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Risk and Protective Factors for Opioid Misuse in American Indian Adolescents

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Abstract

Background: American Indian (AI) youth have disproportionately high rates of both heroin and other opioid misuse and recently have seen a large increase in negative outcomes due to opioid misuse. To address the dearth of research on within-group risk factors for heroin and other opioid misuse in AI adolescents, the goal of the present study is to explore the influence of peer, family, and school factors on opioid use among AI youth.

Methods: Participants ($n=3,498$, 49.5% female, $M_{age}=14.8$) were drawn from a large school-based sample of AI youth living on or near reservations, across six geographic regions, between 2009 and 2013. Participants completed a self-report questionnaire regarding substance use and related factors. Multilevel logistic regression was utilized to examine the role of peer, family, and school-related factors on past-month and lifetime heroin and other opioid misuse.

Results: Greater peer substance use (OR = 1.14, $p<0.001$), lower family disapproval of use (OR = .98, $p = 0.01$), and lower school performance (OR = .90, $p = 0.01$) were associated with greater likelihood of lifetime opioid misuse. Greater peer substance use (OR = 1.05, $p<0.001$) and lower family disapproval of use (OR = .99, $p = 0.04$) were associated with greater likelihood of past month opioid misuse. Greater peer substance use was the only variable significantly related to greater likelihood of lifetime (OR=1.15, $p<.001$) or past month heroin use (OR=1.02, $p=.047$).

Conclusions: Findings highlight the need for interventions and offer potential factors to consider in developing interventions for heroin and/or other opioid misuse among AI adolescents.

Keywords

opioid; heroin; American Indian; adolescents; contextual factors

Contributors

The first author (Nalven) contributed to the manuscript and guided the choice of study variables. Dr. Spillane provided expertise in AI populations and substance use, guided the statistical analyses, and assisted with writing the manuscript. Ms. Schick assisted with writing the manuscript and statistical analyses. All authors reviewed and approved the final manuscript before submission.

Conflict of Interest

No conflict of interest declared.

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1. Introduction

Rates of heroin and other opioid (e.g. oxycodone, methadone, codeine) misuse have substantially increased over the past two decades (Dart et al., 2015; Johnston et al., 2009). Of the 20.5 million Americans meeting criteria for any substance use disorder in 2015, 10% had an opioid use disorder (e.g. heroin, misuse of pain relievers used for purposes other than prescribed, or non-prescription use) and 2.5% had a heroin use disorder (SAMHSA, 2017). While this “opioid crisis” (Drug Enforcement Agency, 2017) has affected all races/ethnicities, age groups, and socioeconomic statuses (SES; Pletcher et al., 2008), American Indians (AIs) are disproportionately affected. Among AI communities, opioid use disparities are reported at alarming rates (Centers for Disease Control and Prevention, 2011; King et al., 2014; Rieckmann et al., 2012). AI youth have disproportionately high prevalence rates of opioid misuse and consequences compared to their non-AI peers (Stanley et al., 2014; Wu et al., 2011); for example, one study found AI youth have over a 500% higher mortality rate due to opioid use (Mack et al., 2017). Despite these alarming statistics, there is a dearth of studies investigating risk and protective factors for heroin use and opioid misuse in AI youth. Therefore, the present study will examine individual differences in heroin and opioid misuse among a sample of AI youth to guide potential targets for intervention.

While studying risk and protective factors related to opioid misuse is meaningful, it is also important to note the context in which AI people live so as to not over-pathologize, overgeneralize, or stigmatize groups and/or individuals. Substance use disparities in AI populations are due, in large part, to the effects of systemic racism and historical trauma (Bombay et al., 2014; Evans-Campbell, 2008). Indeed, discrimination and historical trauma, such as colonization and the resulting destruction of culture, are associated with higher rates of substance use (Brave Heart, 2003; Skewes et al., 2019; Whitbeck et al., 2004). This historical trauma leads to decreased availability of culturally-based alternative reinforcers (such as powwows and sweats) for adolescents to engage in instead of substance use (Hawkins, Cummins, & Marlatt, 2004; Spillane and Smith, 2007; Spillane et al., 2013).

