behaviors, which builds upon the timeline approach utilized by the GT, but extends beyond substance use to incorporate all of the problem behaviors with established covariance. Although timeline analysis was not the central focus of LeBlanc and Bouthillier’s (2003) study, their data can be used to create a timeline of problem behaviors based upon the mean age of onset reported for various behaviors (see Figure 1). While this timeline is more comprehensive than a standard GT timeline, it is still not comprehensive enough; the categories of sexual activity, soft drugs, and hard drugs can be further divided to give a more detailed look at the progression of problem behaviors across categories. In addition, due to the difficulty of neatly incorporating gambling into broad models such as general deviance syndrome or PBT, more careful consideration should

be given to where gambling falls in a comprehensive timeline of problem behaviors. Based upon the exploratory data collected during Study 1 and Study 2, specific hypotheses regarding covariance and timeline progression are outlined before the description of Study 3.

CHAPTER 2

STUDY 1 AND STUDY 2: ESTABLISHING COVARIANCE

Two exploratory studies have been conducted, one with a community sample of frequent gamblers and one with an undergraduate research pool, which inform and suggest feasibility of the timeline data to be collected in Study 3.

Study 1: Method

The first sample (n=354) was comprised of frequent gamblers from the community of Athens, GA with a mean age of 35.4 (12.3). In addition to demographic information, information was sought regarding their gambling, drinking, smoking, and sexual behaviors.

Diagnostic Interview for Gambling Severity (DIGS; Winters, Specker, & Stinchfield, 1996). This semi-structured clinical interview is based on the 10 DSM-IV diagnostic criteria for PG. The 20 items are paraphrased directly from the DSM-IV criteria, with 2 items for each criterion, grouped into pairs to reflect the dichotomous nature of the 10 criteria. Following a face-to-face interview, a trained interviewer determined whether each item was *false*, *somewhat true*, or *very true*, based upon the participants' responses. Within each of the item pairs, two classifications of *somewhat true* or at least one answer of *very true* resulted in the participant receiving a point. The total score was assessed on a scale of 1 to 10, with a score of 5 or higher indicating pathological gambling status. Administration of the DIGS probes specific gambling modalities including playing cards, betting on sporting events, playing the lottery and playing slot machines, but it does not mandate that gambling-related problems be restricted to these forms of gambling. Participants reported engaging in a wide range of gambling activities, including lottery play, cards, dice, sports betting and internet gaming.

Alcohol Use Disorders Identification Test (AUDIT; Saunders, Aasland, Babor, de la Fuente, & Grant, 1993). This 10-item assessment addresses the frequency, amount, and possible consequences of alcohol consumption. Total scores can range from 0 to 40 with a score of 8 or higher indicating hazardous drinking.

Fagerstrom Test for Nicotine Dependence (FTND; Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991). The FTND was used to assess nicotine dependence by assigning a nicotine rating from 1 to 10, as based on particular smoking behaviors that individuals endorse. The FTND has been shown to have good convergent validity with various biochemical measures of smoking, including cotinine and nicotine in saliva (Heatherton et al., 1991).

Lifestyle choices. Additional questions regarding a variety of behaviors and lifestyle choices were assessed, including drug use, deviant behavior, and sexual activity. With regard to drug use, participants were asked about the types of drugs that they have used in the past as well as their frequency of use. Frequency of use for each substance was reported for the last 3 months as well as for the participants' heaviest period use, but only the frequency for the last 3 months is included in the current study. In addition to the age of first sexual intercourse and the number of sexual partners, sexual items focused on risky sexual acts, including having sex with strangers, having unprotected sex, being unfaithful to a partner, having an STD, and having abortions. Lastly, deviant behavior items incorporated in the current paper include being involved in physical fights and being arrested.

Study 1: Results

Substance use and gambling. Significant correlations were found between DIGS scores ($M=4.12$; $SD=3.0$) and AUDIT scores ($M=10.19$, $SD=8.55$; $r=0.18$, $p<.001$) and DIGS scores and FTND scores ($M=3.62$, $SD=4.49$; $r=0.23$, $p<.001$; see Table 1). No significant correlations

were found between the frequency of marijuana use during the last 3 months on a 4-point scale (1=monthly or less; 2=weekly; 3=daily; 4=multiple times daily) and DIGS, AUDIT, or FTND scores.

Sexual Activity. Some sexual activity items in the free-response format required transformation due to highly variable response sets: Three variables, including the age of first intercourse, total number of sexual partners, and partners known less than 24 hours, were log transformed. Significant bivariate correlations were found between gambling severity scores and the age of first intercourse ($r=-0.18$), the total number of sexual partners ($r=0.19$), and the number of sexual partners who the individual has known for less than 24 hours ($r=0.16$).

Deviant behavior. Significant correlations were found between the two deviant behavior variables (getting into physical fights and being arrested) with certain types of sexual activity, drinking, and smoking (see Table 1). No significant correlations were found between deviant behavior variables and drug use.

Study 2: Method

The sample ($n=387$) was comprised of college students who were primarily female (74.9%) and Caucasian (73.6%) with a mean age of 19.4 (1.8) from a research pool at the University of Georgia, who received partial course credit in exchange for their participation. Mostly identical measures from the community sample were used, including the DIGS, AUDIT, FTND, and lifestyle choices questionnaire. DIGS was not administered in a face-to-face format, but in a computerized format, which has been validated in previous college samples (Fortune & Goodie, 2010).

Study 2: Results

Substance use and gambling. Significant correlations between DIGS scores ($M=0.50$; $SD=1.37$) and AUDIT scores ($M=4.57$; $SD=5.01$) were found ($r=0.21$, $p<.001$; see Table 2). The dichotomous variable reflecting whether or not participants smoke (0=No and 1=Yes) revealed significant point-biserial correlations between tobacco use and DIGS scores ($r=.21$, $p<.001$) and AUDIT scores ($r=.29$, $p<.001$), indicating that those who smoke tobacco are more likely to gamble and more likely to drink alcohol. The small number of tobacco users in this sample ($n=33$) made it difficult to examine correlations between total FTND scores and other variables.

Significant correlations were also found between the frequency of marijuana use during the last 3 months and AUDIT scores ($r=.22$, $p<.01$), smoking ($r=.27$, $p<.001$), and DIGS scores ($r=.16$, $p<.05$). The next two most commonly used drugs, cocaine ($n=20$) and painkillers ($n=39$), also showed significant correlations with the frequency of use during the last 3 months and the other variables of interest (see Table 2). The number of participants who used additional types of drugs (methamphetamines, LSD, ecstasy, heroin, or opium) was so minuscule (i.e., less than 20 people for each substance) that statistical analyses of these substances are impracticable.

Sexual activity. Various significant correlations are found between several of the sexual variables and drinking, smoking, and gambling (see Table 2). These variables include the age of first intercourse ($M=16.7$, $SD=1.8$), number of sexual partners ($M=3.3$, $SD=3.5$), number of sexual partners known for less than 24 hours, condom use, and cheating on a partner. The correlations involving sexual activity are limited to individuals who reported having sexual intercourse at least once in the past ($n=214$). Two sexual variables were excluded from analyses,

having an STD ($n=7$) and having an abortion ($n=4$), because the number of participants endorsing these activities were too small to allow for statistical interpretation.

Deviant behavior. Two variables that were investigated included the dichotomous variables of being in a physical fight with someone else ($n=49$) and being arrested ($n=23$). Significant correlations were found between these two variables and sexual variables (see Table 1). Additionally, fighting and being arrested was also significantly correlated with AUDIT scores ($r=.20$ and $r=.28$, $p<.001$, respectively) and DIGS scores ($r=.12$ and $r=.16$, $p<.05$, respectively).

Study 1 and Study 2: Discussion

The results from both Study 1 and Study 2, while exhibiting some minor differences, adhere overall to the idea that gambling is associated with other types of risky behaviors, including those related to substance use, sexual activity, and deviant behavior. Results indicate that both adults from the community and older adolescents in college exhibit significant relationships between gambling activity and the use of alcohol and tobacco. While the frequency of marijuana use and painkillers during the last 3 months was not associated with gambling activity in adults, a significant relationship was observed in the older adolescents. Examination of additional drug use (i.e., methamphetamines, LSD, painkillers, ecstasy) was also limited by the infrequent use of the substances. With regard to sexual activity, both adults and older adolescents exhibit significant relationships between gambling activity and (1) the total number of sexual partners and (2) the total number of partners known for less than 24 hours. While the adults in Study 1 also had a significant relationship between gambling and the age of first intercourse and the frequency of cheating on a partner, Study 2 does not replicate these findings. Further, while adults did not show a relationship between gambling activity and condom use,

data from Study 2 support the association between gambling severity and less frequent condom use in older adolescents. Lastly, while both adults and older adolescents show significant relationships between gambling severity and getting arrested, being involved in physical fights was only significantly associated with gambling severity in the older-adolescent sample.

CHAPTER 3

STUDY 3: TIMELINE DATA

The slight inconsistencies observed between the results in Study 1 and Study 2 are likely due to the age differences between the two samples (35 years old vs. 19 years old). At nearly twice the average age of the college students, the adult sample in Study 1 has had more time, and therefore more opportunity, to have experience with various substances and sexual situations. The fact that nearly half of the sample in Study 2 has abstained from sexual activity thus far and an even larger percentage has abstained from illicit drug use potentially hinders the ability to reveal certain relationships. Because the older-adolescent sample was less likely than the adult sample to take part in certain activities, it can be assumed that age of onset of various activities might play a substantial role in participation. As temporal data was not collected during Study 1 or Study 2, the age of onset of the various activities cannot be compared. Therefore, the goal of Study 3 was to further explore the relationships among the various activities, with a specific focus on the temporal progression of these activities in an older-adolescent sample.

