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Association between Delay in Driving Licensure and Driving While Impaired and Riding with an Impaired Driver among Emerging Adults

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Abstract

Background: Teens who delay driving licensure may not be subject to graduated driver licensing restrictions that are known to reduce crash risk. We explored the association of delay in licensure with driving while impaired (DWI) and riding with an impaired driver (RWI) among emerging adults.

Methods: Data from the NEXT Generation Health Study, starting with 10th grade (2009-2010), were analyzed using logistic regression. The outcome was Wave 7 (W7) self-reported DWI and RWI as dichotomous variables. The independent variable was delay in licensure. Covariates included sex, urbanicity, race/ethnicity, family structure, parent education, family affluence, teen's highest education, minimum legal drinking age laws, and onset age of alcohol use. Descriptive analysis and logistic regressions were conducted.

Results: Of 2525 participants eligible for licensure, 887 reported delay in licensure by 1-2 years (38.9%, weighted) and 1078 by >2 years (30.3% weighted) across 7 waves. In W7, 23.5% (weighted and hereafter, 5.6% once, 17.8% ≥twice) of participants reported DWI and 32.42% (5.6% once, 25.4% ≥twice) reported RWI. Logistic regressions showed no overall significant association of delay in licensure with either W7 RWI or W7 DWI. However, in stratified analyses, among African American youth, delay in licensure was positively associated with DWI (OR=2.41,

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p=.03) and RWI (OR=2.72, p=.05). Among those with ≤ high school or lower education by W7, delayed licensure was positively associated with RWI (OR = 2.51, p < .01).

Conclusions: While in the overall sample, delayed licensure did not appear to be associated with DWI or RWI, our findings suggest that delayed licensure may be of concern to teen risk of DWI and RWI among African Americans and among those with lower educational attainment. Furthermore, as two-thirds of youth delayed licensure, more research is needed to determine if this is more of a positive (i.e., protective) factor by reducing their exposure to crash risk or a negative (i.e., risk) factor due to missing important driver-safety stages of graduated driver licensing.

Keywords

NEXT Generation Health Study; driving while impaired; novice drivers; African Americans

INTRODUCTION

In the United States (U.S.), teens and young adults are at a disproportionately high risk of dying in a car crash even though they drive less than all age groups besides the elderly (Insurance Institute for Highway Safety (IIHS), 2019). Among adolescents, motor vehicle crashes are the leading cause of mortality in the U.S. (Centers for Disease Control and Prevention (CDC), 2019) . A lack of driving experience among this population can account for some of this discrepancy. However, some of this can also be explained by risk behaviors that come with adolescence (Simons-Morton, Li, Ehsani, & Vaca, 2016). Both driving while impaired from alcohol and drugs (DWI) as well as riding with an impaired driver (RWI) are risk behaviors of particular interest in relation to driving.

Adolescence is a transitionary time marked by neurological and physical development as well as self-discovery and experimentation (Arnett, 2000). With adolescence can come increased risky behavior around drugs, alcohol, and drinking and driving. This can be a result of a teen’s inability to assess the true dangers of a given situation, leading them to remain optimistically biased and often underestimating the dangers that can end in health and physical harm or death (Jonah & Dawson, 1987). In 2016, 19% drivers aged 15-20 involved in fatal crashes were intoxicated (blood alcohol concentration (BAC) > .08 g/dL). Drivers under age 21 are subject to zero tolerance laws allowing no alcohol in their blood systems (National Highway Traffic Safety Administration (NHTSA), 2018). At least one part of a more complex answer to why youth in the U.S. experience more DWI fatalities is the young age (14 to 17 in varying states) at which teens can be licensed to drive (Simons-Morton et al., 2016).

Graduated Driver Licensing (GDL) programs are designed to introduce new drivers to increasing levels of driving experience by decreasing restrictions as they pass from one phase to the next phase (Williams, 2017). Typically, in the first phase of GDL, the novice learns to drive with a licensed adult in the car for several months. In the second phase of GDL, the novice can drive independently, but this phase often restricts the number of passengers and nighttime driving in an effort to decrease risk of motor vehicle crashes. GDL programs are often only in place for non-adult novice drivers (i.e., under age 18) (Williams, 2017). GDL programs offer a period of time in which teen novice drivers can gradually and

safely learn to drive. However, once these young drivers transition into independent driving, their crash risk and risky driving behavior increases above the relative risk of adult drivers (Schoettle & Sivak, 2014). GDL is thought to reduce risk by reducing exposure and altering normative expectations about driving behavior (National Highway Traffic Safety Administration (NHTSA), 2018; Thigpen & Handy, 2018).