While considering the important historical contextual factors still affecting AI populations today, it is also critical to identify malleable factors that can reduce opioid misuse in AI adolescents. However, only one study to date has explored factors associated with opioid misuse within an AI sample. This qualitative study examining OxyContin misuse in a Midwest rural reservation found that individuals who have many peers who misuse OxyContin are at increased risk to misuse OxyContin themselves (Momper et al., 2011), further suggesting the need for exploration of within-community risk factors for opioid misuse.

More broadly, a number of contextual factors are associated with substance use in AI adolescents (Oetting et al., 1998). Primary Socialization Theory (PST) provides a way to understand adolescent AI substance use by employing peer substance use, family relations, and school bonds as explanatory variables (Oetting et al., 1998). Peer influence tends to be a robust predictor of adolescent substance use generally (Beauvais, 1992; Iannotti et al., 1996; Mason et al., 2017; Monahan et al., 2014; Oetting et al., 1986; Wills et al., 1999). However, research suggests that family factors may be even more important for some AI communities

due to living in remote locations and/or the collectivistic nature of their culture which prioritizes the group and family. Further, poor family bonding, weak family disapproval of substance use, and poor school adjustment are associated with increased substance use among AI youth (Beauvais, 1992). These findings that family, school, and peers are implicated in non-opioid substance use among AI adolescents suggest that they may offer important information regarding risk for heroin/opioid misuse.

Understanding factors associated with adolescent AI opioid misuse will allow for a better understanding of possible intervention and prevention targets. Thus, this study fills a critical gap in our knowledge of risk factors for heroin and opioid misuse in a high-risk population of adolescents. We hypothesized that, because of the small, close-knit nature of many AI reservation communities, higher family caring and family disapproval of substance use, better school performance, and more positive attitudes towards school would be associated with lower likelihood of heroin and opioid misuse, while peer substance use would be associated with greater misuse.

2. Methods

2.1. Participants

Participants were 3,498 self-identified AI students in Grades 7-12 between the ages of 10 and 21 years old ($M=14.8$, $SD=1.7$; 49.5% female). AI participants were selected from a larger study of 5,774 students (including non-AIs) living on or near AI reservations. The sample was drawn from 33 different schools across 11 states and was stratified across six geographic regions (Northwest, Northern Plains, Northeast, Southeast, Southern Great Plains, and Southwest) to match the percentage of AIs per geographic region reflected in the 2000 U.S. Census data (Snipp, 2000). Specific tribes and reservations who participated in the surveys are not identified to protect their confidentiality. Schools who elected to participate were compensated \$500 and were later provided with a report summarizing aggregate findings from their school. See Table 1 for sample demographic characteristics.

2.2. Procedures

The present study was a secondary data analysis of a dataset collected by Colorado State University's Tri-Ethnic Center for Prevention Research, which is publicly available from the National Addiction and HIV Data Archive Program. For more information regarding procedures for data collection, see Stanley and colleagues (2014). In brief, data were collected between 2009 and 2013 as a part of an ongoing epidemiologic study of substance use trends among AI youth. Prior to data collection, all study procedures were approved by tribal authorities, school boards, and the Colorado State University Institutional Review Board (IRB). Students provided assent to participate and passive consent was used by sending parents a form giving them the opportunity to opt their children out of the study; however, less than 1% of the sample declined or were opted out by their parents.

2.3. Measures

Participants completed The American Drug and Alcohol Survey™, a pencil-and-paper self-report survey which has been used in large national studies to assess substance use rates and

correlates. This survey was listed in the 2007 SAMHSA's Measures and Instruments Resource guide and has been continually updated to reflect current substances used by adolescents. It has also demonstrated good reliability and validity within AI adolescent populations (Oetting et al., 1990; Stanley et al., 2014).

2.3.1. School Measures—*School performance* was assessed using two questions asking what kind of grades participants get and how they would rate themselves as students. Four response options ranged from “poor” to “very good.” Items were summed, with higher scores indicating better school performance. Reliability in the present sample was adequate, Cronbach's $\alpha=0.75$.

Attitude towards school was measured using four questions assessing the degree to which participants like and enjoy school and their teachers and the extent to which they believe their teachers like them (e.g. one question asked if students like school). Four response options ranged from “not at all” to “a lot.” Items were summed, with higher scores indicating more positive attitudes towards school. Reliability in the present sample was good, Cronbach's $\alpha=0.85$.