Based up on the data from Studies 1 and 2 and previous literature in the field, hypotheses include the following:

- (1) A temporal sequence will be observed for other problem behaviors so that
 - a. Sexual activity precedes gambling
 - b. Gambling precedes criminal activity (i.e., getting arrested)
- (2) A relationship will be observed between the temporal sequences and gambling severity, such that the sequence contains a more diverse set of problem behaviors and is accelerated for more severe gamblers.

- (3) Significant correlations will be observed among the various problem behaviors, including
- a. Positive relationships between gambling and substance use
 - b. Positive relationships between gambling and sexual activity
 - c. Positive relationships between gambling and criminal activity
 - d. Positive relationships among types of substance use (tobacco, alcohol, drugs)
- (4) Temporal regularities will be observed that are consistent with prior substance use literature, such that the age of onset for
- a. Tobacco use will be younger and more common than that of alcohol use
 - b. Alcohol use will be younger and more common than that of marijuana use
 - c. Marijuana use will be younger and more common than that of hard drug use

Because the previously discussed data originating from the research pool participants display an average significant correlation of $r=.36$, which corresponds to an effect size between 0.7 and 0.8, a power analysis based on the proposed statistical procedures indicated that a minimum of 128 participants should be sought in order to have a conservative effect size of 0.5 and a statistical power of 0.8 with an alpha level of 0.05 (Soper, 2012).

Method

Participants. Participants included 570 undergraduates from the Psychology Research Pool at the University of Georgia (59.6% female) with a mean age of 19.11 (1.89). The majority of participants self-identified as White ($n=435$), Black ($n=51$), or Asian ($n=59$), and 22 participants were of Hispanic ethnicity. At the start of data collection, no inclusion criteria were implemented. However, after collecting data from 462 participants and procuring only a small percentage of participants in the sample who gamble, the inclusion criteria were changed to the

following: “Individuals participating in this experiment MUST BE frequent gamblers, meaning that you gamble at least once a week or more. All gambling types are acceptable (e.g., lottery, cards, sports betting, etc.).” An independent samples *t*-test indicates that the participants recruited after the implementation of the inclusion criteria were in fact more likely to gamble, as reflected by significantly higher DIGS scores observed for the post-inclusion sample ($M=2.47$; $SD=2.81$) as compared to the pre-inclusion sample ($M=0.66$, $SD=1.61$; $t=6.45$, $p<.001$).

Procedure. Participants completed a series of questionnaires on the computer using the MediaLab software program during a 2-hour experiment session. In addition to demographic information, participants completed questionnaires focusing on the problem behaviors of interest. These included measures previously described for Studies 1 and 2:

- *Diagnostic Interview for Gambling Severity-Screen (DIGS-S)*
- *South Oaks Gambling Screen (SOGS)*
- *Alcohol Use Disorders Identification Test (AUDIT)*
- *Fagerstrom Test for Nicotine Dependence (FTND)*

In addition to these previously used measures, a questionnaire was administered that requested data regarding sexual activity and deviant behaviors, which replaced the previous questions from Study 1 and Study 2 related to these variables. This measure, the *Participation in Risky Activities Questionnaire (PRAQ)*, also contained questions regarding the age of onset for each activity so that a general timeline of events could be established (see Appendix).

Statistical Analyses. Bivariate correlations are calculated between all problem behaviors. In addition, a general timeline of risky behaviors is generated by taking the mean age of onset for all individuals who participate in a given behavior. Separate timelines are also created for gamblers and nongamblers so that latency periods between each pair of activities can be

compared for gamblers and nongamblers using *t*-tests. The evaluation of latency periods is a method used by other researchers when comparing differences in the temporal sequence between two groups, such as gender differences in gambling (e.g., Tavares et al., 2003) and the progression of alcohol use (Johnson, Richter, Kleber, McLellan, & Carise, 2005).

Results

Due to missing data, analyses are based upon a total of 546 participants. The overall results are presented for this sample of 546 participants, while the comparative results regarding gambling activity are based upon the dichotomized samples of gamblers ($n=187$) versus nongamblers ($n=359$), as determined by Item 1 under Gambling Activity from the PRAQ asking, “Do you ever gamble?”

Hypothesis 1, indicating that a temporal sequence will be observed for problem behaviors so that (a) sexual activity precedes gambling and (b) gambling precedes criminal activity (i.e., getting arrested), was only partially supported. While gambling activity did precede the criminal activity of getting arrested ($n=28$), with a mean difference of 1.9 years, gambling activity also preceded any type of sexual activity (see Table 3). The earliest type of sexual activity that gamblers engaged in was oral sex ($n=145$), with a mean age of onset of 16.4 years old, which occurred 0.6 years *after* the earliest type of gambling activity at 15.8 years old.

Hypothesis 2 states that a relationship will be observed between the temporal sequences and gambling severity, such that the sequence contains a more diverse set of problem behaviors and is accelerated for more severe gamblers. Comparisons of participation in the various problem behaviors based upon gambling involvement using X^2 analyses (in order to compare two categorical variables) reveal that a significantly larger percentage of the gambling sample participate in all other problem behaviors than the nongambling sample (see Table 4). When

further dividing the gamblers into three categories based upon gambling severity, as determined by the DIGS (nonproblem gambler=DIGS scores 0-2; possible problem gambler=DIGS scores 3-4; problem gamblers=DIGS scores 5-10), there are no significant differences in the percentages of each gambling group who participate in each of the other problem behaviors.

In order to examine the acceleration of problem behaviors, results are based upon two approaches. Firstly, the age of onset for each problem behavior was compared between gamblers and nongamblers using *t*-tests. Both groups, regardless of the presence or absence of gambling participation, follow a nearly identical timeline of behaviors. That is, the order of problem behaviors for gamblers and nongamblers follows a similar pattern, which allows for simple comparisons of when each particular type of behavior commenced each group and speaks to the acceleration of behaviors between groups. As shown in Table 3, there are very few significant differences found between the gamblers' and nongamblers' ages of onset for various activities. Only three notable differences are apparent: (1) age of onset for alcohol use occurred at an earlier age for gamblers ($M=15.7$, $SD=2.1$) than for nongamblers ($M=16.2$, $SD=1.9$; $t=2.34$, $p<.05$), (2) age of onset for tobacco use occurred at an earlier age for gamblers ($M=16.1$, $SD=2.0$) than for nongamblers ($M=16.6$, $SD=1.9$; $t=1.968$, $p<.05$) and (3) there was a trend for the age of first sexual intercourse, such that gamblers ($M=16.8$; $SD=1.49$) had sex at a slightly earlier age than nongamblers ($M=17.1$, $SD=1.53$; $t=1.870$, $p=.06$).

Secondly, latency periods between problem behaviors are examined between gamblers and nongamblers by looking at the difference in age of onset between each behavior and the one that immediately precedes that behavior, within each problem behavior category. For example, for the category of sexual activity, there are three behaviors included that occur in a certain sequence: oral sex (1st in the timeline for sexual activity), intercourse (2nd), and anal sex (3rd). In

order to be included in a latency period analysis, a participant must have engaged in *both* activities for that latency period. When comparing the latency periods for different types of sexual activity (1st to 2nd and then 2nd to 3rd), no significant differences are found between nongamblers and gamblers (see Table 5). For the category of deviance, only two behaviors are included: physical fights and getting arrested. There is a significant difference observed between gamblers and nongamblers in this category in the opposite direction than predicted (i.e., nongamblers having a shorter latency period between activity 1 and activity 2), but because this type of latency analysis required that individuals participate in both activities to be included, the small *n* for each group limits interpretation.

Lastly, for the category of substance use, seven substances are included in latency analysis (tobacco, alcohol, marijuana, prescription meds, hallucinogens, cocaine, and ecstasy) and two are excluded (methamphetamines and heroin) due to rare use. With the latency analysis the *type* of problem behavior is not as important as the time it takes each group to progress from one problem behavior to the next, which allows us to investigate latencies despite the fact that there are slight differences in progression (e.g., prescription drug use precedes marijuana use for nongamblers but comes subsequently for gamblers). The variations in timeline position and latency categories for gamblers and nongamblers are further explained in Table 5. Results indicate that gamblers are significantly faster to progress to progress in certain substance use latency periods (2-3 and 4-5), but not in the majority of the latency periods. In other words, the average time between the age of onset for gamblers to progress from the second substance in their sequence (tobacco) to the third substance in their sequence (marijuana) is a significantly shorter amount of time than it takes nongamblers to progress from the second substance in their sequence (tobacco) to the third substance in their sequence (prescription medication), with a

latency for gamblers of 0.63 years and a latency for nongamblers of 1.67 years ($t=2.15, p<.05$). The other significant latency difference occurred between substances four and five, representing movement from marijuana to hallucinogens for nongamblers (1.93 years) and from prescription medication to hallucinogens for gamblers (0.21 years; $t=2.56, p<.05$), but the small sample for each group in this latency period ($ns=12$ and 7, respectively) again limits interpretation.

Assessment of the average latency period across the three categories indicates that gamblers have an overall latency period that is nearly identical to that of nongamblers (1.12 years vs. 1.13 years), meaning that they are not overall likely to progress more quickly from one problem behavior to the next. If looking only at the progression in the substance use category, where the most substantial latency period differences existed, gamblers have an average latency period that is nearly half that of nongamblers (.57 years vs. 1.10 years).

