Youth Gambling and its Association with Casino Proximity

by

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CERTIFICATE OF APPROVAL

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Abstract

Background: Studies suggest that casino proximity may influence gambling behavior in adults and college students (Adams, Sullivan, Horton, Menna, & Guilmette, 2007; Sévigny, Ladouceur, Jacques, & Cantinotti, 2008). Casinos may play a role in adolescent gambling because they may provide opportunities for adolescents to illegally gamble and to be exposed to a pro-gambling environment (Welte, Barnes, Tidwell, & Hoffman 2009; Fabiansson, 2006). Exposure to a pro-gambling environment may influence gambling initiation, because peer and family approval may be predictors of gambling among youth (Moore and Ohtsuka, 1999; Larimer and Neighbors, 2003). Additionally, casinos may promote gambling among youth through advertisements; youth and young adults view casino ads as favorable and enticing (McMullen & Miller, 2010; McMullan, Miller, & Perrier, 2012). No studies have examined the association between casino proximity and gambling among high school and middle school youth. It is possible that casino proximity may be associated with lifetime gambling and gambling frequency in youth because those near a casino may be exposed more frequently to a pro-gambling environment and to casino advertisements.

Objectives: To determine 1) the prevalence of gambling and gambling by frequency; 2) if casino proximity is associated with lifetime gambling; (3) if casino proximity is associated with gambling frequency. Casino proximity was measured by living in a zip-code that is in a town that has at least one casino.

Methods: The 2012 Arizona Youth Survey (AYS) was used (n=62,603) to collect data on gambling behaviors, zip-codes, and important confounders. Data were collected from all 15 counties in Arizona and 349 schools between January and April 2012 (Harrison, 2012). The dataset consisted of eighth, tenth, and twelfth graders.

Analyses: Prevalence were calculated by dividing the number of students in a particular frequency category by the total number of students with data for gambling behaviors (*n*=60,891). Logistic regression was used to determine if proximity was a predictor of lifetime gambling. Multinomial logistic regression was used to determine if proximity was a predictor of gambling frequency (with "never" as the base level). Gambling frequencies were: never, before but not in the past 12 months, in the past year, once or twice a month, once or twice a week, and almost every day.

Results: Proximity was a predictor of lifetime gambling, with grade level serving as an effect modifier. Proximity was only a significant predictor among eighth graders, although the increase in odds was only marginal. Eighth graders who lived near a casino were approximately 10% more likely to report ever gambled (OR=1.1; 95% CI =1.02 – 1.2, *p*=.01). Proximity was also a predictor of gambling frequency, with grade level serving as an effect modifier. Eighth graders near a casino were 14% more likely to have gambled at least once in the past year compared to eighth graders far from a casino (RRR=1.14, 95%=1.01 – 1.29). Tenth graders near a casino were 22% more likely to have gambled at least once in the past year (RRR=1.22, 95% CI=1.06 - 1.40). Twelfth graders near a casino were 45% less likely to have gambled weekly (RRR=.55, 95% CI=.36 - .82). Lastly, twelfth graders near a casino were 41% less likely to have gambled daily (RRR=.59, 95% CI= .35 - 1.00). Being in the twelfth grade may be a protective factor against higher gambling frequencies.

Conclusions: The findings of this study may provide some comfort because proximity was not positively associated with higher gambling frequencies. Those who gamble at higher frequencies may be more of a concern compared to those who gamble at low frequencies because frequency may be associated with gambling severity (Shinogle, Norris, Park, Volberg,

Haynes, & Stokan, 2011). However, those who gamble a few times a year may still be at risk for developing gambling problems. Just because one does not gamble frequently does not mean that one is in control of one's gambling. Some individuals in the population gamble less frequently and yet more heavily (Abbott, 2001; Abbott, Volberg, & Rönnberg, 2004). Thus, we should be concerned that casino proximity was positively associated with prior-year gambling (among eighth and tenth graders) and lifetime gambling (among eighth graders), although the association was minor. Interventions should be implemented that discourage gambling and target adolescents living near a casino. Adams et al. (2007) suggests that casinos provide money and other resources to local schools for prevention and treatment programs for gambling problems that may materialize due to exposure or accessibility effects. Additionally, casinos may take care to practice socially responsible advertising. Casinos may be responsible by using ads that show gambling as a pleasurable experience, meanwhile showing that it is possible to have fun, win money, have social status, and experience excitement without gambling (McMullan et al., 2012).

Introduction

Adolescent gambling is considered a problem in the United States. The frequency of gambling among Oregon adolescents is associated with alcohol, tobacco, and marijuana use (Volberg, Hedberg, & Moore, 2008). Similarly, Volberg, Gupta, Griffiths, Ólason, and Delfabbro (2010) found that problem gambling in youth is associated with risky behaviors, such as drug and alcohol use, seatbelt use, violence, and risky sexual activity. Problem gambling is defined as gambling behavior that compromises, disrupts, or damages personal, family, or vocational pursuits (Volberg et al., 2008). The estimated prevalence of youth gambling further indicates that it should be addressed. In a prospective cohort study of 305 adolescents over eight years in Minnesota, rates of prior-year gambling were found to be consistently high for each year (in the 80's percentage-wise). Rates of regular gambling were consistently around 20%, while rates of problem gambling ranged from 2.3 to 4.3% (Winters, Stinchfield, Botzet, & Anderson, 2002). An Oregon youth survey estimates that about 63% of adolescents have gambled at least one point in their lives. Out of the sample (n=1,555), 13% admitted to gambling on a monthly basis, while 3% admitted to gambling on a weekly basis (Volberg et al., 2008). Lastly, Welte et al. (2009), in a national survey of United States youth (n=2,274), found that 68% of the respondents had gambled within the past year, and 11% had gambled more than twice per week.

Role of Casinos in Adolescent Gambling

Casinos play a role in adolescent gambling. The same national survey of adolescents found that casino gambling was associated with an increase in problem gambling symptoms (Welte et al., 2009). The survey found that each additional 14 days in casino visits lead to a 58% increase in problem gambling symptoms. Even though we may find it hard to believe that teens are able to gamble in casinos, likely due to a perceived sophistication of security systems and to

age restrictions, some adolescents evade these restrictions and gamble (Welte et al., 2009; Fabiansson, 2006). Fabiansson (2006), in an assessment of youth gambling participation in rural Australia, found that in one of Australia's largest casinos, approximately 700 underage individuals are caught each month. From the study, the three most frequently reported gambling activities in casinos were blackjack, poker, and roulette. Adolescents found these three games to be easy to join and leave, if they happen to be approached by casino staff. Adolescents may find it possible to sneak into the gaming areas of casinos due to the "open floor" of these areas and the lack of one secure entrance (Fabiansson, 2006).

Casinos may influence adolescent gambling in that they may provide venues for adolescents to gamble in, and casino advertisements make gambling appear "cool.". Thinking that gambling is "cool" may cause youth to gamble or to gamble more frequently with peers (not necessarily in a casino). McMullan et al. (2012) found that youth (especially those 15-18 years) were favorably disposed to casino ads. This group expressed a desire to gamble and perceived from ads that gambling has cultural capital, because it allows one to socialize with friends, win money quickly, have fun by playing, and feel excitement. Similarly, McMullen and Miller (2010) found that young adults were susceptible to casino advertisements.

Casino Proximity and its Relation to Gambling

Studies have been conducted which examine the association between casino proximity and gambling in adults. A study of 8,842 adults in Quebec found a positive correlation between casino proximity and participation in casino games and between casino proximity and casino expenditure (Sévigny et al., 2008). Adams et al. (2007) found that participating in casino slots and table games was more frequent among students attending a university near a casino. However, research is limited. No studies have addressed the effect of a nearby casino on

gambling behaviors in youth. One study found that gambling rates in youth (ages 13-17) in Nevada (where gambling is easily accessible in many NV cities) were lower compared to rates in youth of jurisdictions where gambling is less available (Volberg, 2002). However, this study did not specifically examine casino proximity, instead looking broadly at the effects of mature gambling jurisdictions.

It is possible that living near a casino is positively correlated with youth lifetime gambling and frequency. Proximity may make casinos more accessible to youth, if they desire to sneak-in and gamble. The findings of Sévigny et al. (2008) and Adams et al. (2007) demonstrate the importance of the ease in accessibility in predicting casino game participation. Also, youth near a casino may be more exposed to casino advertisements. Communities that do not have a casino may be exposed to less casino advertisements, because it may be more difficult for the individuals of these communities to travel to and regularly play at casinos. In addition to advertisements, youth living near a casino may be exposed to a social environment that approves of gambling. Fabiansson (2006) found that in rural areas with casinos, parents are encouraged to bring their families to casinos for activities, especially family dinners. Gambling profits from casinos are often used to subsidize food and beverages, leading to less expensive meals at casinos compared to outside restaurants. Exposure to casinos at an early age may cause adolescents to think that gambling is cool and acceptable, further leading youth to gamble. Moore and Ohtsuka (1999) found that youth gambled more frequently when one's family and friends approved of gambling. Larimer and Neighbors (2003) found that peer approval of gambling was a predictor of gambling among college students. Furthermore, in one of Australia's largest casinos, about 50% of youth ages 15-18 caught each month on the gaming

floor entered the casino with their parents, indicating the role of a supportive gambling environment (Fabiansson, 2006).

Study Purpose and Implications

The purpose of this study is to determine 1) the prevalence of gambling and gambling by frequency; 2) if casino proximity is associated with lifetime gambling; (3) if casino proximity is associated with gambling frequency. Several types of youth gambling were examined because living near a casino may influence a range of gambling behaviors. It is illegal for adolescents to gamble in casinos, and casinos may have tight security measures, which may prevent adolescents from entering gaming floors and catch those who happen to do so. Thus, youth whose gambling attitudes are affected by a nearby casino, whether through advertisements or exposure to the actual gaming environment, may choose to gamble amongst themselves, such as play poker or place bets for sporting events. Casino proximity was measured by living in a zip-code that is in a town that has at least one casino.