2.3.2. Family Measures—*Family caring* was measured using three questions examining participant's perceptions of their family's attitudes towards them and their actions as well as the participants' attitudes towards their family (e.g. one question asked how much a student's family cares about them). Four possible response options ranged from “not at all” to “a lot.” Items were summed, with higher scores indicating a greater sense of family caring. Reliability in the present sample was good, Cronbach's $\alpha=0.87$.

Family disapproval of substance use was measured using 12 questions assessing how much a participant's family would try to stop them from using substances (for example, one question asked how much a student's family might try to stop them from drinking). Four possible response options ranged from “not at all” to “a lot.” Items were summed, with higher scores indicating more family disapproval of substance use. Reliability in the present sample was excellent, Cronbach's $\alpha=0.95$.

2.3.3. Peer Substance Use—Eight questions were used to explore perceptions of peer use of various substances (including opioids, alcohol, and other substances; e.g. one question asked how many of their friends use downers). Four possible response options ranged from “not at all” to “a lot.” Items were summed, with higher scores indicating greater perceived peer substance use. Reliability in the present sample was good, Cronbach's $\alpha=0.85$.

2.3.4. Opioid Outcomes

Lifetime misuse. Lifetime heroin use was assessed by asking participants if they had ever tried heroin. Lifetime opioid misuse (referring to use of opioids other than how they were prescribed or non-prescription use) was assessed by collapsing across two questions including a question asking if they had ever used a narcotic other than heroin to get high and a question asking if participants had ever tried Oxycontin. Response options were either “yes” or “no.” Narcotics examples provided in the survey were “codeine, methadone, opium,

and morphine” and were combined with questions about Oxycontin to account for opioid misuse broadly.

Past month misuse.: Past month heroin use was assessed by asking how often participants had used heroin in the past month. Past month opioid misuse was assessed by collapsing across two questions asking how often participants had used a narcotic other than heroin and how often participants had used Oxycontin to get high in the past month. Response options were “No,” “1-2 times,” “3-9 times,” “10-19 times,” and “20 or more times.” Because of the zero-inflated nature of the data, frequency variables were collapsed and coded as 0=“no” and 1=“yes,” such that a rating of 1 accounted for use 1-20 or more times.

2.4. Statistical analyses

All study analyses were conducted using SPSS v24.0 (IBM Corporation, 2016). As recommended by Tabachnik and Fidell (2007), all variables of interest were assessed for adherence to GLM assumptions. In data cleaning, 17 individuals were identified who reported current misuse of opioids but no lifetime misuse of opioids, and 20 individuals were identified who reported current use of heroin but no lifetime use of heroin. Due to this inconsistent responding, we excluded these individuals from analyses. Next, Pearson product-moment correlations were calculated to explore bivariate associations among relevant study variables. Then, a multilevel analytic approach was used to account for the nesting of the data within communities (level two) and to evaluate the effects of gender, age, school, family, and peer factors (level one) on lifetime and past month heroin and other opioid misuse. Four multilevel logistic regressions were conducted to examine the association between hypothesized predictors and lifetime and past month heroin and other opioid misuse after controlling for the effects of age and gender. Results focus on level one variables only in the hopes of better understanding individual differences in adolescent heroin and opioid misuse.

3. Results

3.1. Bivariate Correlations

Pearson product-moment correlations revealed that all substance use outcomes (i.e., lifetime and past month heroin and other opioid misuse) were significantly associated with all hypothesized contextual factors (i.e., school performance, attitudes towards school, family caring, family disapproval of substance use, and perceived peer use). See Table 2 for bivariate relationships.