Hypothesis 3 addressed the expected correlations between the various types of problem behaviors, indicating that there should be (a) positive relationships between gambling and substance use, (b) positive relationships between gambling and sexual activity, (c) positive relationships between gambling and criminal activity, and (d) positive relationships among types of substance use (tobacco, alcohol, drugs). Correlations support each of these predictions to varying degrees, as noted below:

- (a) There are positive correlations observed between DIGS scores and AUDIT ($r=.26, p<.001$) and FTND ($r=.16, p<.001$) scores (see Table 6). Further, there are significant point biserial correlations between DIGS scores and the dichotomized variables (yes/no) of ever using marijuana ($r=.17, p<.001$), unprescribed prescription medications ($r=.33, p<.01$), ecstasy ($r=.13, p<.01$), or cocaine ($r=.16, p<.001$).

- (b) While DIGS scores did not significantly correlate with age of onset of various sexual activities or risky sexual variables related to condom use, STDs, or pregnancy, positive relationships are observed between DIGS scores and the number of people those individuals hooked up with whom they had known for less than 24 hrs ($r=.13, p<.01$), the number of people those individuals had sex with (oral, vaginal, or anal) whom they had known for less than 24 hrs ($r=.17, p<.001$), and the number of times they cheated on a partner while in a monogamous relationship ($r=.11, p<.01$).
- (c) DIGS scores show a positive correlation with both dichotomous variables of being involved in a physical fight and being arrested ($r= .18$ and $.17$, respectively, $ps<.001$).
- (d) As predicted, positive relationships exist between the various types of substance use (see Table 7). While alcohol and tobacco dependence are assessed by the AUDIT and FTND, respectively, the other substances are presented dichotomously (Yes/No). The correlations between substances range between $r=.22$ (ecstasy and tobacco) to $r=.51$ (ecstasy and cocaine), with an average cross-substance correlation of $r=.31$. These data exclude both methamphetamine and heroin use due to the small number of participants ($n=2$ for both) admitting use of these substances. Correlations between hallucinogens and other substances do not reach significance, also likely due to the small number of participants overall ($n=39$) using this category of substances.

Hypothesis 4 indicated that temporal regularities will be observed that are consistent with prior substance use literature. The temporal progression of behaviors is depicted in Figure 2, for the sample as a whole and for gamblers and nongamblers separately, and temporal progressions are compared in Table 8.

- (a) Tobacco use will be younger and more common than that of alcohol use: The use of alcohol was actually more common than tobacco use for both nongamblers (77.3% used alcohol compared to 35.2% who used tobacco) and gamblers (88.7% used alcohol compared to 60.8% who used tobacco), as shown in Table 4. Also inconsistent with predictions, the age of onset for alcohol use was significantly earlier than the age of onset for tobacco use for the entire sample (see Table 8).
- (b) Alcohol use will be younger and more common than that of marijuana use: Both gamblers and nongamblers support the notion that alcohol use is more common than marijuana use (36.0% of nongamblers and 59.7% of gamblers used marijuana) and both groups also exhibit the predicted temporal pattern of alcohol use significantly preceding marijuana use.
- (c) Marijuana use will be younger and more common than that of hard drug use: Marijuana use was more common than any harder drug use for both gamblers and nongamblers (refer back to Table 4). The paired samples t-tests for age of onset also indicate that the age of onset for marijuana use occurs significantly earlier than the age of onset for harder drugs.

CHAPTER 4

GENERAL DISCUSSION

Studies 1-3 helped to substantiate the relationship between gambling and other risky behaviors, using a more valid measure of gambling severity (i.e., the DIGS) and using both a current adult-aged sample (Study 1) and older-adolescent samples (Study 2 and 3). The strongest significant correlations for gambling activity appear to be somewhat consistent across the three studies, with the DIGS showing the greatest correlations with various types of substance use. The rank order of magnitude of these significant correlations does, however, vary between studies. For Study 1, the DIGS was most significantly related to cocaine use, followed by tobacco use, and then alcohol. For both Study 2 and Study 3, alcohol use had the greatest relationship with the DIGS, followed by marijuana and then tobacco. While no additional significant correlations were found for Study 2, smaller significant relationships were also seen between gambling and cocaine use, ecstasy use, and prescription medication use in Study 3. The differences observed here between the magnitudes of the correlations is likely attributable to (1) age differences and (2) sample size differences. The fact that Study 1 participants had a distinct difference from Studies 2 and 3, in that they showed the greatest DIGS relationship with cocaine use as opposed to alcohol, is most likely a reflection of the age of the samples. The additional significant correlations between the DIGS and substance use in Study 3, as compared to the similarly-aged Sample 2, are likely a reflection of more statistical power due to a larger overall sample size.

In the sexual activity category, age-related sample differences are also apparent. While the age of first intercourse was significantly related to the DIGS for Study 1, that same result is

not found for Studies 2 or 3. Further investigation of age-related sexual activity in Study 3 shows that the DIGS did not have a significant relationship with the age of onset for any type of sexual activity (oral, intercourse, anal). Some inconsistencies are also seen between Study 2 and Study 3 in the sexual activity category (i.e., previously insignificant relationships in Study 2 with variables regarding cheating and STDs were significant and trending, respectively, for Study 3), but these are again likely due in part to the increase in sample size for Study 3. The variables within the deviance category, on the other hand, show significant relationships with the DIGS in both Study 2 and 3. As the meta-analysis by Guilamo-Ramos and colleagues (2005) suggested that adult samples exhibit higher average correlations between problem behaviors than adolescent samples, a larger average correlation between problem behaviors might be expected for Sample 1 when compared to Samples 2 and 3. Interestingly, the average overall correlation for Sample 1 is identical to that for Sample 3 ($r=.16$), and the average overall correlation for Sample 2 is slightly higher ($r=.25$). If comparing the average correlation between only gambling and other problem behaviors in each sample (contained in Column 1 for each correlation matrix) as opposed to all problem behaviors in each sample, gambling-related average correlations are consistently smaller by comparison (Sample 1: $r=.13$, Sample 2: $r=.19$; Sample 3: $r=.11$). This finding is consistent with the idea that gambling might be a unique type of problem behavior, and while it is related to other problem behaviors, it is not to the same magnitude.

Surprisingly, as shown by Study 3, the progression of risky behaviors seen in gamblers is incredibly similar to the progression seen in nongamblers. Outside of small timeline variations in the order of progression and differences in the initial age of onset (e.g. significant differences for tobacco and alcohol use and trending for age of first intercourse), there are three notable differences between gamblers and nongamblers: (1) Gamblers are more likely to participate in

risky activities than nongamblers, (2) the average latency period between substances was smaller for gamblers than for nongamblers, and (3) gambling activity precedes participation in most other risky activities.

Even though there were comparatively fewer gamblers than nongamblers in Study 3, X^2 analyses reveal that gambling category (yes/no) is significantly related to greater participation in all other risky activities, excluding methamphetamine and heroin use. Interestingly, once gambling severity was taken into account, there were no statistical differences between the problem behaviors of participants scoring at various ranges of the DIGS, as depicted in Table 4. In other words, the X^2 analyses indicate that the three levels of gambling severity have no impact on whether or not individuals participate in the other forms of problem behaviors; a pathological gambler with a DIGS score of 5 or higher is no more likely than a gambler with a DIGS score between 0 and 2 to participate in various sexual acts, deviant acts, or substance use. These findings suggest that there might be something distinctive about those who gamble versus those who do not, regardless of the *degree* to which they gamble, which again lends support to previous work showing that gambling is a unique behavior that does not neatly fit into pre-existing theories of problem behaviors.

The shorter average latency period for substance use for gamblers is consistent with predictions and supports the notion that those who gamble might feel more urgency to “increase the stakes” in order to get the same pleasure from activities. This progression, however, also appears to have its limits since the individual latency periods are only significantly different between gamblers and nongamblers for two of the intervals (the progression of use from substance 2 to substance 3 and the progression from substance 4 to substance 5). The small number of individuals from Study 3 admitting to using these substances, in addition to the nearly

nonexistent use of methamphetamines and heroin, seriously hinder the ability to analyze the latency periods more in-depth. Because so few participants used the more illicit drugs (including hallucinogens, cocaine, ecstasy, methamphetamines, and heroin), there is very little statistical power to detect differences between groups. Additionally, there were no latency differences for sexual activity and the latency differences for deviant behaviors were in the opposite direction than predicted, with nongamblers showing a smaller latency period between physical fighting and getting arrested than gamblers. As such, this area needs to be further explored, ideally with a higher-risk sample in order to justify more concrete conclusions.

Lastly, the fact that gambling activity preceded most other investigated problem behaviors (excluding being involved in physical fights and drinking alcohol) is not necessarily what the data from LeBlanc and Bouthillier's (2003) study would indicate, as their data suggest that soft drug use and sexual activity are a prelude to gambling involvement. It is possible that the differences in onset are due to the types of samples being used (a younger adolescent, adjudicated sample vs. an older-adolescent, college sample) or are more simply a reflection of the changes that might have occurred in relation to gambling during the last decade. It is possible that gambling is more accessible than other activities or substances, especially with the increase in internet gambling during the last decade. It is relatively easy for someone underage to indicate that he/she is of legal age in order to participate in online gambling; it has recently been found that nearly 70% of individuals under the age of 21 claimed to gamble during the previous year and 52.5% of girls and 72% of boys between the ages of 14 and 17 claimed to gamble (Welte, Barnes, Tidwell, & Hoffman, 2008).