This study utilized data from the 2012 Arizona Youth Survey (AYS). The purpose of this survey is to measure the prevalence and frequency of substance abuse among $8^{th,}$ 10^{th}, and 12^{th} graders, as well as assess risk and protective factors. The survey is conducted every two years by the Arizona Criminal Justice Commission. This dataset is ideal because there are 21 casinos in 17 communities throughout the state that were open before 2012 (See Appendix A). The most casinos that a city has are three (in Tucson). This is ideal since many casino communities only have one or two. Many casino communities do not resemble Las Vegas or Atlantic City, where the main industry is gambling.

This study has future implications. Knowing if casino proximity is associated with youth gambling will aid the prevention of problem gambling. If there is an association between early-

onset gambling and casino proximity, interventions which prevent problem gambling may target adolescents living close to a casino. For example, Adams et al. (2007) proposed that casinos provide money and other resources to local schools for prevention and treatment programs for students with gambling problems that might emerge due to exposure and accessibility effects. Other interventions may include implementing regulations and better practices to ensure that advertisements from casinos are socially responsible and do not target children and adolescents (McMullen et al., 2012).

In the event of an association, it is crucial that interventions be implemented, because early-onset gambling was found to be a significant risk factor of at-risk gambling in young adults (Winters et al., 2002). Those with at-risk gambling were defined as those at an increased likelihood for developing a serious gambling problem if they continue to gamble. Adults with severe gambling problems are likely to have begun gambling at an earlier age compared to adults without problems (Volberg et al., 2010). Additionally, Winters et al. (2002) found that early at-risk and early problem gambling were risk factors of at-risk and problem gambling in adults. Gambling frequency, measured in this study, may be an indicator of at-risk and problem gambling (Shinogle et al., 2011). Thus, to prevent problem gambling in adolescents and adults, we should consider early-onset gambling and its frequency.

Methods

AYS Research Design and Purpose

The 2012 Arizona Youth Survey (AYS) was used because it is one of the few statewide youth behavioral surveys examining gambling. Inquiries were sent to the few other states that assessed youth gambling about the possible use of their datasets. However, no responses from these states were received. Arizona was the only state to respond and allow the use of their data.

The AYS collects data from high schools and middle schools throughout the state. The survey has been conducted for 21 years by the Arizona Criminal Justice Commission. Statewide and county reports are published and available to the public for each survey year. School district and school-specific reports are given to school officials. These reports may aid districts and schools in local planning strategies and program development. The specific aim of the AYS is to develop risk and protective factor profiles for communities that show the proportion of youth at risk for a certain harmful behavior, such as for drug use, and the proportion of youth with a specific protective factor for that particular behavior. These profiles allow the community data to be comparable to data on a national level; the comparisons are mentioned in the biennial reports. National-level data are gathered, and profiles are made from the BH (Bach Harrison) Norm, which contains the same questions as the AYS. The BH Norm is used to create a benchmark for responses, used for comparative purposes. The BH Norm collects data from Arizona, Arkansas, Louisiana, Michigan, Montana, Nebraska, New York, Oklahoma, and Utah. Another specific aim of the AYS is to present data on the recent and lifetime use of alcohol, tobacco and other drugs, binge drinking, and other antisocial behaviors, such as poor academic attendance. Also, the survey seeks to examine the correlation of substance abuse with academic achievement, socioeconomic background, and perceived parental and peer approval (Harrison,

2012). Specific to this study, the survey collected data regarding zip-code, lifetime gambling and frequency for all types of activities, and potential confounders.

Recruitment and Informed Consent

For the 2012 survey, data were collected between January and April 2012 from both charter and public schools. School participation is voluntary. From the schools that chose to participate, not all students participated because informed consent is required from parents, and not all parents gave their consent. Also, some students were absent on the days when the AYS was conducted, and some refused to participate because informed consent is also required from students. However, data were collected from all 15 counties in Arizona and from 349 schools; 69,293 participants responded to the survey (Harrison, 2012).

AYS Data Collection and "Usable Cases"

Data were collected anonymously. School administrators and teachers were provided detailed instructions for administering the AYS. Teachers read a script to students to ensure anonymity and to reduce response bias, so students in different schools were likely to interpret the instructions in similar fashions. To further reduce response bias, the questionnaire was pretested, using a well-developed and tested administration protocol. This was to ensure that students would comprehend the meaning of every question. After completion, all surveys were mailed to Bach Harrison L.L.C. and electronically scanned. Bach Harrison L.L.C. provided technical assistance to the Arizona Criminal Justice Commission (Harrison, 2012).

Of the 69,293 completed surveys, 3,166 were discarded due to a high possibility of dishonesty. Dishonesty was determined to be present if at least one of the following four situations took place: 1) if a student marked an age that was inconsistent with his or her grade; 2) if a student said he or she had ever used phonoxydine (a non-existent drug); 3) if a student

reported a level of multiple drug use that was impossibly high; 4) and if a student indicated a past-month substance use rate higher than his or her lifetime use rate. Also, another 83 surveys were discarded because these students did not report a grade level or reported more than one grade level (Harrison, 2012).

Exclusion Criteria

Further responses were excluded from the AYS study. Because the intent of the biennial report was to analyze behaviors in 8th, 10th, and 12th graders, 6,078 students in the 6th, 7th, 9th, or 11th grade were excluded. Either these students completed the survey because they were attending a class that consisted of other grades or the school chose to survey these students for a more complete profile of their students (Harrison, 2012). An additional 149 students enrolled in schools of the Bureau of Indian Affairs (BIA), which are intended by the state to have their own dataset, were excluded. The final statewide analytic sample consisted of 62,817 students.

This current analysis eliminated an additional 214 participants, living in a zip-code in Bullhead City. Bullhead City is adjacent to the casinos in Laughlin, Nevada, along the state border. These subjects were excluded since it is unclear if those in Bullhead City feel that the nearby casinos in Laughlin are part of their community, due to living in another state. This study's final sample consisted of 62,603 students.

Sample Representativeness

The percentage of the final study sample from each county was found to be close to the actual percentage of students from each county. The only exception was Pima County, comprising of 14.4% of the total number of students statewide and only 8% of the sample (Harrison, 2012). It is important to note that Pima County includes Tucson, which is home to

three casinos. Thus, the number of adolescents in the sample living near a casino may not be an accurate representation of those in the actual population of Arizona.

Data Management

The Institutional Review Board (IRB) from the Oregon Health and Science University determined that the study did not require approval because the analyses used de-identified data. A data agreement was granted by the Arizona Criminal Justice Commission on February 28, 2014, allowing the use of the 2012 AYS. Data in an SPSS file was sent via email by the director of the Statistical Analysis Center of the Justice Commission. The data file was converted to a STATA file. Data management included eliminating students from Bullhead City, recoding variables, and creating analytic variables. For both data management and statistical analyses, STATA version 12 was used. Other than excluding participants and recoding and creating variables specific to this secondary analysis, data management was conducted by statisticians at Bach Harrison L.L.C. Thus, the data was already carefully evaluated for error and dishonesty.

Variables and Coding

Casino Proximity. This was measured by whether the participant lived in a zip-code that is in a town or city that has a casino(s) that was open before January 2012 (See Appendix A). Zip-codes for each adolescent are part of the 2012 AYS dataset. Participants that have zip-codes that belong to a town or city that has a casino(s) were in the proximate group. All other participants were in the other group, those who presumably lived further away from a casino(s). This variable was coded as "1=proximate" and "0=far."

Outcome Variables. These variables are youth lifetime gambling and frequency. The determination of values used the same question in the AYS:

- How often have you done the following for money, possessions, or anything of value:
  a. Played a slot machine, poker machine or other gambling machine?

b. Played the lottery or scratch off tickets?
c. Bet on sports?
d. Played cards
e. Bought a raffle ticket?
f. Played bingo?
g. Gambled on the internet?
h. Played a dice game?
i. Bet on a game of personal skill such as pool or a video game?
j. Bet on a horse or other

- Responses for each question (a-j) are:
  - Almost every day
  - Once or twice a week
  - Once or twice a month
  - At least once in the past 12 months
  - Before, but not in the past 12 months
  - Never

Lifetime gambling was defined by whether an adolescent has ever gambled in his or her life regardless of activity. This is a dichotomous (yes/no variable), coded as "1=yes" and "0=no." The responses to the above survey questions were used to create a single lifetime gambling variable. Gambling frequency was defined by how often an adolescent gambles, regardless of activity. For each participant, frequency was the highest frequency that the individual marked for questions (a-j). Frequencies were coded as "1=never", "2=before, but not in the past 12 months", "3= at least once in the past 12 months," "4=once or twice a month", "5=once or twice a week", and "6=almost every day."

Covariates. The covariates (and possible confounders) adjusted include grade, sex, race, rural vs. urban status, current alcohol and drug use, smoking status, parental living situation, and whether one skipped school. Decisions for the use of these covariates were made based on previous findings. All of the information for these covariates, except for rural vs. urban status, was collected by the 2012 AYS. Rural vs. urban status was determined by using county information from the AYS and information from the Arizona Rural Health Assessment, which

classifies counties as urban, Rural-Urban, and Rural-Rural (see Appendix B). The urban counties have at least one community with a population of 500,000 or greater. Rural-Urban counties have at least one community with a population of 50,000 or greater, while all communities in Rural-Rural counties have populations less than 50,000 (The University of Arizona Rural Health Office, 2010). This variable was coded as "1=residing in an urban county", "2=residing in a Rural-Urban county," and "3= residing in a Rural-Rural county." See below for how the covariates with information exclusively from the AYS were coded.