3.2. Logistic Regression Predicting Lifetime and Past Month Opioid Misuse

The first logistic regression model predicting lifetime opioid misuse found better school performance was associated with lower odds of lifetime opioid misuse ($p=.01$, $OR=0.90$, 95%CI [0.82, 0.98]), as was greater family disapproval of substance use ($p=.01$, $OR=0.99$, 95%CI [0.97, 1.00]). Conversely, greater perceived peer substance use was associated with higher odds of lifetime opioid misuse ($p<.001$, $OR=1.14$, 95%CI [1.11, 1.16]). The overall model predicting lifetime opioid misuse was significant, $F(7, 2393)=30.93$, $p<.001$. In the second model predicting past month opioid misuse, greater family disapproval of substance

use was associated with lower odds of past month opioid misuse ($p=.04$, $OR=0.99$, 95%CI [0.97, 1.00]), while greater perceived peer use was associated with higher odds of past month opioid misuse ($p<.001$, $OR=1.05$, 95%CI [1.03, 1.08]). The overall model predicting past month opioid misuse was significant, $F(7, 2484)=5.57$, $p<.001$. In both models, family caring and attitudes towards school were not significantly related to either lifetime or past month opioid misuse, while school performance was not significantly related to past month opioid misuse (see Table 3).

3.3. Logistic Regression Predicting Lifetime and Past Month Heroin Use

The first logistic regression model predicting lifetime heroin use found greater perceived peer substance use was associated with higher odds of lifetime heroin use ($p<.001$, $OR=1.15$, 95%CI [1.10, 1.19]). The overall model predicting lifetime heroin use was significant, $F(7, 2487)=10.51$, $p<.001$. In the second model predicting past month heroin use, greater perceived peer use was associated with higher odds of past month heroin use ($p=.047$, $OR=1.02$, 95%CI [1.00, 1.04]). However, the overall model predicting past month heroin use was not significant, $F(7, 2489)=0.75$, $p=.63$. In both models, family disapproval of substance use, family caring, attitudes towards school, and school performance did not appear to be significantly related to either lifetime or past month heroin use (see Table 4).

4. Discussion

This study was among the first to examine risk and protective factors for heroin and other opioid misuse in a sample of AI youth. Despite alarming reports that AI youth are at an increased risk to misuse opioids (including heroin) and to experience opioid-related negative consequences (Stanley et al., 2014; Wu et al., 2011), there is a dearth of research examining factors that contribute to this heightened risk. Common explanations include discrimination, colonization, and historical trauma causing collective community increases in substance use (Bombay et al., 2014; Brave Heart, 2003; Evans-Campbell, 2008; Skewes et al., 2019; Whitbeck et al., 2004), but further individual differences have not previously been considered. In the current sample, 2.8% reported ever using heroin and 14.7% reported ever misusing non-heroin opioids. Additionally, 1.1% reported using heroin in the past month and 4.1% reported misusing other opioids in the past month. Although we did not test a direct comparison, our findings are similar to other findings suggesting that AI youth misuse heroin and other opioids at greater rates than what is observed in the general adolescent population. Specifically, the 2008 National Survey on Drug Use and Health reported lifetime prevalence rates of adolescent heroin use between 0.2-0.3% and lifetime opioid misuse between 8.6-11.5% (Havens et al., 2011). Further, Monitoring the Future found that students from Grades 8 through 12 reported 1.2% lifetime and 0.4% past month heroin use prevalence rates (Johnston et al., 2011). Our results therefore highlight that heroin and other opioid misuse may be a greater problem for AI youth.

With respect to individual differences, our results are partially consistent with studies that found support for the importance of family factors as protective against use of other substances among adolescents (Donohew et al., 1999; Galliher et al., 2007). For example, we found that family disapproval of substance use was related to lower rates of both past

month and lifetime opioid misuse. This is consistent with research in non-AI populations that found family disapproval of substance use is associated with less alcohol, cigarette, and marijuana use (Scheer et al., 2000). On the other hand, we did not find support for the role of family caring, which is inconsistent with prior work finding strong family relationships are linked with less substance use among AI youth (Tingey et al., 2016; Whitesell et al., 2014). This inconsistency is surprising given previous work suggesting that family may be particularly important for AI youth (Beauvais, 1992).

Consistent with our hypothesis and previous findings in non-AI samples, school performance was a significant predictor of lifetime opioid misuse. However, both school variables were unrelated to past month opioid misuse and lifetime or past month heroin use. This is inconsistent with PST, which suggests that school bonding is protective against substance use among AI youth (Oetting et al., 1998). This may be the result of using a school-based sample; those who are currently misusing opioids/heroin may no longer attend school, and therefore our results do not capture trends in this population. Indeed, previous research found that those who drop out of school may be more likely to use substances (Beauvais et al., 1996; Henderson et al., 1998) and that AI youth are more likely to drop out of school than their non-AI counterparts (Beauvais et al., 1996; Chavers, 1991). Additionally, any nonsignificant findings may be because our sample reported low base rates of heroin use, especially within the past month.