Another potential catalyst for the earlier onset of gambling activity is the comparative lack of parental disapproval or supervision of such activity. Parents typically try to dissuade their

children from smoking, drinking, using drugs, or having sexual relations at an early age, most likely due to their own experiences with these behaviors during adolescence and the ever increasing awareness of the dangers of participating in such activities. Gambling, on the other hand, is often times a risky behavior that parents are not aware that they need to monitor or warn their children against, or one that they think that do not feel is *necessary* to warn against as previously suggested by others in the gambling research field (Barnes et al., 2005). It was not until very recently that the dangers of gambling were brought into the public spotlight. Now it is much more common to find gambling awareness campaigns focused on gambling activity during college or in areas surrounding large gambling hubs, like Las Vegas or Atlantic City, but the results of the current work suggest that perhaps greater effort should be made to increase awareness during early adolescence because gambling appears to begin early on in the timeline and to precede other problem behaviors.

Perhaps the most startling finding for the group as a whole was the more common use of alcohol than tobacco and the earlier age of onset for alcohol use than for tobacco use. As tobacco has typically been viewed as the “gateway drug” since Kandel’s model was proposed in the 1970s, it is surprising to see that now alcohol might be more appropriately labeled as such. This notable change in tobacco use is one that might be attributable to the growing knowledge regarding the harmful effects of smoking and the increase in anti-tobacco campaigns during the last couple of decades. While the health consequences of alcohol use can be just as harmful as those of tobacco use, the younger population is likely to be able to identify the hallmark health consequence of smoking (i.e., lung cancer) and perhaps not be able to identify the equivalent for drinking. Also, while smoking has been completely prohibited in several public venues, such as restaurants, airports, and college campuses, alcohol use is typically permitted as long as the

individual is of legal age. In this way, alcohol use may actually appear to be more permissible to older adolescents than tobacco use.

Limitations

There are limitations of the current study to consider. The quality of the data regarding the age of onset might be questionable for a few reasons. First, all of these data were collected retrospectively, meaning that the participant might have unknowingly provided inaccurate responses. Typically when retrospectively reporting the timeframe of behaviors, participants estimate an age that is closer to their current age. This phenomenon, known as forward telescoping, has been specifically noted when reporting the age of onset for tobacco use (Johnson & Schultz, 2005). It is presumed that this type of cognitive distortion should affect all types of behavior equally, meaning that even if participants forward telescoped their age of onset of tobacco use (making it occur at a later age than it should) they should also be telescoping their age of onset for the other activities, including gambling. As such, telescoping should not significantly impact the current findings; even if the ages of onset are slightly skewed, the progression of activities and the latency periods between the ages of onset for the various activities should remain the same.

Another threat to the quality of the data is the fact that all of the participants in the final study were undergraduates at a large state university in the Southeastern United States. As such, the activities that these individuals are exposed to and participate in might drastically differ from those activities that individuals in other areas of the United States or other areas of the world might endorse. Further, because the mean age of the sample was less than 20 years old, it is also possible that these individuals have not yet had the time to participate in all of the various forms of risky behaviors and if an older sample was investigated the time timeline might appear quite

different. Therefore, the external validity of the current findings is limited to some degree. It would be beneficial to try to replicate the developed timeline of risky activities in both young- and older-adult samples.

Future Directions

Especially in light of the finding regarding the more common use of alcohol than tobacco, it is now becoming increasingly important to consider what problem behaviors are becoming more common and the potential influence that these new behaviors might have on subsequent involvement in other activities. The current data does not warrant causal connections or conclusions to be drawn, so it is not appropriate to indicate that participating in gambling activities will likely *cause* one to later participate in certain types of substance use or sexual activities. However, knowing that participation in gambling precedes these other behaviors and that gamblers are more likely to participate in these other behaviors than nongamblers helps to establish the importance of considering gambling in more complex theories and models of problem behaviors.

Once gambling behavior finds its place in broader models of problem behaviors, it would also be beneficial to explore gambling within this context at a more microlevel. For example, the specific types of gambling modalities may serve as unique predictors of future problem behaviors. In fact, work by Felsher, Derevensky, and Gupta in 2004 goes as far as to suggest that lottery tickets might be a “gateway” activity to other types of gambling modalities. The investigation of gambling activity among the Canadian adolescents in this sample indicate that the mean age of onset for lottery ticket purchasing (which they differentiate from lottery ticket play, as purchased by someone other than the gambler) is 12.24 years old. This is the mean age collapsed across gambling severity groups, and as one would predict, the problem gamblers

reported a slightly, yet not significantly so, earlier age of first lottery ticket purchase of 11.94 years old. While these findings might implicate lottery play as a gateway gambling modality the data from Sample 3 in the current work tells a different story. Of the seven types of gambling modalities investigated (dice, cards, sports, online, casino table games, slots, lottery, plus “other”), lottery play was the gambling modality with the *latest* age of onset ($M=17.65$, $SD=10.75$). Dice games had the earliest reported age of onset ($M=15.15$; $SD=3.81$), but also had the fewest number of participants ($n=55$). Interestingly, while the lottery had the latest age of onset, it actually had the largest number of participants compared to all other gambling modalities ($n=172$). So while the current data suggests that the lottery might be the most popular form of gambling overall, it certainly does not appear to be the one occurring the earliest. These data do not differentiate between lottery *play* and lottery *purchase*, as Felsher and colleagues did, so that might be a contributing factor to the disparate findings, as well as the region of data collection.

Additionally, it would be beneficial to further explore the progression within each behavior (from onset to regular use or participation and then to problematic use or participation) and how these within behavior progressions might influence additional behavior progressions. For example, while the current data show that gambling onset occurs before alcohol use, and therefore might be viewed as a type of trigger for that behavior, it might be that the progression from onset to regular gambling activity or the progression from regular to problematic gambling activity is the actual trigger. One criticism of the GT, as pointed out by Vanyukov and colleagues (2012), is the fact that GT does not move beyond simple substance use to problematic substance use or dependence; this is a shortcoming that can be rectified with future work with timeline data. Additional data from Study 3 suggests that not only do participants have an earlier age of

onset for gambling in comparison to tobacco use and marijuana use, but that they also report progressing to both regular gambling (i.e., once a week) and problematic gambling (i.e., self-identified) before the regular use of alcohol or marijuana (regular tobacco use was reported slightly earlier than problem gambling) and before the problem use of tobacco, marijuana, and alcohol. Granted, participants' reports on problem gambling and problem use of substances are likely to be somewhat inaccurate, as participants may not be familiar with the criteria that constitute reaching problematic levels of behavior or may not want to admit to having reached that point for various personal reasons.

Lastly, if attempting to draw causal connections among the problem behaviors, additional factors such as gender and impulsivity would be important to include in the analyses, as both are likely to contribute to participation in problem behaviors. For the purposes of establishing a simple timeline of problem behaviors, however, that did not prove essential to the current project.

CHAPTER 5

CONCLUSION

How mental health professionals attempt to prevent and treat pathological gambling is continually influenced by research findings in the field. As pathological gambling finds its new niche in the DSM-5 among other addictive disorders, it will be important to continue to make advances in gambling-related research. One way to do this, as the current paper demonstrates, is to reexamine integrate theories of problem behaviors in an effort to fully understand the similarities and differences between gambling and other problem behaviors. This project takes the first step in this process (1) by attempting to address and overcome previous methodological limitations in the field and (2) by creating a basic timeline of problem behaviors, because causal connections cannot be properly evaluated before determining which behaviors precede others. Current findings suggest that while the magnitude of correlations between gambling and other problem behaviors is not as large as the correlations observed among the other problem behaviors themselves, those who participate in gambling are also more likely than nongamblers to participate in those other problem behaviors and to participate in gambling *before* other problem behaviors. As such, gambling activity represents a potential catalyst in relation to other problem behaviors and warrants further investigation.

REFERENCES

- Barnes, G. M., Welte, J. W., Hoffman, J. H., & Dintcheff, B. A. (1999). Gambling and alcohol use among youth: Influences of demographic, socialization, and individual factors. *Addictive Behaviors, 24*, 749-767.
- Barnes, G. M., Welte, J. W., Hoffman, J. H., & Dintcheff, B. A. (2005). Shared predictors of youthful gambling, substance use, and delinquency. *Psychology of Addictive Behaviors, 19*, 165-174.
- Bretteville-Jensen, A. L., Melberg, H. O., & Jones, A. M. (2008). Sequential patterns of drug use initiation: Can we believe in the Gateway Theory? *B. E. Journal of Economic Analysis & Policy, 8*(2), 1-29.
- Choo, T., Roh, S., & Robinson, M. (2008). Assessing the "Gateway Hypothesis" among middle and high school students in Tennessee. *Journal of Drug Issues, 38*, 467-492.
- Degenhardt, L., Dierker, L., Chiu, W. T., Medina-Mora, M. E., Neumark, Y., Sampson, N., ...Kessler, R. C. (2010). Evaluating the drug use "gateway" theory using cross-national data: Consistency and associations of the order of initiation of drug use among participants in the WHO World Mental Health Surveys. *Drug and Alcohol Dependence, 108*, 84-97.
- Dickson, L. M., Derevensky, J. L., & Gupta, R. (2002). The prevention of gambling problems in youth: A conceptual framework. *Journal of Gambling Studies, 18*, 97-157.
- Donovan, J. E., & Jessor, R. (1985). Structure of problem behavior in adolescence and young adulthood. *Journal of Counseling and Clinical Psychology, 53*, 890-904.