Table 1. Summary of covariates from 2012 AYS

Variable	Question(s) on AYS	Possible responses on AYS	Coding for analysis	Additional Information
Alcohol use	"How many occasions if any have you had beer, wine or hard liquor to drink during the past 30 days?"	- 0 - 1-2 - 3-5 - 6-9 - 10-19 - 20-39 - 40+	0=No occasion 1=1 or more occasions	
Drug use	"How many occasions if any have you…" - "…used marijuana during the past 30 days?" - "…used LSD or other hallucinogens during the past 30 days?" - "…used cocaine or crack during the past 30 days?" - "…used methamphetamines (meth, crystal meth) in the past 30 days?" - "…used Ecstasy ('X', 'E', or MDMA) in the past 30 days?" - "…used prescription pain relievers (such as Vicodin, Oxycontin, Percocet, or Codeine) without a doctor telling you to take them during the past 30 days?" - "…used heroin in the past 30 days?" - "…used prescription sedatives (tranquilizers, such as Valium or Xanax, barbiturates, or sleeping pills) without a doctor telling you to take them during the past 30 days?"	- 0 - 1-2 - 3-5 - 6-9 - 10-19 - 20-39 - 40+	0=No drug use 1=Any drug use	These eight questions were used to create a single dichotomous variable

Table 1 (Continued).

Smoking status	"Have you ever smoked cigarettes?"	- Never - Once or twice - Once in a while but not regularly - Regularly in the past - Regularly now	1=Never/Once or twice/Once in a while but not regularly (non-smoker) 2=Regularly in the past (ex-smoker) 3=Regularly now (current smoker)
Parental living situation	"Think of where you live most of the time. Which of the following people live there with you? (Mark all that apply.)"	- Mother - Stepmother - Father - Stepfather - Foster parents(s) - Grand-parents(s) - Aunt - Uncle - Other adults(s) - Brother(s) - Stepbrother(s) - Sister(s) - Stepsister(s) - Other children	1=Lives with both mother and father 2=Lives with only mother or father 3=Does not live with parents
Skipped school	"During the LAST FOUR WEEKS how many whole days of school have you missed because you skipped or 'cut'?"	- None - 1 day - 2 days - 3 days - 4-5 days - 6-10 days - 11 or more days	1=No 2= Yes (1 or more days skipped)
Grade	"What grade are you in?"	-8th -10th -12th	1=8th 2=10th 3=12th
Sex	"Are you:"	- Female - Male	0=Female 1=Male
Race	"What is your race? (Mark all that apply.)"	- American Indian or Alaska Native (AI/AN) - Asian - Black or African American - Hawaiian or other Pacific Islander - White	1=White 2=Black or African American 3=AI/AN 4=Other

Descriptive Analysis

The characteristics of this study's sample were determined by calculating frequency distributions for each of the variables. Prevalence for lifetime gambling was calculated by dividing the number of adolescents who have ever gambled by the number of youth with data for lifetime gambling. The prevalence estimates for different gambling frequencies were calculated by dividing the number of youth in a specific frequency category (such as 'almost every day') by the number of youth with data for frequency. Prevalence was expressed as a percentage.

Logistic Regression Analysis

Logistic regression determined if casino proximity predicted lifetime gambling. STATA automatically excludes observations with missing data for logistic regression. Simple logistic regression was used to analyze the association between proximity and lifetime gambling, as well as the associations between each covariate and lifetime gambling. Unadjusted odds ratios and their 95% CIs described the association between each predictor and lifetime gambling. Casino proximity and any covariates that have *p*-values less than .25 were included in stepwise selection procedures for multiple logistic regression to determine which covariates should stay in the model. Inclusion criteria was set at p=.15, and exclusion criteria was set at p=.2 for the stepwise selection. Afterwards, manual selection of variables based on multiple logistic regression was conducted. All non-significant variables ($p > 0.05$) were initially removed, and the variables not included in the selection procedures were added back to the model to check if still non-significant (α=.05). If significant, they were included back in the model. This was the main effects model. For this model, adjusted odds ratios and their 95% CIs for each predictor were estimated.

Interaction terms between casino proximity and each of the covariates, sex and each of the covariates, and grade and each of the covariates were assessed. Interactions including proximity were assessed since proximity was our predictor of interest. Being male is a risk factor for engaging in risky behaviors. For example, young men who drink alcohol or use drugs may be more likely to gamble than young women who abuse substances, even though substance abuse may increase the likelihood of gambling for both groups. Age (correlated with grade) may affect one's ability to gamble; for example, younger adolescents may have less money to gamble with or lack the necessary transportation to gamble with peers.

Each interaction was added to the main effects model separately. The model with the interaction and the model without the interaction were compared using the Likelihood-Ratio test. If the model with the interaction was a better fit, the interaction was included in the model, and its variables (if not in the model already) were added back to the model. Multiple logistic regression with all the predictors and the chosen interactions assessed if still significant (α=.05). If non-significant, they were to be excluded; however, non-significant variables that made up significant interactions were allowed in the model. All excluded variables were added back to check if still non-significant (α=.05).

Confounding was assessed for with all excluded variables. Each potential confounder was added back to the overall model separately. The beta coefficient for casino proximity was compared in the model with each confounder and without each confounder. If the coefficient changed by more than 10%, then the variable was a confounder and needed to be included in the model. Multicollinearity was assessed using the Variance Inflation Factor approach. The Hosmer-Lemeshow test assessed goodness of fit. Lastly, outliers were determined by detecting observations with Pregibon's dbeta values greater than 1. These observations were deleted, and

the model without the outliers was compared to the model with the outliers by examining the odds ratio for proximity.

Multinomial Logistic Regression Analysis

Multinomial logistic regression was conducted to determine if casino proximity predicted gambling frequency. At first, ordered logistic regression was used to determine this relationship. A model was built, with casino proximity being a significant predictor. However, the proportional odds assumption was violated. The variables in the model did not predict the relationship between each gambling frequency in the same manner. Thus, multinomial logistic regression became the optimal method.

Univariate analyses were first used for casino proximity and each potential confounder. The base level used for gambling frequency was "never." Using the Wald statistic, variables with *p*-values less than .25 were included in the further analysis. Because STATA does not allow stepwise variable selection procedures for multinomial logistic regression, variable selection was conducted manually based on likelihood ratio tests. The original full model included variables with *p*-values less than .25 from the univariate analyses. For the comparative models, I eliminated a predictor from the full model. The comparative models were compared to the full model separately. If the full model was non-significant, then that certain predictor was removed from the model, and the comparative model became the new full model. This process was repeated until I tested for the elimination of all predictors. Variables not originally included in the Likelihood-Ratio tests (with *p*-values greater than .25) were individually added back to the model and compared to the final model to check if still non-significant (at the α=.05 level). The model determined by these procedures was the main effects model.

Interactions were assessed to determine the final model. This analysis assessed the same interactions that were tested in the logistic regression analysis and in the same manner. After, a multiple multinomial logistic regression was conducted to check if each predictor and interaction term chosen were still significant. Non-significant variables were removed from the model. The adjusted relative risk ratios and their 95% CIs for each predictor in the model were determined. Multicollinearity was assessed for using the Variance Inflation Factor approach. The independence of irrelevant alternatives (IIA) assumption was checked for using the Hausman test.

The goodness of fit of the model was checked by running separate multiple logistic regressions for each pair of frequencies, using the variables specified by the multinomial logistic analysis. The Hosmer-Lemeshow test was conducted for each logistic regression model. The assessment of outliers was assessed by detecting observations with Pregibon's dbeta values greater than one for each logistic regression model. The models with and without the outliers were compared to determine if the outliers influenced model estimates. The results found by running separate logistic regression analyses accurately represent the multinomial logistic regression model. I chose to run separate logistic regressions when conducting model diagnostics because STATA cannot determine outliers for multinomial logistic regression.

Results

Sample Characteristics and Gambling Prevalence

Arizona youths (*n*=62,603) aged 12 through 19 years completed the Arizona Youth Survey in 2012. The mean age was 15.2 years (SD=1.7). Gender was evenly distributed, with 50.5% of the sample being female and 49.5% being male. Approximately 25.9 % of the sample lived in close proximity to at least one casino, and the prevalence of youth who have ever

gambled was 72.1%. See tables below for sample characteristics and gambling prevalence by frequency. The number of participants with data for each variable varies because of missing data.