There is some evidence that youth are increasingly delaying license until at or after their 18th birthday (Williams, 2017), but trends in age at licensure is difficult to study (Curry et al, 2015). While some very recent research sheds additional light on the factors associated with delay in driving licensure (DDL), this area is not fully understood (Vaca et al., 2020). However, studies have linked economic factors (Schoettle & Sivak, 2014), sociodemographic characteristics (Thigpen & Handy, 2018), and GDL driver restrictions (Tefft, Williams, & Grabowski, 2014) to DDL. Some studies show important group differences in DDL between racial/ethnic youth groups (Shults, Banerjee, & Perry, 2016; Shults & Williams, 2013; Tefft et al., 2014). DDL appears to be more prevalent in Black and Latino youth (Tefft et al., 2014). This suggests Black and Latino youth could be more likely to miss out on participating in a state's GDL program, forgoing its novice driver safety benefits, and possibly putting them at a higher risk for crash and other risky driving behaviors.

U.S. Latinos have recently been shown to be overrepresented in DWI arrests (Courchesne, Muth, Barker, & Woodruff, 2019). However, there is concern this overrepresentation is due to the stronger presence of law enforcement in areas where Latinos tend to drink and drive (Romano, Voas, & Lacey, 2010). Similar to DWI arrests, Latinos have been overrepresented in alcohol related crashes (Roudsari, Ramisetty-Mikler, & Rodriguez, 2009). In contrast, an analysis of fatal crashes adjusted by population that occurred in the U.S. between 2000 and 2015 reported that Whites had approximately equal alcohol-related crash fatality rates per 100,000 population (3.52) as Latinos (3.41) and Blacks (3.44) (DiMaggio, Wheeler-Martin, & Oliver, 2018).

Regarding adolescents' drinking and driving, while some studies reported that Latino youth were more likely to drink and drive in contrast to the lower rates of drinking and driving for Blacks and Asian American youth (Walker et al.,2003a), other studies reported White adolescents to be more likely to drink and drive than their Latino counterparts (Delcher, Johnson, & Maldonado-Molina, 2013). Recently, Vaca and colleagues (Vaca, Romano, Fell, Li, & Simons-Morton, 2019) reported an overrepresentation of Latino youth in alcohol-related fatal crashes, although such overrepresentation varied by age and driver license status. There is some agreement that Latinos are more likely to ride as passengers in private vehicles than their White counterparts (Walker, Waiters , Grube, & Chen, 2005) and to be at a higher risk of riding with an impaired driver (RWI) compared to Whites (Walker et al., 2005). This risk is especially high among Latino teens and young adults (Li, Simons-Morton, & Hingson, 2013; O'Malley & Johnston, 1999; Walker et al., 2005). Overall, teens that have early and recurrent exposure to RWI are at greater risk of crash-injury death (Moulton, Peterson, Haddix, & Drew, 2010; Quinlan, Shults, & Rudd, 2014; Quinlan, Brewer, Sleet, & Dellinger, 2000) and more likely to drive while impaired (DWI) in the future (Li, Simons-Morton, Vaca, & Hingson, 2014).

Further, to add to these important differences, there are wide variations found in the number of states with special laws designed to reduce underage drinking and underage drinking and driving. While all 50 states and the District of Columbia have adopted a core minimum legal drinking age of 21 (MLDA-21), a large number of states have adopted expanded underage drinking laws. Those additional laws were the focus of research on their effects on underage drinking driver fatal crashes (Fell, Scherer, Thomas, & Voas, 2016). Each law's strengths and weaknesses in terms of coverage, sanctions for violations, exceptions, and ease of enforcement were examined. Results showed wide variability in the strength of each underage drinking law and in the number of states that have adopted them. Half of the States have adopted only 13 or fewer out of the 20 MLDA-21 laws that were scored and only 5 of the 20 laws have been adopted by all 50 States and the District of Columbia (Fell, Thomas, Scherer, Fisher, & Romano, 2015). The standardized MLDA-21 law strength scores ranged from 0.85 in Utah to 0.27 in Iowa with a minimum possible score of 0.00 and a maximum possible score of 1.00. The number of MLDA-21 laws adopted in the States ranged from all 20 in Utah to only 9 in Kentucky. Of the 20 expanded underage drinking laws that were studied, nine have been instrumental in saving more than 1,300 lives in the states that have adopted them, and an additional 210 lives could be saved if they were adopted in every state. Given the presence and strengths of these MLDA-21 laws, we chose to include them in the study analyses.