Within our sample, peer substance use was significantly associated with both heroin and other opioid misuse and was the only significant predictor of lifetime and past month heroin use. Peer substance use has a robust relationship with substance use among AI adolescents (Momper et al., 2011; Tingey et al., 2016; Whitesell et al., 2014). It may be that family and school factors were not related to heroin use because those adolescents who use heroin associate with more deviant peers and may devalue school and family. Further, AIs may be less likely to distance themselves from substance-using family members (Spillane and Smith, 2007), and this family connectedness may imply that family factors are less salient in youth's decision to use heroin.

4.1. Limitations

Our results contribute important information regarding factors related to AI adolescent heroin and other opioid misuse, but should be considered within the context of our limitations. First, data were based on self-report measures, which may underestimate actual substance use rates in adolescents (Brener et al., 2003), though the ADAS has good empirical support for assessing adolescent substance use (Wills et al., 1997; Winters et al., 1990). Second, the nature of school-based samples precludes examination of these factors among students who have dropped out of school and are therefore not reflected in this data. Third, data were collected between six and 10 years prior to analyses, and therefore may not reflect more recent national changes in opioid use rates (Dart et al., 2015). Finally, the data collected for this study are correlational and cross-sectional in nature and thus, no causal references can be made about our findings. It would be informative to examine these relationships in prospective, longitudinal data to further understand the temporal nature among these relations.

4.2. Conclusions and Future Directions

This study is one of the first to examine factors associated with heroin/opioid misuse among AI adolescents. Large nationally representative surveys, such as Monitoring the Future, often enroll small sample sizes of AIs or AIs only from one region and consequently, are not likely to be representative of AI youth. This often precludes examination of factors related to AI adolescent substance use because it ignores the high degree of variability across geographic regions. The current dataset capitalizes on being collected from a large, representative sample of AI youth. Regarding opioid misuse, the contextual roles of family, peers, and school may be important in preventing substance use early on, with the goal of preventing later substance use disorders, overdose-related death, or other negative outcomes.

Our results highlight the importance of families in adolescent substance use. Families should be encouraged to communicate their views on substance use with youth and express their disapproval, as greater family disapproval was related to decreased odds of lifetime opioid misuse. Adolescents whose parents do not provide clear messages regarding substance use may be communicating permissive norms for use, and research has found these norms are strongly related to use (Elek et al., 2006). Moreover, peers are likely to be an important target for intervention, as peer substance use was the only factor associated with all opioid misuse behaviors. Programs may emphasize the importance of recognizing that in AI communities, peers may include similar-aged family members, making it difficult to avoid interaction with peers that are using (i.e., because they will be at family gatherings and other important events). Thus, our results highlight the potential value for prevention and treatment programs to focus on family and peers.

Overall, our findings suggest that AI youth have slightly different factors related to their opioid misuse, compared to other substances. Therefore, prevention/interventions likely have to be tailored to specifically target opioid misuse. On a legislative level, more resources should be allocated to this marginalized group to aide in the development of family, peer, and school level interventions to help ameliorate disparities in misuse and consequences.

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Highlights

- AI youth reported high rates of opioid use, as compared to the general population.
- Peer substance use was associated with lifetime and past month opioid use.
- Family and school factors were found to be associated with lifetime opioid use.

Table 1

Sample descriptive characteristics

	<i>n (%)</i>	<i>M (SD)</i>
<i>Demographics</i>		
Age		14.76 (1.70)
Gender (Female)	1663 (47.9%)	
<i>Study Contextual Variables</i>		
Family Disapproval of Substance Use		31.66 (7.93)
Family Caring		11.22 (1.71)
Attitude Towards School		7.07 (3.14)
School Performance		6.08 (1.24)
Peer Substance Use		6.07 (4.49)
<i>Prevalence of Substance Use</i>		
Past Month Opioid Misuse	144 (4.1%)	
Lifetime Opioid Misuse	512 (14.7%)	
Past Month Heroin Use	37 (1.1%)	
Lifetime Heroin Use	99 (2.8%)	