Table 2. Descriptive statistics for 2012 AYS participants

Variable	*N*	Percent
Casino proximity (*n*=62,603)		
Far	46421	74.15%
Proximate	16182	25.85%
Grade (*n*=62,603)		
8	28860	46.10%
10	18719	29.90%
12	15024	24.00%
Sex (*n*=61,113)		
Female	30841	50.47%
Male	30272	49.53%
Race (*n*=44,881)		
White	32915	73.33%
Black or African American	2632	5.86%
AI/AN	3176	7.08%
Other	6158	9.84%
Rural status (*n*=62,603)		
Urban county	45843	73.23%
Rural-Urban	1437	2.30%
Rural-Rural county	15323	24.48%
Alcohol use (*n*=59,196)		
No	42600	71.96%
Yes	16596	28.04%
Drug use *(n*=59,410)		
No	48335	81.36%
Yes	11075	18.64%
Smoking status (*n*=59,510)		
Non-smoker	54779	92.05%
Ex-smoker	2245	3.77%
Current smoker	2486	4.18%
Parent living situation (*n*=62,603)		
Lives with both mother and father	36435	58.20%
Lives with only mother or father	23110	36.92%
Does not live with parents	3058	4.88%
Skipped school (*n*=61,400)		
No	42060	68.50%
Yes	19340	31.50%

Table 3. Prevalence for lifetime gambling and frequency

	N	**Percentage**
Lifetime gambling (*n*=60,891)		
No	17020	27.95%
Yes	43871	72.05%
Gambling frequency (*n*=60,891; exclusive frequency)		
Never	17020	27.95%
Before, but not in the past 12 months	9048	14.86%
At least once in the past 12 months	17141	28.15%
Once or twice a month	10015	16.45%
Once or twice a week	4180	6.86%
Almost every day	3487	5.73%
Gambling frequency (*n*=60,891; non-exclusive frequency)		
Never	17020	27.95%
At least once in lifetime	43871	72.05%
At least once in the past 12 months	34823	57.19%
At least monthly	17682	29.05%
At least weekly	7667	12.95%
Almost every day	3487	5.73%

Logistic Regression Analysis for Lifetime Gambling

Based on univariate analyses, casino proximity, grade, sex, race, rural status, alcohol use, drug use, smoking status, parental living situation, and whether one skipped school had *p*-values less than .25 and were included in the stepwise selection procedures. Table 4 summarizes the unadjusted odds ratios for lifetime gambling for each predictor, as well as their *p*-values. Casino proximity alone was not associated with lifetime gambling (p=.21). The odds of an adolescent near a casino having ever gambled were .97 times less than the odds of an adolescent far from a casino having ever gambled.

Table 4. Summary of unadjusted associations between significant predictors* and lifetime gambling

Variable	Gambling occurrence (*n*, % having ever gambled)	Odds ratio (95% CI)	*P*-value
Casino proximity			.21
Far	32610 (72.18%)	Referent	
Proximate	11261 (71.66%)	.97 (.94, 1.01)	
Grade			<.0001
8th	21605 (74.86%)	Referent	
10th	13450 (71.85%)	.86 (.82, .89)	
12th	10124 (67.38%)	.69 (.66, .73)	
Sex			<.001
Female	20482 (67.70%)	Referent	
Male	22327 (76.39%)	1.54 (1.49, 1.60)	
Race			.0002
White	22720 (70.45%)	Referent	
Black or African American	1820 (72.22%)	1.09 (.99, 1.91)	
AI/AN	2246 (73.49%)	1.16 (1.07, 1.26)	
Other	4321 (72.15%)	1.08 (1.02, 1.15)	
Rural status			.0663
Urban county	32167 (72.00%)	Referent	
Rural-Urban county	1045 (74.80%)	1.15 (1.02, 1.30)	
Rural-Rural county	10659 (71.91%)	1.00 (.96, 1.04)	
Alcohol use			<.001
No	29187 (68.72%)	Referent	
Yes	13257 (80.26%)	1.85 (1.77, 1.93)	
Drug use			<.001
No	33749 (70.06%)	Referent	
Yes	8834 (80.14%)	1.72 (1.64, 1.81)	
Smoking status			<.0001
Non-smoker	39069 (71.52%)	Referent	
Ex-smoker	1728 (77.21%)	1.35 (1.22, 1.49)	
Current smoker	1903 (77.08%)	1.34 (1.22, 1.47)	
Parental living situation			<.0001
Lives with both mother and father	25472 (71.40%)	Referent	
Lives with only mother or father	16419 (73.20%)	1.09 (1.05, 1.14)	
Does not live with parents	2025 (71.05%)	.98 (.90, 1.07)	
Skipped school			<.001
No	28929 (69.98%)	Referent	
Yes	14426 (76.51%)	1.40 (1.34, 1.45)	

* *P*<.25 using simple logistic regression

Table 5 summarizes results from the multivariable logistic regression model with only main effects included. Casino proximity, grade, sex, race, alcohol use, drug use, parental living situation, whether one skipped school, and smoking status were selected as predictors of youth

gambling. When covariates were included, proximity did not have an influence on lifetime gambling (OR=1.04; 95% CI =.99 – 1.1, *p*=.088) after controlling for all other covariates in the model.

Table 5. Multiple logistic regression modelling results for lifetime gambling

	Main effect model		*Final model with interactions*	
Variable	**OR (95% CI)**	***P*-value**	**OR (95% CI)**	***P*-value**
Casino proximity		.088	---	.003
Far	Referent			
Proximate	1.04 (.99, 1.10)			.
Grade		<.0001	---	<.0001
8th	Referent			
10th	.80 (.75, .84)			
12th	.56 (.53, .60)			
Sex		<.001	---	<.001
Female	Referent			
Male	1.59 (1.52, 1.66)			
Race		.0485		.06262
White	Referent		Referent	
Black or African American	1.05 (.95, 1.16)		1.04 (.95, 1.15)	
AI/AN	1.08 (.99, 1.18)		1.08 (.99, 1.18)	
Other	1.08 (1.01, 1.15)		1.07 (1.00, 1.15)	
Alcohol use		<.001	---	<.001
No	Referent			
Yes	1.83 (1.73, 1.95)			
Drug use		<.001	**---**	<.001
No	Referent			
Yes	1.33 (1.24, 1.42)			
Parental living situation		.0888	**---**	**---**
Lives with both mother and father	Referent			
Lives with only mother or father	1.03 (.99, 1.08)			
Does not live with parents	.92 (.83, 1.03)			
Skipped school		<.0001		<.001
No	Referent		Referent	
Yes	1.29 (1.23, 1.36)		1.30 (1.23,1.37)	
Smoking		.1179	---	.0009
Non-smoker	Referent			
Ex-smoker	1.07 (.85, 1.21)			
Current smoker	.91 (.80, 1.02)			
Rural status			---	.5135
Urban county				
Rural-Urban county				
Rural-Rural county				

Table 5 (Continued).

	Main effect model		*Final model with interactions*	
Variable	**OR (95% CI)**	***P*-value**	**OR (95% CI)**	***P*-value**
Effect of grade for proximity				.009
8th grade				
Far			Referent	
Proximate			1.11 (1.02,1.20)	
10th grade				
Far			Referent	
Proximate			1.04 (.85, 1.14)	
12th grade				
Far			Referent	
Proximate			.95 (.86, 1.04)	
Effect of grade for alcohol use				.006
8th grade				
No alcohol use			Referent	
Alcohol use			2.05 (1.75, 2.40)	
10th grade				
No alcohol use			Referent	
Alcohol use			1.59 (1.40, 1.80)	
12th grade				
No alcohol use			Referent	
Alcohol use			1.55 (1.37, 1.75)	
Effect of grade for drug use				.001
8th grade				
No drug use			Referent	
Drug use			1.76 (1.51, 2.05)	
10th grade				
No drug use			Referent	
Drug use			1.23 (1.09, 1.38)	
12th grade				
No drug use			Referent	
Drug use			1.23 (1.10, 1.38)	
Effect of sex for alcohol use				<.001
Male				
No alcohol use			Referent	
Alcohol use			2.88 (2.12, 3.91)	
Female				
No alcohol use			Referent	
Alcohol use			2.03 (1.62, 2.54)	
Effect of sex for smoking				.001
Male				
Non-smoker			Referent	
Ex-smoker			1.14 (.81, 1.59)	
Current smoker			.84, (.44, 1.59)	
Female				
Non-smoker			Referent	
Ex-smoker			.76 (.57, 1.03)	
Current smoker			.50 (.29, .89)	

Table 5 (Continued).

	Main effect model		*Final model with interactions*	
Variable	**OR (95% CI)**	***P*-value**	**OR (95% CI)**	***P*-value**
Effect of sex for rural status				.007
Male				
Urban county			Referent	
Rural-Urban county			.99 (.78, 1.26)	
Rural-Rural county			.90 (.83, .97)	
Female				
Urban county			Referent	
Rural-Urban county			1.09 (.87, 1.37)	
Rural-Rural county			1.03 (.96, 1.10)	

For the final logistic regression model, interactions were assessed using the methods previously described. The interaction terms that were significant were grade*proximity, grade*alcohol use, grade*drug use, sex*alcohol, sex*rural status, and sex*smoking status. The predictors for the final model are shown in Table 5. All predictors were significant at the α=.05 level. Although rural status was non-significant on its own, it was included in the final model because of its significant interaction with sex. Race was kept in the model, despite being non-significant (p=.06), because it was a confounder. Parental living situation was not in the final model because it was neither significant nor a confounder.

Table 5 suggests that grade level served as an effect modifier between casino proximity and lifetime gambling (p=.009), after controlling for important covariates. Proximity was only a significant predictor of lifetime gambling for eighth graders. Eighth graders who lived near a casino were approximately 10% more likely to report ever gambled (OR=1.1; 95% CI =1.02 – 1.2, p=.01). Tenth graders who lived near a casino were 4% more likely to report ever gambled (OR=1.04; 95% CI=.95 – 1.14, p=.36). Twelfth graders who lived near a casino were 5% less likely to report ever gambled (OR=.95; 95% CI=.86 - 1.04, p=.239).

The model was evaluated for multicollinearity using the Variance Inflation Factor approach. Multicollinearity was not an issue because the mean VIF equaled 6.2 (less than 10). The final model provided a well enough fit of the data (HL Wald F=13.66, p=.0911).