The extent to which DDL plays a role in DWI and RWI behaviors has been largely unexplored and remains unclear. The purpose of this study was to examine the association between DDL and DWI/RWI among emerging adults.

MATERIALS AND METHODS

Sampling

Data were collected for the NEXT Generation Health Study (NEXT), a longitudinal study that followed a nationally representative sample of U.S. adolescents into emerging adulthood starting with 10th grade (2009-2010 school-year). NEXT was funded by the Intramural Research Program of the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development (NICHD). This study used multistage sampling to collect primary sampling units (i.e., U.S. school districts) from the nine census divisions. Schools and classrooms were randomly sampled from the school districts. Afterwards, 145 schools were invited and 81 agreed to participate. A total of 2785 cohort members participated in the NEXT study. Wave 1 (W1) data collection began in the 2009 – 2010 school year and continued to survey participants yearly until W7 in 2016. From W1-W7, 91%, 88%, 86%, 78%, 79%, 84%, and 83% of the full sample (N = 2785) completed the survey during the spring each year. African American participants were oversampled to provide a large enough sample (N = 687) to examine racial/ethnic differences. Surveys were administered in the spring semester of each wave.

Parental consent and adolescent assent were obtained from 15-17-years old; participant consent was obtained when they turned 18 years of age. The protocol for the study was approved by *Eunice Kennedy Shriver* National Institute of Child Health and Human Development.

Measures

Outcome Variables—The two outcome variables were W7 driving while impaired (DWI) and riding with an impaired driver (RWI), which were derived from the Youth Risk Behavior Survey (YRBS) questionnaire (Eaton et al., 2010).

DWI was assessed with three items asking participants how many days they drove in the past 30 days after: (1) drinking alcohol, (2) using marijuana, or (3) using illicit drugs. Due to non-normal distribution and a severe floor effect of the data, we collapsed and recoded responses across substances to derive a dichotomous variable, DWI ≥ 1 day vs. 0 days in the past 30 days.

RWI at W7 was measured by asking participants: “During the last 12 months, how many times did you ride in a vehicle driven by someone who had been drinking alcohol?” thus capturing participants’ perception of the drivers’ alcohol consumption. The same question was repeated for “smoking marijuana” and “using illicit drugs other than alcohol or marijuana.” These questions were collapsed and dichotomized as: RWI ≥ once vs. no RWI (last 12 months).

Independent Variables—The independent variables assessed in this study included delay in driving licensure, sex, urbanicity, race/ethnicity, parent education, parental affluence, teen’s highest education by W7, family structure, onset age of alcohol use, and the number and strengths of the MLDA-21 laws in the participating states.

Delay in Driving Licensure (DDL)—This variable was calculated based on all 7 waves of NEXT data and determined as year(s) elapsed between participant’s eligible year for licensure based on laws in the states where they stayed when completing the survey and licensed year. Researchers were able to keep track of the age of each participant and whether the year they participated in the survey they were eligible to have their driver’s license. The extent of DDL was created based on the earliest eligible age (Wave #) that a participant would have been allowed their first independent driving license (state to state variability), and self-reported age (Wave #) at licensure. For example, a participant living in a state where the earliest age for independent licensure is 17 whose age is 17.5 at W3 but does not report getting licensed until W4, the DDL would be one year. We expected possible DDL values to range between 0 to 7, with “0” indicating No Delay in licensure and “7” reaching W7 without a license. We recoded the DDL values to two variables, one of which was 3-cateogry variable (DDL 0 years, 1 year, and 2 or more years) for descriptive purposes and a dichotomous variable (DDL 0 years and 1 or more years) for analyses.

Urbanicity—Participants’ schools were coded at the baseline wave of the study according to seven urban-centric locales; those coded as large central city, mid-size city were categorized as urban, those coded as urban fringe of large city, urban fringe of mid-size city, large town, small town, and rural were categorized as suburban/rural (National Center for Education Statistics, 2019).

Family Structure—Students' family structure was collapsed into five categories: both biological parents; one biological parent, one stepparent; single parent, mother only; single parent, father only; and other.

Parental Education—Parent's self-reported highest education level (of both the mother and father in the household) was measured in W1 and were categorized based on the highest level of education of either parent.

Family Affluence—Family socioeconomic status (SES) was estimated in W1 using the Family Affluence Scale (Currie et al., 2004) including cars and computers owned, if student had his/her own bedroom, and number of family vacations in the last 12 months. Students were then categorized as low, moderate or high affluence (Spriggs, Iannotti, Nansel, & Haynie, 2007).