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Table 2

Bivariate correlations among substance use variables and relevant contextual variables

Measure	1	2	3	4	5	6	7	8	9	10	11
1. Age	—										
2. Gender (Female)	.001	—									
3. Past Month Opioid Misuse	.05*	-.004	—								
4. Past Month Heroin Use	.004	-.02	.41**	—							
5. Lifetime Opioid Misuse	.14**	.06*	.49**	.23**	—						
6. Lifetime Heroin Use	.004	-.01	.31**	.61**	.33**	—					
7. Family Disapproval	-.02	.10**	-.15**	-.07**	-.15**	-.11**	—				
8. Family Caring	.04*	.03	-.10**	-.15**	-.11**	-.13**	.45**	—			
9. Attitude Towards School	.13**	.05**	-.08**	-.06**	-.09**	-.08**	.23**	.31**	—		
10. School Performance	.02	.08**	-.12**	-.07**	-.15**	-.07**	.14**	.20**	.44**	—	
11. Peer SubstanceUse	.17**	.10**	.27**	.21**	.36**	.18**	-.11**	-.08**	-.11**	-.17**	—

Note. *p < .05, **p < .001

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Table 3

Multilevel logistic regression examining factors associated with lifetime and past month opioid misuse

	<i>b</i>	<i>SE</i>	<i>p</i>	<i>OR</i>	95% CI	<i>b</i>	<i>SE</i>	<i>p</i>	<i>OR</i>	95% CI
	Lifetime Opioid Misuse					Past Month Opioid Misuse				
Intercept										
Age	.11	.03	<.001	1.11	(1.05, 1.18)	.02	.03	.51	1.01	(0.96, 1.08)
Gender	.05	.11	.61	1.05	(0.87, 1.27)	-.04	.09	.68	0.96	(0.80, 1.16)
Family Disapproval	-.02	.01	.01	0.98	(0.97, 1.00)	-.01	.01	.04	0.99	(0.97, 1.00)
Family Caring	-.04	.03	.31	0.97	(0.90, 1.03)	.01	.03	.86	1.01	(0.94, 1.08)
Attitudes Towards School	-.003	.02	.86	1.00	(0.90, 1.03)	.01	.02	.76	1.00	(0.96, 1.03)
School Performance	-.11	.04	.01	0.90	(0.82, 0.98)	-.05	.04	.27	0.96	(0.88, 1.04)
Peer Substance Use	.13	.01	<.001	1.14	(1.11, 1.16)	.05	.01	<.001	1.05	(1.03, 1.08)

Note: Bolded typeface indicates significance at the $p < .05$ alpha level. *OR* = odds ratio.

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Table 4

Multilevel logistic regression examining factors associated with lifetime and past month heroin use

	<i>b</i>	<i>SE</i>	<i>p</i>	<i>OR</i>	95% CI	<i>b</i>	<i>SE</i>	<i>p</i>	<i>OR</i>	95% CI
	Lifetime Heroin Use					Past Month Heroin Use				
Intercept										
Age	-.002	.07	.98	1.00	(0.87, 1.15)	-.01	.03	.84	0.99	(0.94, 1.05)
Gender	-.10	.23	.66	0.90	(0.57, 1.43)	-.03	.09	.74	0.97	(0.81, 1.17)
Family Disapproval	-.02	.01	.09	0.98	(0.95, 1.00)	-.001	.01	.85	1.00	(0.99, 1.01)
Family Caring	-.10	.07	.11	0.91	(0.81, 1.02)	-.02	.03	.55	0.98	(0.92, 1.05)
Attitudes Towards School	-.04	.04	.31	0.96	(0.89, 1.04)	.003	.02	.86	1.00	(0.97, 1.04)
School Performance	-.04	.09	.64	0.96	(0.80, 1.15)	-.01	.04	.82	0.99	(0.91, 1.08)
Peer Substance Use	.14	.02	<.001	1.15	(1.10, 1.19)	.02	.01	.047	1.02	(1.00, 1.04)

Note: Bolded typeface indicates significance at the $p < .05$ alpha level. *OR* = odds ratio.

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