Lastly, outliers were removed from the model by dropping observations with Pregibon's dbetas values greater than 1. There were 2,944 observations removed from the model. The interaction between grade and proximity was still significant (*p=.04).* However, proximity was not a significant predictor of lifetime gambling for all three grades. Eighth graders who lived near a casino were 7% more likely to report ever gambled (OR=1.07; 95% CI=.99 – 1.17, p=.101). Tenth graders who lived near a casino were 4% more likely to report ever gambled (OR=1.04; 95% CI=.95 – 1.14, p=.36). Twelfth graders who lived near a casino were 5% less likely to report ever gambled (OR=.95; 95% CI=.86 - 1.04, p=.239). The model without the outliers differed from the model with the outliers because casino proximity among 8th graders became a non-significant predictor. Thus, outliers influenced the results of this logistic regression analysis.

Multinomial Logistic Regression Analysis

Univariate analyses were conducted for casino proximity and each potential confounder, with gambling frequency as the outcome and 'never' being the base level. All predictors were significant, with p<.001. Thus, all predictors were included in the further analyses.

The main effects model was determined using the procedures previously described. The Likelihood-Ratio tests revealed that all variables should be included in the model. The final model was determined, also through Likelihood-Ratio tests (See tables below). Proximity distinguished youth who gambled at least once in the past 12 months, monthly, weekly, and daily from youth who have never gambled. When predicting whether one has gambled before, yet not

in the past 12 months, proximity was not a significant predictor. In the tables below, for each gambling frequency, only significant predictors (at the α=.05 level) are mentioned.

Table 6. Multinomial logistic regression modelling results for gambling frequency, comparing 'never' to 'at least once in the past 12 months' and 'never' to 'once or twice a month'

	Never- at least once in the past 12 months		*Never-once or twice a month*	
Variable	**RRR (95% CI)**	***P-value***	**RRR (95% CI)**	***P*-value**
Casino proximity		.002	---	.021
Far	Referent			
Proximate	1.26 (1.09, 1.46)			.
Grade		<.0001	---	<.0001
8th grade	Referent			
10th grade	.81 (.71, .93)			
12th grade	.56 (.44, .71)			
Sex	---	---	---	<.001
Female				
Male				
Race		.0005		.0268
White	Referent		Referent	
Black or African American	.81 (.71, .93)		.88 (.75, 1.04)	
AI/AN	.85 (.77, .95)		1.16 (1.03, 1.30)	
Other	.97 (.90, 1.05)		1.02 (.93, 1.11)	
Alcohol use	---	<.001	---	<.001
No				
Yes				
Drug use	---	<.001	**---**	<.001
No				
Yes				
Parental living situation		.0177		.0456
Lives with both mother and father	Referent		Referent	
Lives with only mother or father	1.01 (.96, 1.07)		1.00 (.94, 1.08)	
Does not live with parents	.83 (.73, .95)		.82 (.70, .97)	
Skipped school		<.001		<.001
No	Referent		Referent	
Yes	1.16 (1.09, 1.23)		1.40 (1.31, 1.50)	
Smoking status	---	.0008	---	.001
Non-smoker				
Ex-smoker				
Current smoker				
Rural status	---		---	
Urban county				
Rural-Urban county				
Rural-Rural county				

Table 6 (Continued).

	Never- at least once in the past 12 months		*Never-once or twice a month*	
Variable	**RRR (95% CI)**	***P-value***	**RRR (95% CI)**	***P*-value**
Effect of grade for proximity		.04		.004
8th grade				
Far	Referent		Referent	
Proximate	1.14 (1.01, 1.29)		1.13 (.98, 1.31)	
10th grade				
Far	Referent		Referent	
Proximate	1.22 (1.06, 1.40)		.94 (.77, 1.13)	
12th grade				
Far	Referent		Referent	
Proximate	.94 (.81, 1.08)		.83 (.67, 1.03)	
Effect of grade for sex	---	---		.016
8th grade				
Female			Referent	
Male			1.39 (.86, 2.25)	
10th grade				
Female			Referent	
Male			2.14 (1.49, 3.09)	
12th grade				
Female			Referent	
Male			2.06 (1.41, 3.01)	
Effect of grade for rural status	---	---		.022
8th grade				
Urban county			Referent	
Rural-Urban county			.92 (.70, 1.21)	
Rural-Rural county			.97 (.83, 1.14)	
10th grade				
Urban county			Referent	
Rural-Urban county			1.37 (.67, 2.79)	
Rural-Rural county			1.09 (.91, 1.30)	
12th grade				
Urban county			Referent	
Rural-Urban county			2.22 (1.22, 4.04)	
Rural-Rural county			1.27 (1.01, 1.59)	
Effect of grade for alcohol use	---	---		.008
8th grade				
No alcohol use			Referent	
Alcohol use			2.53 (2.07, 3.09)	
10th grade				
No alcohol use			Referent	
Alcohol use			1.92 (1.61, 2.31)	
12th grade				
No alcohol use			Referent	
Alcohol use			1.84 (1.50, 2.25)	

Table 6 (Continued).

	Never- at least once in the past 12 months		*Never-once or twice a month*	
Variable	**RRR (95% CI)**	***P-value***	**RRR (95% CI)**	***P*-value**
Effect of grade for drug use		.04		.017
8th grade				
No drug use	Referent		Referent	
Drug use	1.54 (1.29, 1.84)		1.94 (1.62, 2.34)	
10th grade				
No drug use	Referent		Referent	
Drug use	1.17 (1.02, 1.34)		1.44 (1.23, 1.67)	
12th grade				
No drug use	Referent		Referent	
Drug use	1.20 (1.06, 1.37)		1.41 (1.21, 1.65)	
Effect of grade for smoking	---	---		.004
8th grade				
Non-smoker			Referent	
Ex-smoker			.74 (.48, 1.15)	
Current smoker			.44 (.23, .84)*	
10th grade				
Non-smoker			Referent	
Ex-smoker			1.33 (.99, 1.79)	
Current smoker			.75 (.52, 1.09)	
12th grade				
Non-smoker			Referent	
Ex-smoker			.89 (.67, 1.17)	
Current smoker			.88 (.63, 1.23)	
Effect of sex for alcohol use		.002		<.001
Male				
No alcohol use	Referent		Referent	
Alcohol use	1.99 (1.40, 2.83)		3.39 (2.37, 4.85)	
Female				
No alcohol use	Referent		Referent	
Alcohol use	1.54 (1.18, 2.00)		2.60 (1.91, 3.53)	
Effect of sex for smoking		.019		.001
Male				
Non-smoker	Referent		Referent	
Ex-smoker	1.02 (.69, 1.53)		.95 (.63, 1.42)	
Current smoker	.59 (.27, 1.28)		.57 (.27, 1.24)	
Female				
Non-smoker	Referent		Referent	
Ex-smoker	.74 (.52, 1.06)		.67 (.44, 1.01)	
Current smoker	.40 (.20, .80)		.38 (.18, .83)	
Effect of sex for rural status		.015		.005
Male				
Urban county	Referent		Referent	
Rural-Urban county	.73 (.51, 1.04)		.97 (.67, 1.41)	
Rural-Rural county	.76 (.60, .96)		.75 (.58, .96)	
Female				
Urban county	Referent		Referent	
Rural-Urban county	.98 (.74, 1.29)		1.01 (.72, 1.41)	
Rural-Rural county	.82 (.66, 1.01)		.83 (.64, 1.08)	

Table 7. Multinomial logistic regression modelling results for gambling frequency comparing 'never' to 'once or twice a week' and 'never' to 'almost every day'

	Never- once or twice a week		*Never-almost every day*	
Variable	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P*-value**
Casino proximity	---	.093	---	.037
Far				
Proximate				.
Grade	---	<.0001	---	<.0001
8th grade				
10th grade				
12th grade				
Sex	---	<.001	---	<.001
Female				
Male				
Race		<.0001		<.0001
White	Referent		Referent	
Black or African American	1.24 (1.00, 1.53)		1.74 (1.41, 2.15)	
AI/AN	1.30 (1.12, 1.52)		1.62 (1.39, 1.90)	
Other	1.26 (1.11, 1.43)		1.39 (1.21, 1.59)	
Alcohol use	---	<.001	---	<.001
No				
Yes				
Drug use	---	<.001	---	<.001
No				
Yes				
Parental living situation	---	---	---	---
Lives with both mother and father				
Lives with only mother or father				
Does not live with parents				
Skipped School		<.001		<.001
No	Referent		Referent	
Yes	1.60 (1.45, 1.76)		1.83 (1.65, 2.03)	
Smoking status		.0272	---	---
Non-smoker	Referent			
Ex-smoker	.75 (.52, 1.08)			
Current smoker	.41 (.21, .81)			
Rural status		.0099		.2116
Urban county	Referent		Referent	
Rural-Urban county	1.40 (1.04, 1.89)		1.35 (.97 , 1.89)	
Rural-Rural County	.86 (.65, 1.13)		1.12 (.84, 1.51)	
Effect of grade for proximity		.008		.027
8th grade				
Far	Referent		Referent	
Proximate	1.05 (.85, 1.31)		1.12 (.87, 1.44)	
10th grade				
Far	Referent		Referent	
Proximate	.97 (.71, 1.34)		1.09 (.76, 1.57)	
12th grade				
Far	Referent		Referent	
Proximate	.55 (.36, .82)		.59 (.35, 1.00)	

Table 7 (Continued).