- Donovan, J. E., Jessor, R., & Costa, F. M. (1988). Syndrome of problem behavior in adolescence: A replication. *Journal of Consulting and Clinical Psychology, 56*, 762-765.
- Falk, D. E., Yi, H., & Hiller-Sturmhöfel, S. (2006). An epidemiological analysis of co-occurring alcohol and tobacco use and disorders. *Alcohol Research & Health, 29*, 162-172.
- Felsher, J. R., Derevensky, J. L., & Gupta, R. (2004). Lottery participation by youth with gambling problems: Are lottery tickets a gateway to other gambling venues? *International Gambling Studies, 4*(2), 109-125. doi 1080/144597904123312969.5
- Fergusson, D. M., Boden, J. M., & Horwood, L. J. (2006). Cannabis use and other illicit drug use: Testing the cannabis gateway hypothesis. *Addiction, 101*, 556-569.
- Fortune, E. E., & Goodie, A. S. (2010). Comparing the utility of a modified Diagnostic Interview for Gambling Severity (DIGS) with the South Oaks Gambling Screen (SOGS) as a research screen in college students. *Journal of Gambling Studies, 26*, 639-644.
- Grant, J. E., Potenza, M. N., Weinstein, A., & Gorelick, D. A. (2010). Introduction to behavioral addictions. *The American Journal of Drug and Alcohol Abuse, 36*, 233-241.
- Griffiths, M., & Sutherland, I. (1998). Adolescent gambling and drug use. *Journal of Community & Applied Social Psychology, 8*, 423-427.
- Guilamo-Ramos, V., Litardo, H. A., & Jaccard, J. (2005). Prevention programs for reducing adolescent problem behaviors: Implications of the co-occurrence of problem behaviors in adolescence. *Journal of Adolescent Health, 36*, 82-86.
- Heatherton, T. F., Kozlowski, L. T., Frecker, R. C., & Fagerstrom, K.-O. (1991). The Fagerstrom Test for Nicotine Dependence: A revision of the Fagerstrom Tolerance Questionnaire. *Journal of Addiction, 86*, 119-127.

- Jessor, R. (1987). Problem-behavior theory, psychosocial development, and adolescent problem drinking. *British Journal of Addiction*, 82, 331-342.
- Jessor, R., & Jessor, S. L. (1977). *Problem behavior and psychosocial development: A longitudinal study of youth*. New York: Academic Press.
- Jessor, R., Turbin, M. S., Costa, F. M., Dong, Q., Zhang, H., & Wang, C. (2003). Adolescent problem behavior in China and the United States: A cross-national study of psychosocial protective factors. *Journal of Research on Adolescence*, 13, 329-360.
- Johson, E. O., & Schultz, L. (2005). Forward telescoping bias in reported age of onset: An example from cigarette smoking. *International Journal of Methods in Psychiatric Research*, 14(3), 119-129. doi 10.1002/mpr2
- Johnson, P. B., Richter, L., Kleber, H. D., McLellan, A. T., & Carise, D. (2005). Telescoping of drinking-related behaviors: Gender, racial/ethnic, and age comparisons. *Substance Use & Misuse*, 40, 1139-1151.
- Kandel, D. (1975). Stages in adolescent involvement in drug use. *Science*, 190, 912-914.
- Kandel, D. B., Yamaguchi, K., & Chen, K. (1992). Stages of progression in drug involvement from adolescence to adulthood: Further evidence for the Gateway Theory. *Journal of Studies on Alcohol*, 53, 447-457.
- Le Blanc, M., & Bouthillier, C. (2003). A developmental test of the general deviance syndrome with adjudicated girls and boys using hierarchical confirmatory factor analysis. *Criminal Behaviour and Mental Health*, 13, 81-105.
- Lesieur, H. R., & Blume, S. B. (1987). The south oaks gambling screen (SOGS): A new instrument for the identification of PGs. *American Journal of Psychiatry*, 144, 1184-1188.

- Lynskey, M. T., Fergusson, D. M., & Horwood, L. J. (1998). The origins of the correlations between tobacco, alcohol, and cannabis use during adolescence. *Journal of Child Psychology, 39*, 995-1005.
- Petry, P. M. (2004). *Pathological gambling: Etiology, comorbidity, and treatment*. Washington DC: American Psychological Association.
- Prince van Leeuwen, A., Verhulst, F. C., Reijneveld, S. A., Vollebergh, W. A. M., Ormel, J., & Huizink, A. C. (2011). Can the gateway hypothesis, the common liability model and/or, the route of administration model predict initiation of cannabis use during adolescence? A survival analysis – the TRAILS study. *Journal of Adolescent Health, 48*, 73-78.
- Saunders, J. B., Aasland, O. G., Babor, T. F., de la Fuente, J. R., & Grant, M. (1993). Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption--II. *Addiction, 88*, 791-804.
- Stinchfield, R. (2002). Reliability, validity, and classification accuracy of the South Oaks Gambling Screen (SOGS). *Addictive Behaviors, 27*, 1-19.
- Shaffer, H. J., Hall, M. N., & Vander Bilt, J. (1999). Estimating the prevalence of disordered gambling behavior in the United States and Canada: A research synthesis. *American Journal of Public Health, 89*, 1369-1376.
- Soper, D.S. (2012) "A-priori Sample Size Calculator for Student t-Tests (Online Software)", <http://www.danielsoper.com/statcalc3>.
- Sullivan, C. J., Childs, K. K., & O'Connell, D. (2010). Adolescent risk behavior subgroups: An empirical assessment. *Journal of Youth Adolescence, 39*, 541-562.

- Tavares, H., Martins, S. S., Lobo, D. S. S., Silveira, C. M., Gentil, V., & Hodgins, D. C. (2003). Factors at play in faster progression for female pathological gamblers: An exploratory analysis. *Journal of Clinical Psychiatry, 64*, 433-438.
- Vanyukov, M. M., Tarter, R. E., Kirillova, G. P., Kirisci, L., Reynolds, M. D., Kreek, M. J., ...Ridenour, T. A. (2012). Common liability to addiction and “gateway hypothesis”: Theoretical, empirical and evolutionary perspective. *Drug and Alcohol Dependence, 123*, pS3-pS17. doi: 10.1016/j.drugalcdep.2011.12. 018
- Vazsonyi, A. T., Chen, P., Jenkins, D. D., Burcu, E., Torrente, G., Sheu, C. (2010). Jessor’s Problem Behavior Theory: Cross-national evidence from Hungary, the Netherlands, Slovenia, Spain, Switzerland, Taiwan, Turkey, and the United States. *Developmental Psychology, 46*, 1779-1791.
- Vitaro, F., Brendgen, M., Ladouceur, R., & Tremblay, R. E. (2001). Gambling, delinquency, and drug use during adolescence: Mutual influences and common risk factors. *Journal of Gambling Studies, 17*, 171-190.
- Welte J. W., Barnes G. M., Tidwell M.C., & Hoffman J. H. (2008). The prevalence of problem gambling among U.S. adolescents and young adults: Results from a national survey. *Journal of Gambling Studies, 24*(2),119-133.
- Wickwire, E. M., McCausland, C., Whelan, J. P., & Luellen, J. (2008). Environmental correlates of gambling behavior among college students: A partial application of problem behavior theory to gambling. *Journal of College Student Development, 49*, 459-475.
- Willoughby, T., Chalmers, H., & Busseri, M. A. (2004). Where is the syndrome? Examining the co-occurrence among multiple problem behaviors in adolescence. *Journal of Consulting and Clinical Psychology, 72*, 1022-1037.

- Winters, K. C., Specker, S., & Stinchfield, R. D. (1996). *Diagnostic interview for gambling severity (DIGS)*. Minneapolis: University of Minnesota Medical School.
- Winters, K. C., Stinchfield, R. D., Botzet, A., & Anderson, N. (2002). A prospective study of youth gambling behaviors. *Psychology of Addictive Behaviors, 16*, 3-9.
- Winters, K.C., Stinchfield, R.D, & Fulkerson, J. (1993). Toward the development of an adolescent problem severity scale. *Journal of Gambling Studies, 9*, 63-84
- Zangeneh, M., Mann, R. E., McCreadym J., & Oseni, L. (2009). Gambling in ethnic adolescent populations: An exploratory study of the utility of problem behavior theory as an explanatory framework. *International Journal of Mental Health and Addiction, 8*, 51-69.

Table 1. Correlations between problem behaviors for Study 1.

Problem Behaviors	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Gambling																	
<i>1. DIGS</i>																	
Sexual Activity																	
<i>2. Age of 1st intercourse</i>		-.20**															
<i>3. Number of partners</i>	.19**		-.42**														
<i>4. Partners < than 24 hrs</i>	.16*	-.25**	.68**														
<i>5. Condom use</i>	-.00	-.02	-.16*	-.14*													
<i>6. Cheating</i>	.16*	-.29**	.60**	.51**	-.12												
<i>7. STDs</i>	.00	-.08	.33**	.15*	1**	.16*											
<i>8. Abortions</i>	.11	-.12*	.16*	.20*	-.14*	.20*	.03										
Deviance																	
<i>9. Fighting</i>	-.03	-.14*	.31**	.20*	-.23**	.15	-.23**	-.10									
<i>10. Arrested</i>	.15*	-.17*	.34**	.22**	-.15*	.12	-.14*	-.09	.42**								
Substance Use^a																	
<i>11. AUDIT</i>	.18**	-.10	.19**	.17*	-.08	.26**	-.08	.01	.19**	.21**							
<i>12. FTND</i>	.23**	-.23**	.19**	.31**	-.10	.22*	-.10	-.08	.16*	.36**	.27**						
<i>13. Marijuana</i>	-.04	-.01	.03	-.02	-.00	.04	-.05	.11	.11	.04	.09	.06					
<i>14. Cocaine</i>	.25**	-.26**	.15	.09	-.03	.10	-.20*	-.01	-.15	-.13	.07	-.00	.22*				
<i>15. Methamphetamines</i>	.08	-.18	.02	-.07	-.09	.09	-.06	-.07	-.03	.01	.02	-.21	.19	.48**			
<i>16. LSD</i>	.19	-.21	.23	.21	-.06	-.13	-.03	-.09	-.03	.10	-.03	.17	.22*	.46**	.36**		
<i>17. Painkillers</i>	.10	-.14	.10	-.19	-.04	-.06	.04	.26*	.02	.10	.01	.04	.27*	.31**	.57**	.38**	
<i>18. Ecstasy</i>	.09	-.15	.06	-.03	-.06	-.05	-.04	.14	.05	.05	-.02	.08	-.07	.28*	.55**	.66**	.46**

* $p < .05$, ** $p < .001$

Abbreviations: AUDIT= Alcohol Use Disorders Identification Test; DIGS=Diagnostic interview for gambling severity; FTND= Fagerstrom Test for Nicotine Dependence

Notes: ^a all drug variables reflect frequency of use

Table 2. Correlations between problem behaviors for Study 2.

Problem Behaviors	1	2	3	4	5	6	7	8	9	10	11	12
Gambling												
<i>1. DIGS</i>												
Sexual Activity												
<i>2. Age of 1st intercourse</i>	-.12											
<i>3. Number of partners</i>	.37**	-.46**										
<i>4. Partners < than 24 hrs</i>	.25**	-.22**	.57**									
<i>5. Condom use</i>	-.27**	.23**	-.27**	-.16*								
<i>6. Cheating</i>	.11	-.45**	.44**	.15*	-.27**							
Deviance^a												
<i>7. Fighting</i>	.12*	-.25**	.11	.07	-.12	.09						
<i>8. Arrested</i>	.16**	-.17*	.28**	.17*	-.06	.21*	.27**					
Substance Use^b												
<i>9. AUDIT</i>	.21**	-.12	.29**	.25*	.01	.01	.20**	.28**				
<i>10. Smoking^a</i>	.15**	-.21**	.27**	.20*	-.21*	.27**	.08	.20**	.29**			
<i>11. Marijuana</i>	.10*	-.20*	.56**	.36**	-.20**	.13	.17**	.27**	.52**	.36**		
<i>12. Cocaine</i>	.24**	-.33**	.51**	.29**	-.34**	.33**	.13*	.20**	.32**	.37**	.50**	
<i>13. Painkillers</i>	.17**	-.40**	.37**	.32**	-.31**	.33**	.24**	.28**	.33**	.41**	.26**	.46**

* $p < .05$, ** $p < .001$

Abbreviations: AUDIT= Alcohol Use Disorders Identification Test; DIGS=Diagnostic interview for gambling severity

Notes: ^aYes/No response; ^b all drug variables reflect frequency of use

Table 3: Age comparisons of onset for risky behaviors for gamblers and nongamblers

Problem Behaviors	NonGamblers (n=359)	Gamblers (n=187)	Group Differences <i>t</i> (<i>p</i>)
Sexual Activity	Mean (SD)	Mean (SD)	
<i>Oral Sex</i>	16.6 (1.7) <i>n</i> =205	16.4 (1.7) <i>n</i> =145	.80 (<i>ns</i>)
<i>Intercourse</i>	17.1 (1.5) <i>n</i> =190	16.8 (1.5) <i>n</i> =130	1.87 (.06)
<i>Anal Sex</i>	17.9 (1.4) <i>n</i> =25	18.8 (2.6) <i>n</i> =24	-1.53 (<i>ns</i>)
Deviance	Mean (SD)	Mean (SD)	
<i>Fighting</i>	14.1 (3.1) <i>n</i> =58	13.6 (2.9) <i>n</i> =76	0.87 (<i>ns</i>)
<i>Arrested</i>	17.7 (2.6) <i>n</i> =22	17.7 (1.7) <i>n</i> =28	-.06 (<i>ns</i>)
Substance Use	Mean (SD)	Mean (SD)	
<i>Alcohol</i>	16.2 (1.9) <i>n</i> =276	15.7 (2.1) <i>n</i> =165	2.34 (.02)
<i>Tobacco</i>	16.6 (1.9) <i>n</i> =127	16.1 (2.0) <i>n</i> =113	1.97 (.05)
<i>Marijuana</i>	17.0 (1.6) <i>n</i> =130	16.7 (1.8) <i>n</i> =111	1.45 (<i>ns</i>)
<i>Prescription Drugs</i>	17.0 (2.3)† <i>n</i> =37	16.9 (2.4) <i>n</i> =40	0.27 (<i>ns</i>)
<i>Hallucinogens</i>	17.8 (1.0) <i>n</i> =12	18.0 (1.8) <i>n</i> =12	-0.30(<i>ns</i>)
<i>Ecstasy</i>	18.2 (1.9) <i>n</i> =19	18.4 (1.9) <i>n</i> =20	-0.29 (<i>ns</i>)
<i>Cocaine</i>	18.1 (2.1) <i>n</i> =14	18.0 (3.9) <i>n</i> =28	0.10 (<i>ns</i>)

† When reporting to the 3rd decimal place, age of onset for prescription drugs comes slightly (although not significantly) before marijuana use for nongamblers (16.992 vs. 17.023)

Table 4: Chi-squared analysis of the effect of gambling category on participation in other problem behaviors.

Problem Behaviors	Dichotomous Gambling Status			Gambling Severity based upon DIGS			
	NonGamblers (n=359)	Gamblers (n=187)	Pearson X^2	DIGS: 0-2 (n=102)	DIGS: 3-4 (n=44)	DIGS: 5+ (n=41)	Pearson X^2
Sexual Activity							
<i>Oral Sex</i>	56.8%	78.0%	22.32***	77.5%	79.5%	75.6%	.19
<i>Intercourse</i>	52.6%	69.9%	13.96***	70.6%	65.9%	70.7%	.35
<i>Anal Sex</i>	6.9%	12.9%	5.19**	12.7%	11.4%	14.6%	.21
Deviance							
<i>Fighting</i>	16.3%	40.9%	39.81***	36.3%	45.5%	46.3%	1.78
<i>Arrested</i>	6.1%	15.1%	11.56***	14.7%	9.1%	22.0%	2.77
Substance Use							
<i>Tobacco</i>	35.2%	60.8%	33.25***	58.8%	75.0%	53.7%	4.76 [†]
<i>Alcohol</i>	77.3%	88.7%	9.78***	86.3%	88.6%	92.7%	1.17
<i>Marijuana</i>	36.0%	59.7%	26.72***	57.8%	61.4%	61.0%	.22
<i>Prescription</i>	10.8%	21.5%	11.72***	21.6%	22.7%	19.5%	.14
<i>Ecstasy</i>	5.3%	10.8%	5.41*	9.8%	11.4%	12.2%	.20
<i>Cocaine</i>	2.8%	12.3%	18.71***	10.2%	14.3%	15.4%	.90
<i>Meth.</i>	<1%	<1%	.22	<1%	<1%	<1%	.84
<i>Heroin</i>	<1%	<1%	.22	<1%	<1%	<1%	.84

* $p < .05$, *** $p < .001$, [†] $p < .10$

Table 5. Latency periods between problem behaviors for gamblers and nongamblers.

Timeline Category and Position	Latency in Years between Behaviors		<i>t</i> -score
	Nongamblers Mean (SD)	Gamblers Mean (SD)	
Sexual Activity			
1-2	.55 (1.47) (<i>n</i> =178)	.55 (1.37) (<i>n</i> =123)	.01
2-3	1.64 (1.61) (<i>n</i> =25)	2.02 (2.60) (<i>n</i> =24)	.62
Deviance			
1-2	1.31 (2.69) (<i>n</i> =8)	4.21 (3.19) (<i>n</i> =17)	2.22*
Substance use			
1-2	.89 (1.77) <i>n</i> =120	.75(2.00) <i>n</i> =109	0.56
2-3	1.67 (1.40) <i>n</i> =27	0.63 (2.38) <i>n</i> =86	2.15*
3-4	1.33 (1.47) <i>n</i> =28	.70 (1.74) <i>n</i> =33	1.51
4-5	1.93 (.21) <i>n</i> =12	.21 (.64) <i>n</i> =7	2.56*
5-6	.44 (.94) <i>n</i> =8	.31 (1.07) <i>n</i> =7	1.25
6-7	.33 (.91) <i>n</i> =12	.81 (5.12) <i>n</i> =13	.32

**p*<.05

Notes. The time positions listed in column 1 for Sexual Activity and Deviance are identical for Nongamblers and Gamblers. For Sexual Activity: 1=Age of 1st Oral Sex, 2= Age of 1st Intercourse, 3= Age of 1st Anal sex and for Deviance: 1= Age of 1st Physical Fight, 2=Age of 1st Arrest. Substance use positions differ per category. For Nongamblers: 1=Alcohol, 2= Tobacco, 3= Prescription Medications, 4=Marijuana, 5=Hallucinogens, 6=Cocaine, and 7=Ecstasy. For Gamblers: 1=Alcohol, 2=Tobacco, 3=Marijuana, 4=Prescription Medications 5=Hallucinogens, 6=Cocaine, and 7=Ecstasy. In order to be included in a latency period analysis, participants had to participate in *both* activities.

Table 6. Correlations between problem behaviors for Study 3.