	Never- once or twice a week		*Never-almost every day*	
Variable	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P*-value**
Effect of grade for sex		.029	--=	---
8th grade				
Female	Referent			
Male	1.59 (.88, 2.89)			
10th grade				
Female	Referent			
Male	3.55 (2.07, 6.08)			
12th grade				
Female	Referent			
Male	2.34 (1.31, 4.18)			
Effect of grade for rural status		.006		.023
8th grade				
Urban county	Referent		Referent	
Rural-Urban county	1.59 (1.14, 2.21)		1.42 (.98, 2.06)	
Rural-Rural county	1.02 (.81, 1.30)		1.35 (1.04, 1.75)	
10th grade				
Urban county	Referent		Referent	
Rural-Urban county	1.74 (.67, 4.51)		1.15 (.33, 4.03)	
Rural-Rural county	1.31 (.98, 1.76)		1.80 (1.31, 2.49)	
12th grade				
Urban county	Referent		Referent	
Rural-Urban county	1.63 (.68, 3.88)		2.51 (1.03, 6.12)	
Rural-Rural county	1.39 (.97, 1.99)		1.17 (.70, 1.94)	
Effect of grade for alcohol use		<.001		.002
8th grade				
No alcohol use	Referent		Referent	
Alcohol use	3.60 (2.78, 4.65)		4.09 (3.07, 5.43)	
10th grade				
No alcohol use	Referent		Referent	
Alcohol use	2.36 (1.76, 3.14)		1.93 (1.39, 2.69)	
12th grade				
No alcohol use	Referent		Referent	
Alcohol use	1.77 (1.26, 2.49)		2.48 (1.55, 3.96)	
Effect of grade for drug use		.005		<.001
8th grade				
No drug use	Referent		Referent	
Drug use	2.35 (1.89, 2.93)		2.26 (1.80, 2.84)	
10th grade				
No drug use	Referent		Referent	
Drug use	1.40 (1.13, 1.73)		1.39 (1.11, 1.74)	
12th grade				
No drug use	Referent		Referent	
Drug use	1.47 (1.17, 1.84)		1.09 (.83, 1.42)	

Table 7 (Continued).

	Never- once or twice a week		*Never-almost every day*	
Variable	**RRR (95% CI)**	***P-value***	**RRR (95% CI)**	***P*-value**
Effect of grade for smoking		.042	---	---
8th grade				
Non-smoker	Referent			
Ex-smoker	.81 (.48, 1.38)			
Current smoker	.35 (.15, .81)			
10th grade				
Non-smoker	Referent			
Ex-smoker	1.24 (.81, 1.91)			
Current smoker	.89 (.52, 1.54)			
12th grade				
Non-smoker	Referent			
Ex-smoker	.97 (.64, 1.47)			
Current smoker	.98 (.57, 1.66)			
Effect of sex for alcohol use		.006	---	---
Male				
No alcohol use	Referent			
Alcohol use	5.93 (3.91, 8.98)			
Female				
No alcohol use	Referent			
Alcohol use	4.97 (3.23, 7.64)			
Effect of sex for smoking		.013	---	---
Male				
Non-smoker	Referent			
Ex-smoker	1.10 (.69, 1.76)			
Current smoker	.77 (.33, 1.84)			
Female				
Non-smoker	Referent			
Ex-smoker	.62 (.35, 1.11)			
Current smoker	.32 (.11, .93)			
Effect of sex for rural status		.029		.028
Male				
Urban county	Referent		Referent	
Rural-Urban county	1.48 (.96, 2.29)		1.30 (.82, 2.05)	
Rural-Rural county	.69 (.50, .96)		.79 (.57, 1.11)	
Female				
Urban county	Referent		Referent	
Rural-Urban county	1.40 (.88, 2.24)		1.65 (.95, 2.88)	
Rural-Rural county	.85 (.57, 1.25)		1.42 (.90, 2.24)	

Casino proximity was a predictor of gambling at least once in the past year, with grade level serving as an effect modifier (p=.04). Eighth graders who lived near a casino were 14% more likely to have gambled at least once in the past year compared to eighth graders far from a casino (RRR=1.14, 95%=1.01 – 1.29). Tenth graders near a casino were 22% more likely to have gambled at least once in the past year (RRR=1.22, 95% CI=1.06 - 1.40). Proximity was not

significant for twelfth graders. Twelfth graders who lived near a casino were 6% less likely to have gambled at least once in the past year (RRR=.94, 95% CI=.81 – 1.08).

Grade level served as an effect modifier for the relationship between proximity and gambling on a monthly basis (p=.004). However, the relationship between casino proximity and monthly gambling was non-significant within all three grades. Eighth graders who lived near a casino were 13% more likely to have gambled monthly (RRR=1.13, 95% CI=.98 - 1.31). Tenth graders who lived near a casino were 6% less likely to have gambled monthly (RRR=.94, 95% CI=.77 – 1.13). Twelfth graders who lived near a casino were 17% less likely to have gambled monthly (RRR=.83, 95% CI=.67 - 1.03).

Casino proximity was a predictor of weekly gambling, with grade level serving as an effect modifier (p=.008). The relationship between proximity and weekly gambling was only significant among twelfth graders. Eighth graders near a casino were 5% more likely to have gambled weekly compared to eighth graders living far from a casino (RRR= 1.05, 95% CI=.85 - 1.31). Tenth graders near a casino were 3% less likely to have gambled weekly (RRR=.97, 95% CI=.71 - 1.34). Twelfth graders near a casino were 45% less likely to have gambled weekly (RRR=.55, 95% CI=.36 - .82).

Lastly, grade level served as an effect modifier for the relationship between proximity and gambling on a daily basis (p=.027). The relationship was only significant (borderline significance) among twelfth graders. Eighth graders near a casino were 12% more likely to have gambled daily compared to eighth graders far from a casino (RRR=1.12, 95% CI= .87 – 1.44). Tenth graders near a casino were 9% more likely to have gambled daily (RRR=1.09, 95% CI=.76 – 1.57). Twelfth graders near a casino were 41% less likely to have gambled daily (RRR=.59, 95% CI= .35 - 1.00, p=.05).

The Hausman test revealed that the IIA assumption was met. Proximity and the covariates in the model predicted each gambling frequency (compared to 'never') differently. Multicollinearity is not an issue because the mean VIF was 8.7 (under 10). It was that high due to there being many interactions in the model. Goodness of fit was assessed by conducting five separate logistic regression analyses correlating with those conducted by the multinomial logistic regression analysis. This multinomial logistic regression model was a good fit since each of the five logistic regression models revealed Hosmer-Lemeshow tests with *p*-values greater than .05.

The removal of outliers influenced the multinomial logistic regression model. With the outliers, grade served as an effect modifier for the relationship between proximity and prior-year gambling, with the relationship being significant for eighth and tenth graders. Eighth graders near a casino were 14% more likely to have gambled at least once in the past year than those far from a casino (RRR=1.14, 95%=1.01 – 1.29). Tenth graders near a casino were 22% more likely to have gambled once in the past year (RRR=1.22, 95% CI=1.06 - 1.40). However, with the removal of the outliers, grade level was no longer an effect modifier. Casino proximity became a significant predictor on its own. Adolescents near a casino were 20% more likely to have gambled in the past year compared to those far from a casino (RRR=1.20, 95% CI= 1.03 – 1.39, *p*=.02).

The removal of outliers changed the results of our model predicting monthly gambling. With these outliers, grade served as an effect modifier for the relationship between proximity and monthly gambling, although the relationship was not significant at any grade level. With the removal of these outliers, grade no longer served as an effect modifier (*p*=.102), and casino proximity alone was a non-significant predictor (*p*=.489).

However, the removal of outliers did not significantly influence the model's ability to predict weekly gambling. With the outliers, grade level served as an effect modifier between casino proximity and weekly gambling, with the relationship only being significant among 12th graders. Twelfth graders near a casino were 45% less likely to gamble weekly (RRR=.55, 95% CI=.36 - .82), suggesting the protective effect of the 12th grade. With the removal of outliers, grade level still served as an effect modifier, with the relationship remaining only significant among 12th graders. Twelfth graders were 48% less likely to gamble weekly (RRR=.52, 95% CI=.35 - .79). The change in the relative risk ratios did not differ by at least 10%, concluding that these influential observations do not change the model's ability to predict weekly gambling.

Lastly, the removal of outliers changed the model's ability to predict gambling on a daily basis. Grade level no longer served as an effect modifier for the relationship. With the outliers, the relationship between proximity and daily gambling was of borderline significance (p=.05) among 12th graders. Twelfth graders near a casino were 41% less likely to gamble daily (OR=.59, 95% CI=.35 - 1.00). With the removal of these outliers, the interaction between grade and proximity was no longer significant (p=.292), and proximity alone was a non-significant predictor of daily gambling (p=.648). Thus, outliers influenced the results of this multinomial logistic regression analysis.

Discussion

Prevalence of Gambling

The prevalence of youth lifetime gambling was approximately 72%. An estimated 57.19% youth had gambled *at least* once within the past year. Approximately, 29% gambled *at least* monthly, 13% gambled *at least* weekly, and 6% gambled nearly daily. See the table below for how the prevalence in Arizona compares to those of other states. Keep in mind that regional differences and the years in which prevalence were assessed may account for variations in prevalence.

Table 8. Youth gambling prevalence of various states

State	Source	*N* and Age	Lifetime gambling	Past-year	At least monthly/ past month	At least weekly
Florida	Shapira, Ferguson, Frost-Pineda, and Gold (2002)	*n*=1051 (13-17)	70%	40%	---	11.5%
Indiana	Wolf and Hutcherson (2004)	*n*=811 (12-17)	45.4%	36.9%	17.8%	---
Minnesota	Stinchfield (2011)	*n* =83260 (9^{th} and 12^{th} graders)	---	53%	---	11.4%
Nevada	Volberg (2002)	*n*=1004 (13-17)	67%	49%	17%	7%
New York	Rainone and Gallati (2007)	*n*=5800 (12-17)	---	72%	34%	---
Oregon	Volberg, Hedberg, and Moore (2008)	*n*=1555 (12-17)	63%	46%		3%
Texas	Wallisch (1993)	*n*=924 (14-17)	79%	66%	---	14%
Washington	Volberg and Moore (1999)	*n*=1000 (13-17)	78%	65%	---	8%

Lifetime Gambling and Frequency

Casino proximity was a predictor of lifetime gambling, with grade level serving as an effect modifier. The relationship between proximity and lifetime gambling was only significant

among eighth graders. Eighth graders who lived near a casino were 10% more likely to report ever gambling compared to those far from a casino (p=.01). However, this change in odds was only marginal.