Behaviors	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Gambling															
<i>1. DIGS</i>															
Sexual Activity															
<i>2. Age of oral sex</i>	.04														
<i>3. Age of sex</i>	-.03	.63***													
<i>4. Age of anal sex</i>	.22	.07	.24 [†]												
<i>5. Hookup Partners <24 hrs</i>	.13**	-.15**	-.13*	.18											
<i>6. Sex Partners < than 24 hrs</i>	.17***	-.17***	-.25***	.11	.58***										
<i>7. Condom use</i>	.09	-.22***	-.27***	.27 [†]	.06	.10									
<i>8. Cheating</i>	.11**	-.17**	-.32***	.04	.15***	.21***	.25***								
<i>9. STDs Tested</i>	.08 [†]	-.11*	-.20***	.16	.14***	.25***	.11	.20***							
<i>10. STDs Diagnosed</i>	.08 [†]	-.05	-.13*	.69***	.05	.11**	.05	.14***	.27***						
<i>11. # of Abortions</i>	.02	-.01	-.05	-.02	.11*	.17***	.18*	.17***	.04	.18***					
Deviance															
<i>12. Fighting^a</i>	.18***	-.13*	-.19***	.24 [†]	.12***	.18***	.14*	.23***	.21***	.11*	.10*				
<i>13. Fight Age</i>	.05	-.02	.04	-.55*	.05	-.02	.07	-.02	.26**	.04	-.08				
<i>14. Arrested^a</i>	.17***	-.08	-.16**	.11	.29***	.24***	.09	.25***	.20***	.13***	.09*	.19***	.03		
<i>15. Arrested Age</i>	.03	.36*	.48***	.10	-.04	-.17	-.20	-.40**	.01	-.04	.18	-.18	.26		
Substance Use															
<i>16. AUDIT</i>	.26***	-.04	-.05	.24 [†]	.50***	.32***	.12 [†]	.20***	.13**	.12***	.03	.19***	.08	.26***	.12
<i>17. FTND</i>	.16***	-.03	-.08	.16	.23***	.16***	-.09	.13**	.07 [†]	.03	.06	.14***	.05	.26***	.15
<i>18. Marijuana^a</i>	.17***	-.15**	-.12*	.23	.33***	.20***	.24***	.20***	.23***	.14***	.05	.15***	.03	.26***	-.18
<i>19. Prescript. Meds^a</i>	.08 [†]	-.14**	-.11	.03	.18***	.11**	.09	.15***	.15***	.06	.06	.14***	.06	.18***	-.05
<i>20. Ecstasy^a</i>	.13**	-.13*	-.11*	-.05	.23***	.19***	.18**	.22***	.17***	.00	.04	.07 [†]	.24**	.31***	.21
<i>21. Cocaine^a</i>	.16***	-.19***	-.19***	.41**	.25***	.19***	.20**	.18***	.20***	.14**	.05	.13**	.14	.29***	-.05
<i>22. Hallucinogens^a</i>	-.04	-.43***	-.36*	-.5	-.18	-.02	.33 [†]	.09	.06	.13	.13	.15	-.38	.12	-.52*

* $p < .05$, ** $p < .01$, *** $p < .001$, [†] $p < .10$

^a represents a dichotomous variable (yes/no) and point-biserial correlations.

Notes. Correlations not calculated between the variables Fighting and Fighting age or Arrested and Arrested Age because only those who reported participating in those activities reported age. Therefore, the values would be constant.

Table 7. Correlations for substance use in Study 3

Type of Substance	Alcohol (AUDIT)	FTND	Marijuana	Prescription Meds	Ecstasy	Cocaine
<i>Tobacco (FTND)</i>	.32***					
<i>Marijuana</i>	.51***	.26***				
<i>Prescription Meds</i>	.23***	.29***	.28***			
<i>Ecstasy</i>	.24***	.22***	.30***	.31***		
<i>Cocaine</i>	.28***	.33***	.29***	.23***	.52***	
<i>Hallucinogens</i>	-.15	.08	.21	.11	--	--

*** $p < .001$

-- too small to compute

Notes. Data on methamphetamine and heroin use not included due to minimal use ($n=2$ for each)

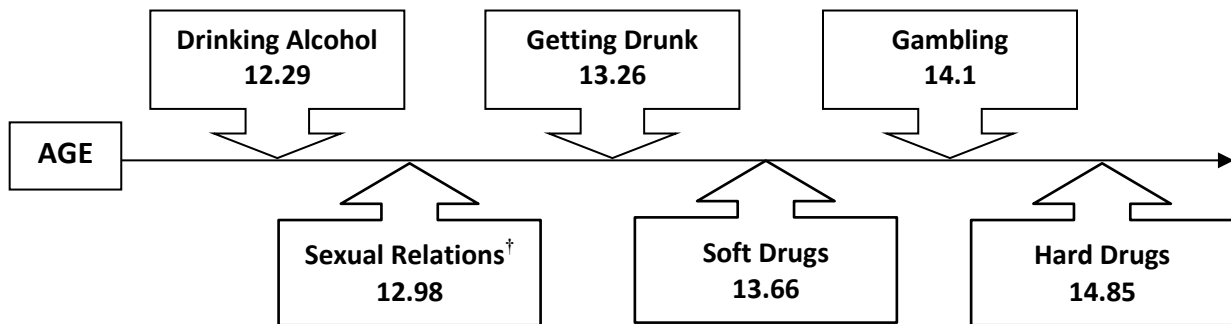
Table 8. Paired samples t-tests of age of onset for different types of substance use

Age Comparisons	<i>n</i> [†]	<i>t</i>
Alcohol Age – Tobacco Age	229	6.66**
Tobacco Age – Marijuana Age	179	3.42**
Marijuana Age – Prescription Medication Age	61	4.70**
Marijuana Age – Hallucinogens Age	24	7.11**
Marijuana Age – Cocaine Age	42	3.67**
Marijuana Age – Ecstasy Age	38	8.05**

** $p < .001$

†In order to be included in an age comparison, participants must have participated in both of the included activities. This *n* value represents the total number included for each comparison.

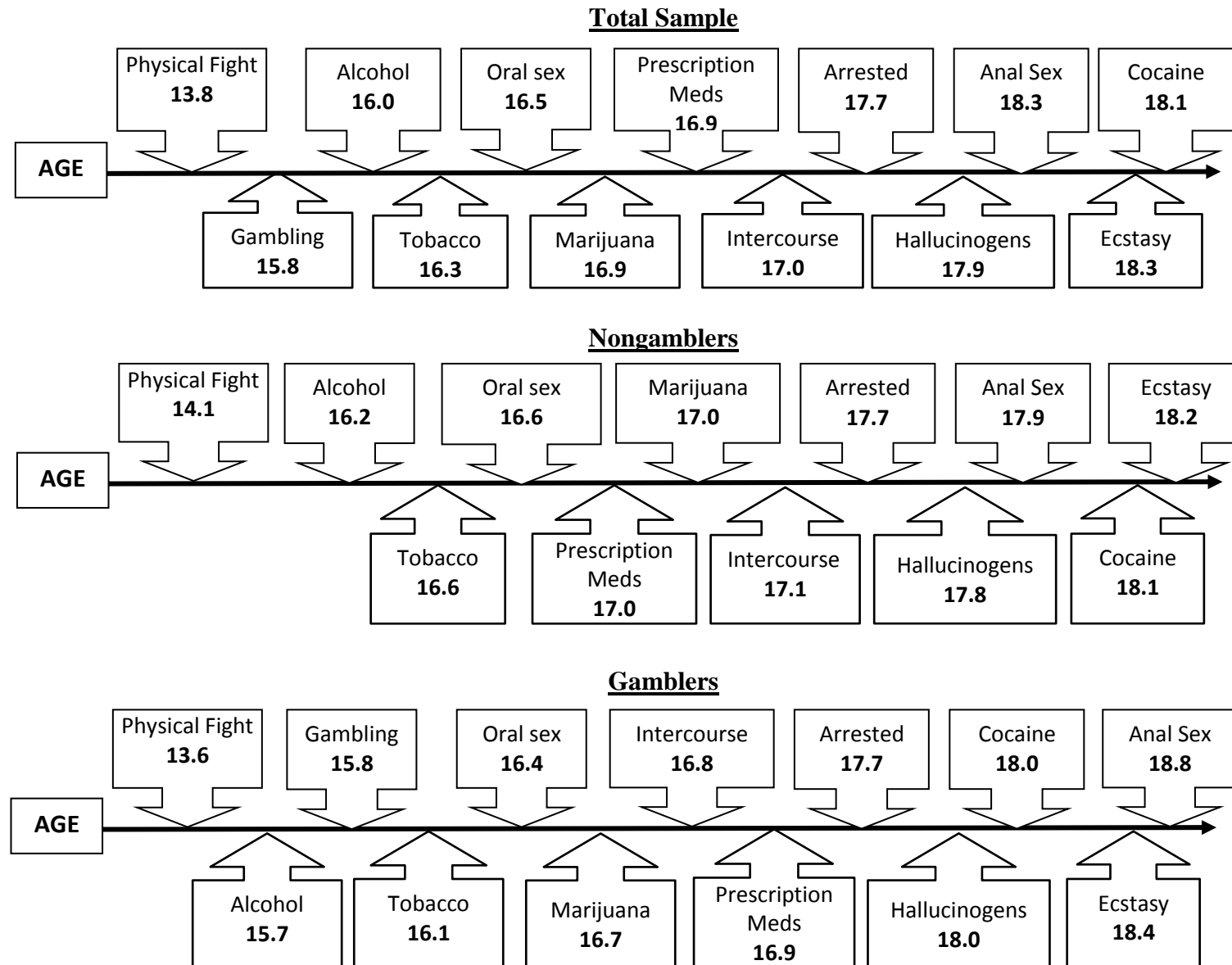
Figure 1. Mean age of onset for risky behaviors as based upon LeBlanc and Bouthillier (2003)



[†] While Leblanc and Bouthillier reported sexual activity separately for homosexual and heterosexual acts, Sexual Relations in this figure represents the calculated weighted mean of the combination of those data.

Notes. Figure constructed from the data presented by LeBlanc and Bouthillier (2003) in Table 2 pp.90-91.

Figure 2. Overall timeline for onset of risky behaviors for total sample (N=546) and comparative timelines for gamblers ($n=187$) and nongamblers ($n=359$) from Study 3



APPENDIX

Participation in Risky Activities Questionnaire

Directions: Please answer the questions for each activity listed below. If you do not engage in a certain activity, indicate that in the appropriate location and then move on to the next activity.

When giving a response regarding age, please give numerical responses to the nearest ½ of a year. For example, if asked how old you were when you started the 9th grade, the most appropriate response might be 14 years old, 14.5 years old, or 15 years old. Please indicate the most accurate age for your personal experiences.

Tobacco use

1. Have you ever used tobacco?
2. How old were you when you 1st used tobacco (to the nearest ½ year)?
3. The first time you used tobacco, were you simultaneously using another type of substance (e.g., alcohol)?
 - a. If so, what was the substance?
4. Did you ever use tobacco regularly (i.e., at least once a week)?
 - a. How old were you when you first started using the substance regularly?
5. Have you ever had a problem with tobacco use?
 - a. How old were you when you first started having a problem with tobacco use?

Alcohol use

1. Have you ever used alcohol?
2. How old were you when you 1st used alcohol (to the nearest ½ year)?
3. The first time you used alcohol, were you simultaneously using another type of substance (e.g., tobacco)?
 - a. If so, what was the substance?
4. Did you ever use alcohol regularly (i.e., at least once a week)?
 - a. How old were you when you first started using the substance regularly?
5. Have you ever had a problem with alcohol use?
 - a. How old were you when you first started having a problem with alcohol use?

Drug use*Marijuana*

1. Have you ever used marijuana?

2. How old were you when you 1st used marijuana (to the nearest ½ year)?
3. The first time you used marijuana, were you simultaneously using another type of substance (e.g., alcohol)?
 - a. If so, what was the substance?
4. Did you ever use marijuana regularly (i.e., at least once a week)?
 - a. How old were you when you first started using the substance regularly?
5. Have you ever had a problem with marijuana use?
 - a. How old were you when you first started having a problem with marijuana use?

Prescription Medication (e.g., Adderall, Ritalin, Valium, Xanax, etc.)

1. Have you ever used prescription medication(s) that were NOT prescribed to you by a doctor or that you used in excess of your doctor-recommended amount?
 - a. If so, what were the prescription medication(s)?
2. How old were you when you 1st used prescription medications (to the nearest ½ year)?
3. The first time you used prescription medications, were you simultaneously using another type of substance (e.g., alcohol)?
 - a. If so, what was the substance?
4. Did you ever use prescription medications regularly (i.e., at least once a week)?
 - a. How old were you when you first started using the prescription medications regularly?
5. Have you ever had a problem with prescription medications use?
 - a. How old were you when you first started having a problem with prescription medications?

Methamphetamines (example: Speed, Meth, Crank)

1. Have you ever used methamphetamines?
2. How old were you when you 1st used methamphetamines (to the nearest ½ year)?
3. The first time you used methamphetamines, were you simultaneously using another type of substance (e.g., alcohol)?
 - a. If so, what was the substance?
4. Did you ever use methamphetamines regularly (i.e., at least once a week)?
 - a. How old were you when you first started using methamphetamines regularly?
5. Have you ever had a problem methamphetamines use?
 - a. How old were you when you first started having a problem with methamphetamines?

Ecstasy

1. Have you ever used ecstasy?
2. How old were you when you 1st used ecstasy (to the nearest ½ year)?
3. The first time you used ecstasy, were you simultaneously using another type of substance (e.g., alcohol)?
 - a. If so, what was the substance?
4. Did you ever use ecstasy regularly (i.e., at least once a week)?
 - a. How old were you when you first started using ecstasy regularly?
5. Have you ever had a problem with ecstasy use?
 - a. How old were you when you first started having a problem with ecstasy use
Hallucinogens (e.g., acid, shrooms, etc.)

1. Have you ever used hallucinogens? If so, which ones?
2. How old were you when you 1st used hallucinogens (to the nearest ½ year)?
3. The first time you used hallucinogens, were you simultaneously using another type of substance (e.g., alcohol)?
 - a. If so, what was the substance?
4. Did you ever use hallucinogens regularly (i.e., at least once a week)?
 - a. How old were you when you first started using hallucinogens regularly?
5. Have you ever had a problem with hallucinogens use?
 - a. How old were you when you first started having a problem with hallucinogens use?

Cocaine

1. Have you ever used cocaine?
2. How old were you when you 1st used cocaine (to the nearest ½ year)?
3. The first time you used cocaine, were you simultaneously using another type of substance (e.g., alcohol)?
 - a. If so, what was the substance?
4. Did you ever use cocaine regularly (i.e., at least once a week)?
 - a. How old were you when you first started using cocaine regularly?
5. Have you ever had a problem with cocaine use?
 - a. How old were you when you first started having a problem with cocaine use?

Heroin

1. Have you ever used heroin?
2. How old were you when you 1st used heroin (to the nearest ½ year)?
3. The first time you used heroin, were you simultaneously using another type of substance (e.g., alcohol)?

- a. If so, what was the substance?
4. Did you ever use heroin regularly (i.e., at least once a week)?
 - a. How old were you when you first started using heroin regularly?
5. Have you ever had a problem with heroin use?
 - a. How old were you when you first started having a problem with heroin use?

Other

1. Have you ever used any other type of drug?
 - a. If so, what was that drug?
2. How old were you when you 1st used that substance (to the nearest ½ year)?
3. The first time you used that substance, were you simultaneously using another type of substance (e.g., alcohol)?
 - a. If so, what was the substance?
4. Did you ever use that substance regularly (i.e., at least once a week)?
 - a. How old were you when you first started using that substance regularly?
5. Have you ever had a problem with that substance?
 - a. How old were you when you first started having a problem with that substance?

Sexual Activity

Types of Activity

1. Have you ever kissed anyone?
 - a. How old were you the first time you kissed someone?
 - b. Were you under the influence of any type of substance at that time?
 - c. What type of substance?
2. Have you ever engaged in “petting activities” (i.e. touching of your partner’s private parts)
 - a. How old were you the first time you engaged in petting activities?
 - b. Were you under the influence of any type of substance at that time?
 - c. What type of substance?
3. Have you ever had oral sex?
 - a. How old were you the first time you had oral sex?
 - b. Were you under the influence of any type of substance at that time?
 - c. What type of substance?
4. Have you ever had intercourse?
 - a. How old were you the first time you had intercourse?
 - b. Were you under the influence of any type of substance at that time?
 - c. What type of substance?
5. Have you ever had anal sex?
 - a. How old were you the first time you had anal sex?
 - b. Were you under the influence of any type of substance at that time?

- c. What type of substance?

Safe Sex

1. When having sex with a nonmonogamous partner, how often do you use condoms?
2. When having sex with a monogamous partner, how often do you use condoms?
3. Have you EVER had unprotected sex?
 - a. If you have ever had unprotected sex, how often were you under the influence of a substance?
 - b. What was the substance?
4. If you are a sexually active female, are you on any type of birth control?
 - a. If so, what kind?
5. How many people have you “hooked-up” with (e.g., kissing or petting activities, but NOT sex) that you have known for less than 24 hours?
 - a. If you have hooked up with people you have known for less than 24 hours, how often were you under the influence of a substance?
 - b. What was the substance?
6. How many people have you had sex with (oral, vaginal, or anal) that you have known for less than 24 hours?
 - a. If you have had sex with people you have known for less than 24 hours, how often were you under the influence of a substance?
 - b. What was the substance?
7. How many times have you cheated on a monogamous partner?
 - a. If you have cheated on a partner, how often were you under the influence of a substance at that time?
 - b. What was the substance?
8. How often have you been tested for sexually transmitted diseases?
9. Have you ever been pregnant (if female) or impregnated someone (if male)?
 - a. How many times?
10. Have you ever had an abortion (if female) or impregnated a female that had an abortion (if male)?
 - a. How many times?

Gambling Activity

1. Do you ever gamble?
2. How old were you the first time you gambled?
3. For the gambling activities listed below, please write how old you were the first time you engaged in each type of gambling activity. If you have NEVER participated in a certain activity, write a 0 in the adjacent space.

_____ Lottery

- _____ Online gambling
- _____ Cards (e.g., poker)
- _____ Casino games (e.g., Black Jack, Roulette, etc.)
- _____ Slot machines
- _____ Sports betting
- _____ Dice games
- _____ Other: _____
- _____ Other: _____

4. The first time you gambled, were you under the influence of any type of substance?
 - a. If so, what was the substance?
5. Did you ever gamble regularly (i.e., at least once a week)?
 - a. How old were you when you first started to gamble regularly?
 - b. How often when gambling are you under the influence of a substance?
6. Have you ever had a problem with gambling?
 - a. How old were you when you first started to have a problem with gambling?

Criminal Activity

1. Have you ever been in a physical fight with another person?
 - a. How old were you the first time you got into a physical fight?
 - b. Were you under the influence of a substance?
 - c. What was the substance?
2. Have you ever been arrested?
 - a. How old were you the first time you got arrested?
 - b. Were you under the influence of a substance?
 - c. What was the substance?