Proximity was also a predictor of gambling frequency, with grade level serving as an effect modifier. Eighth graders near a casino were 14% more likely to have gambled in the past year. Tenth graders near a casino were 22% more likely to have gambled in the past year. However, the change in risk among eighth and tenth graders was marginal. Suggesting the protective nature of being in the 12th grade, 12th graders near a casino were less likely to have gambled weekly or daily compared to 12th graders far from a casino. Twelfth graders near a casino were 45% less likely to gamble weekly and 41% less likely to gamble daily. The relationships between proximity and weekly gambling and proximity and daily gambling were non-existent among eighth and tenth graders.

Past literature provides rationale for why casino proximity positively correlated with lifetime gambling and gambling within the past year. Those living near a casino may be more exposed to casino advertisements. Casino advertisements may make gambling appealing to youth (McMullen et al., 2012; McMullen & Miller, 2010). Youth near a casino, especially in rural environments, may go to the casino often with family, such as for family dinners (Fabiansson, 2006). Exposure to a pro-gambling environment may lead youth to gamble among peers. Moore and Ohtsuka (1999) found that youth gambled more frequently when one's family and friends approved of gambling. Similarly, Larimer and Neighbors (2003) found that peer approval of gambling was a predictor of gambling among college students. Thus, casino proximity may lead to gambling initiation among youth regardless of form of gambling. In terms of casino gambling, adolescents are able to sneak past security systems intended to keep them

from casino gaming floors (Fabiansson, 2006; Welte et al., 2009). Adolescents living near a casino may be more likely to sneak inside, because they will not have to travel far. Adult studies show the importance of less travel time. Sévigny et al. (2008) found that casino proximity was associated with participation in casino games and casino expenditure. Adams et al. (2007) found that participating in casino slots and table games was more frequent in students attending college near a casino.

Based on the findings of Adams et al. (2007) and Sévigny et al. (2008), we were curious to determine if proximity influenced youth illegally gambling in casinos. We ran a secondary analysis examining proximity as a predictor of gambling with slots, because this form of gambling is associated with casinos. About 11.3% of the AYS sample reported ever gambling with slots, which may be surprising due to the age limit of 21. After adjusting for the known risk factors of youth gambling, proximity was not a predictor of lifetime slot gambling or frequency. However, we should be careful not to conclude that proximity has no effect on youth gambling in casinos, because there are other forms of gambling, besides slots, that youth can illegally participate in. For example, Fabiansson (2006) found that the most frequently reported gambling activities in casinos by youth were blackjack, poker, and roulette. Unfortunately, the AYS survey does not ask questions specifically for casino gambling, and many activities can be played privately, making it difficult to distinguish between casino and non-casino gambling.

Grade and Lifetime Gambling/ Frequency.

The finding that grade level did not positively correlate with gambling frequency and lifetime gambling was surprising, due to contradicting past research. Volberg et al. (2008) found that gambling frequency correlated with age in a survey of Oregon youth. The average age of adolescents who gambled weekly was significantly higher than those who gambled less

frequently, and those who gambled weekly or more often were likely to be in high school rather than in middle school grades. A prior youth survey in Oregon also found that gambling increased with age, and youth gambling surveys in Florida and Texas found similar results (Carlson & Moore, 1998; Shapira et al., 2002; Wallisch, 1993). The results of our multinomial logistic regression analysis suggest otherwise. When predicting weekly gambling, 10th graders were 49% less likely to gamble weekly compared to 8th graders, and 12th graders were 71% less likely to gamble weekly compared to eighth graders. When predicting daily gambling, 10th graders were 44% less likely to gamble daily compared to 8th graders, and 12th graders were 71% less likely to gamble daily compared to 8th graders. Grade also did not positively correlate with lifetime gambling. In the 2012 AYS, 75% of 8th graders, 72% of 10th graders, and 67% of 12th graders reported ever gambling. In contrast, McMullen et al. (2012) found that 22% of 13 and 14 year olds ever gambled compared to 69% of those ages 17 and 18.

However, some youth surveys found that gambling frequency and lifetime gambling do not necessarily increase with age. A New York survey found that lifetime and monthly gambling rates did not differ between 7-8th, 9-10th, and 11-12th graders (Rainone & Gallati, 2007). A Nevada survey supported our results regarding grade, finding that older adolescents were not more likely to gamble than younger adolescents (Volberg, 2002). Lastly, previous AYSs conducted in 2008 and 2010 replicated our results regarding grade (Harrison, 2012). However, due to mixed findings regarding age and grade, we should be careful not to generalize our results regarding grade.

There are possible explanations for why we found grade level to be negatively correlated with lifetime gambling and frequency. First, eighth graders may have a different of idea of gambling than 10th and 12th graders. The 2012 Arizona Youth Survey referred to gambling as an

activity for "money, possessions, or anything of value." Eighth graders may gamble (such as buy a raffle ticket or play bingo) for non-monetary prizes, such as for candy or snacks, and consider these prizes as valuable. However, 12th graders, although equally taking part in these activities, may not see these prizes as valuable, and thus, may not consider the activity as actually gambling. Differences in interpretation may be why lifetime gambling and frequency decreased with an increase in grade level.

Another explanation is because grade level was not evenly distributed; tenth and twelfth graders were underrepresented compared to eighth graders. In the AYS sample, 46% were eighth graders, 30% tenth graders, and 24% twelfth graders. A more representative sample would have grade evenly distributed, since enrollment numbers for the 2011-2012 school-year for 8th, 10th, and 12th graders were approximately equal, according to the Justice Commission. Response rates decreased with an increase in grade; eighth graders had a response rate of 35.7%. Tenth graders had a response rate of 23.4%, while only 18.8% of twelfth graders responded. Older youth who gambled may have been excluded from our analyses, leading to a negative association. There are many reasons for why response rates may have decreased with an increase in grade level. It may be more difficult to survey twelfth graders because schools may be focusing on college preparation. Tenth graders may be more difficult to survey than eighth graders due to the more demanding nature of high school courses. Tenth and twelfth graders may be more likely to skip classes, since they have cars that allow them to leave school campuses. Past AYSs also found that response rates were negatively correlated with grade (Harrison, 2008; Harrison, 2012), indicating that grade distributions may be of a systematic nature. Also, it is likely that our sample excluded older gamblers because gambling is positively associated with truancy; this analysis found that skipping school was positively associated with

lifetime gambling and frequency. Tenth and twelfth grade gamblers may have the means (e.g. transportation) to skip school compared to eighth grade gamblers. The loss of older gamblers in the sample may explain the negative correlation between grade and youth gambling . Thus, we should interpret our findings regarding grade lightly.

Grade and Proximity Interaction.

Due to rationale and past findings of age, our findings of the interaction between grade level and proximity may be surprising. One may expect for the relationship between proximity and lifetime gambling/frequency to be positively correlated among twelfth graders. Older youth may have more money to spend because they are old enough to acquire work. Thus, they are likely to be influenced by a nearby gambling environment and advertisements, having enough money to start or keep gambling. Rather, this study found that casino proximity did not positively correlate with gambling behaviors among older students. Being in the twelfth grade served as a protective factor for higher gambling frequencies, with twelfth graders near a casino being less likely to gamble weekly or daily compared to twelfth graders far from a casino. However, we should interpret this interaction with caution, since response rates decreased with an increase in grade. With the tenth and twelfth grades having fewer respondents than the eighth grade, our sample could have lost older individuals living near a casino who gambled. Also, gambling is positively associated with truancy; we found that skipping school was positively associated with lifetime gambling and frequency. A sizable portion of gamblers may not have been present when AYS data were collected, especially older gamblers because they may have the means (e.g. transportation) to skip school. Older gamblers excluded may have been living near a casino. With the loss of these individuals, being in the twelfth grade may have

falsely appeared as a protective factor against weekly and daily gambling for those near a casino, instead of as a risk factor. Thus, the interaction term should be interpreted with caution.

Limitations and Strengths

A limitation of this study is its inability to control for depression, a family history of gambling, and if one has recently moved, which are possible confounders. The 2012 AYS does not ask any questions regarding depression, family history, and moving status. However, using the AYS was a cost-effective way to gather data, because there are no current existing datasets that account for youth gambling, casino proximity, and every possible confounder. It would be costly to issue surveys that measure all possible confounders, as well as the exposure and outcome. For example, subjects would need to be recruited, such as by providing monetary incentives for schools to issue and youths to complete the survey. Thus, it would not be feasible to discard the AYS in favor of gathering new data. Also, with a large sample size 62,603 youth, it is unlikely that the majority have recently moved.

Another limitation is this study's measure of casino proximity, which is residing in a zip-code that is in a town that has at least one casino. Some zip-codes are part of more than one town. For an adolescent that has a zip-code that is in two towns, he or she may be classified as living proximate to a casino, yet live in a neighboring community that has zero casinos. However, it is possible that the effect from a casino will extend into neighboring communities. Participants may have a zip-code that is exclusively in a town that has a casino, yet still be far from a casino for any effects to take place, because some towns are larger than others. Alternatively, participants may have a zip-code that is exclusively in a town that has no casino, yet be close to a casino, due to living along a town's borders. Thus, with zip-codes, there is the possibility of misclassification. Therefore, defining casino proximity as whether one resides

within a specific distance of a casino may be more effective, as was done in Sévigny et al. (2008). However, such data were not collected by the AYS. The AYS does not ask students for their addresses; only data regarding zip-codes were collected. With zip-codes, it is impossible to determine the exact distance one lives from a casino. I could only determine whether one lives in the same zip-code that is in a town that has a casino. Similarly, Adams et al. (2007) based casino proximity on if the casino was visible in the immediate or local community, which is a subjective measure; no exact mileages were used. Based on Adams et al. (2007), using zip-codes to determine proximity may have been a practical proxy measure. Also, there may be effects from living in a town that neighbors a casino community, which may be captured by the zip-code method. Thus, the strategy of using zip-codes to determine proximity may have been both practical and useful.

In addition, the sample used in this study may not be representative of Arizona. The percentage of the sample from each county was close to the actual percentage of students from each county. The only exception was Pima County, comprising of 14.4% of the total number of students statewide and approximately only 8.0% of the sample (Harrison, 2012). Pima County includes Tucson, which is home to three casinos. With the exclusion of more subjects living near a casino, the results could be skewed either away from or towards the null hypothesis that casino proximity does not affect youth gambling. Also, the sample may not be representative due to grade level being unevenly distributed and uneven response rates among eighth (35.7%), tenth (23.4%), and twelfth graders (18.8%). With lower response rates among tenth and twelfth graders, results among these grades may not accurately represent their respective populations in Arizona. Thus, studies should be repeated that are able to achieve similar response rates from youth of different ages or grades.

Fourthly, our results may not accurately reflect the gambling behaviors of Arizona youth. Youth gambling has been associated with truancy. This analysis found that skipping school was positively associated with lifetime gambling and frequency. Additionally, poor school performance and delinquency were found to be risk factors of problem gambling in youth (Shead, Derevenksy, & Gupta, 2010; Winters et al., 2002). Delinquents and youth with poor academic performances may be likely to skip school on a regular basis, and therefore, may not have been present when AYS data were collected. Thus, our sample study, as well as samples from other youth surveys, may have excluded youth who regularly gamble or experience problem gambling. With the exclusion of gamblers, our estimated prevalence of gambling may be lower than actual, and the results from our inferential analyses may not be accurate. Therefore, future studies should seek creative recruitment methods to achieve samples that accurately reflect the risky behaviors of youth.

Lastly, there is a lack of generalizability because only Arizona youth were surveyed. The results of this study may not be generalizable to youth in other regions of the United States or other countries where gambling is more or less mature. All 21 casinos in Arizona used to determine casino proximity have been open for at least ten years prior to 2012. However, some states have recently opened casinos, such as within the past five years. The effect of a nearby casino may depend on how long the casino has been in business, due to the *adaptation hypothesis*, which proposes that people gradually adapt to the risks and hazards associated with potential objects of addiction (Shaffer, 2005). Also, many towns in Arizona that have a casino(s) only have one or at most three (Tucson). These towns do not resemble communities where gambling is the main industry, such as Las Vegas or Atlantic City. Our results may not apply to these communities. Additionally, states differ in gambling laws, including what types of

gambling are available and the legal gambling age. In 2012, legalized gambling in Arizona included 14,530 electronic gaming machines, a traditional state lottery, Indian casinos, pari-mutuel wagering, and charitable gaming (Marotta, Bahan, Reynolds, Vander Linden, & Whyte, 2014). The legal age for gambling is 21 years, which came into effect June 1, 2013, when the legal age increased from 18 to 21 (Ariz. Rev. Stat. § 13-3301). However, in many other states, those who are 18 may purchase lottery tickets. These differences may cause state variations in youth gambling trends. Thus, studies should be repeated in other states to determine if the effect of living near a casino is likely to exist no matter of region.

The main strength of this study was the AYS. The dataset has a large sample size, with 62,603 adolescents. With a large sample size, it was possible to detect small differences between those who live near a casino and those who do not. The dataset was ideal because there are many casinos scattered throughout Arizona. There were 21 casinos in Arizona located within 17 towns open in 2012. With casinos scattered throughout the state, it was possible for differences between rural and urban communities to be assessed. With many casinos, the sample sizes in the two proximity groups were large enough to detect small statistical differences. Additionally, this study is important because no previous studies have been conducted which examine the relationship between casino proximity and gambling in adolescents.

Implications

It is important to understand the relationship between casino proximity and lifetime gambling and frequency in adolescents. Early-onset gambling should be addressed because it is a risk factor for problem gambling in adults (Winters et al., 2002; Volberg et al., 2010). Problem gambling in youth is associated with drug and alcohol use, poor seatbelt use, violence and risky sexual activity (Volberg et al., 2010). Additionally, Volberg et al. (2008) found that

the frequency of gambling among adolescents was associated with alcohol, tobacco, and marijuana use.

The findings of this study may provide some comfort because proximity was not positively associated with higher gambling frequencies. Those who gamble at a higher frequency may be more of a concern compared to those who have only tried gambling once or gamble a few times a year. Gambling frequency may be associated with gambling severity, although not always the case. A survey of Maryland adults found that those who gambled weekly had a higher percentage of problem and at-risk gambling compared to those who gambled monthly or only in the past year (Shinogle et al., 2011). Out of those who gambled on a weekly basis, 13.5% were problem gamblers compared to 3.6% of monthly gamblers and 1.1% of prior-year gamblers. Out of those who gambled on a weekly basis, 20% were at-risk gamblers compared to 14.1% of monthly gamblers and 6.3% of prior-year gamblers. Thus, it is of some comfort that casino proximity did not positively correlate with gambling on a weekly or daily basis. Youth who gamble on a weekly or daily basis may be more at risk for developing gambling problems compared to youth who gamble less frequently.

However, those who gamble a few times a year may still be at risk for developing gambling problems, so we should not be completely reassured. Just because one does not gamble on a frequent basis does not mean that one is in control of one's gambling. Some individuals in the population gamble less frequently and yet gamble more heavily (Abbott, 2001; Abbott et al., 2004). Thus, we should be concerned that casino proximity was positively associated with prior-year gambling (among eighth and tenth graders) and lifetime gambling (among eighth graders), although the association was minor. An adolescent may only need the initial gambling experience to determine if gambling is an enjoyable and exciting activity. Thus,

interventions should be implemented that discourage gambling and target adolescents living near casinos. Adams et al. (2007) suggests that casinos provide money and other resources to local schools for prevention and treatment programs for gambling problems that may materialize due to exposure or accessibility effects. Also, casinos may take care to practice socially responsible advertising. McMullan et al. (2012) found that youth (especially those 15-18 years) were favorably disposed to casino ads. This group expressed a desire to gamble and perceived from ads that gambling has cultural capital, since it allows one to socialize with friends, win money quickly, have fun by playing, and feel excitement. Casinos may be responsible by using ads that show gambling as a pleasurable experience, meanwhile showing that it is possible to have fun, win money, have social status, and experience excitement without gambling (McMullan et al., 2012). Such ads may promote gambling among adults while minimizing harm that may result from naïve views of the value and purpose of gambling.

Future Studies

Future studies should address the relationship between casino proximity and problem gambling in youth. This current study was only able to examine gambling frequency, which is not always an indicator of problem gambling. It was practical to examine frequency, since it is assessed by the AYS, and the AYS is an established biennial survey that has been conducted for 21 years achieving large sample sizes. However, problem gambling should be directly assessed due to its negative consequences. Problem gambling compromises, disrupts, or damages personal, family, or vocational pursuits (Volberg et al., 2008). It would also be useful to determine if adolescents living near a casino(s) are more likely to have problems with gambling in adulthood. Current studies have only examined adult casino proximity and problem gambling. It may be useful to examine youth casino proximity, because the environment that one grows up

in may play a key role in the development of one's attitudes and habits towards gambling. Growing up with the belief that gambling is acceptable and exciting may be motivation for adults to start or keep gambling. Alternatively, growing up in a community that hosts a casino may serve as a protective factor for adult-onset problem gambling by producing an inoculation effect. Discovering the long-term impacts of growing up in a casino community hold important public health implications and deserve further study.

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Appendix A

List of Arizona Casinos Open before January 2012

Casino	**Location**
Apache Gold	San Carlos
Blue Water	Parker
Bucky's	Prescott
Casino Del Sol	Tucson
Casino Arizona at Talking Stick	Scottsdale
Casino Arizona at Salt River	Scottsdale
Cliff Castle	Camp Verde
Cocopah	Somerton
Desert Diamond-Tucson	Tucson
Desert Diamond-Sahuarita	Sahuarita
Desert Diamond-Why	Why
Fort McDowell	Fort McDowell
Harrah's Ak-Chin	Maricopa
Hon-Dah	Pinetop
Lone Butte	Chandler
Mazatzal	Payson
Paradise	Yuma
Spirit Mountain	Mohave Valley
Vee Quiva	Laveen
Wild Horse	Chandler
Yapavai	Prescott

Appendix B

Urban and Rural Definitions by County from Arizona Rural Health Assessment (The University of Arizona Rural Health Office, 2010)

County	**Urban/Rural Definition***
Apache	Rural-Rural
Cochise	Rural-Rural
Coconino	Rural-Urban
Gila	Rural-Rural
Graham	Rural-Rural
Greenloe	Rural-Rural
LaPaz	Rural-Rural
Maricopa	Urban
Mohave	Rural-Rural
Navajo	Rural-Rural
Pima	Urban
Pinal	Rural-Rural
Santa Cruz	Rural-Rural
Yavapai	Rural-Rural
Yuma	Rural-Urban

* Urban counties have at least one community with a population of 500,000 or greater; Rural-Urban counties have at least one community with a population of 50,000 or greater; all communities in Rural-Rural counties have populations less than 50,000