Teen's Education Enrollment—Higher Education Enrollment was measured with one question, "Are you currently attending school?" with possible responses: No, I am not attending school; High School; Technical/Vocational School; Community College; College/University; and Graduate School or Professional School. Then, the six categories were collapsed to three categories: not attending school; attending technical/vocational school or community college; and attending college or above.

Onset Age of Alcohol Use—Participants were asked in all waves of NEXT, "How old were you the first time you had a drink of an alcoholic beverage? Please do not include any time when you only had a sip or two from a drink." If the participants have not drunk any alcohol they were asked to check the option "Never" otherwise they were asked to put the years (age) of onset age of alcohol use (OAU) they could remember. The OAU variable will be created using the first-time reported OAU age in four waves. Data will be excluded if a participant reported they had the first alcoholic beverage drinking before they were 10 years old. The age at first assessment that participants marked any level of alcohol consumption in this question indicated as the onset age of alcohol use. The question was derived from the Health Behavior in School-Aged Children questionnaire (Currie et al., 2004). We used year 14 to create a dichotomous variable to indicate the onset age of alcohol use ≥ 14 years vs. 14 or youngers as adolescents usually experienced their first standard drink at about 14 years old (Masten, Faden, Zucker, & Spear, 2008; Morean, Peterson, & L'Insalata, 2019).

W7 Driving Exposure—We included the variable "driving days in the past 30 days" as an exposure variable based on the question, "On how many days in the last 30 days have you driven a motor vehicle (car, motorcycle, van, truck, etc.)?"

Presence and Strengths of Underage Drinking Laws—The strength scores of the minimum legal drinking age 21 (MLDA-21) laws developed by Fell and colleagues (Fell, Thomas, et al., 2015) were used to assess the strengths and weaknesses of underage drinking laws in the U.S. The association between MLDA-21 overall scores and W7 DWI and W7 RWI were examined in the study. The participants were categorized into living in a state having higher MLDA-21 scores or living in a state having lower MLDA-21 scores based on the median value (0.44) of MLDA-21 overall scores. Several studies have concluded that

many of the 20 MLDA-21 laws in existence have been effective in reducing alcohol impaired underage 21 drivers in fatal crashes. The strengths of some of these laws do matter in their effectiveness (Fell, Scherer, & Voas, 2015; Romano, Scherer, Fell, & Taylor, 2015; Scherer, Fell, Thomas, & Voas, 2015).

Statistical Analysis

Logistic regressions were conducted to assess the associations between DDL and the dichotomous DWI and RWI variables. Unadjusted and adjusted models were conducted and missing data were deleted list-wise. We also conducted subsequent stratified analyses of the hypothesized associations by other independent variables. All statistical analyses were conducted using SAS version 9.4 (SAS Institute, Cary, NC) accounting for features of the complex survey design (i.e., stratification [strata include the nine census divisions], clustering, and sampling weights). Odds ratio (OR) and 95% confidence interval (95%CI) were reported. Domain analysis (referring to the computation of statistics for subpopulations in addition to the computation of statistics for the entire study population) was applied for analyses when using the driving subsample.

RESULTS

As shown in Table 1, in W7 23.5% (weighted and hereafter, 5.6% once, 17.8% ≥twice) of participants reported driving while impaired (DWI) and 32.42% (5.6% once, 25.4% ≥twice) reported riding with an impaired driver (RWI). Of 2525 participants (22.6 years, standard error = 0.03 in W7) eligible for licensure, 887 reported DDL by 1-2 years (38.9%, weighted) and 1078 by >2 years (30.4%, weighted) across 7 waves. In addition, 56% of the sample were Whites, 59% were female, 49% were of moderate family affluence, with most participants (86%) living in suburban/rural areas.

Logistic regressions using the whole sample show no significant association of DDL with either W7 DWI (odds ratio [OR] =0.91, 95%CI: 0.66, 1.26, p=.55) or W7 RWI (OR=1.19, 95%CI: 0.87, 1.63, p=.25) (data not shown). MLDA-21 scores were not significantly associated with W7 DWI (OR = 0.94, 95%CI: 0.62, 1.40, p=.73) or W7 RWI (OR=1.14, 95%CI: 0.80, 1.62, p=.44). Driving exposure in W7 was not significantly associated with W7 DWI (OR = 1.01, 95%CI: 0.99, 1.03, p=.17) or W7 RWI (OR=1.01, 95%CI: 0.99, 1.02, p=.28).

In the unadjusted models, W7 DWI was associated with DDL when the analyses were stratified by race/ethnicity, urbanicity, and onset of alcohol use, but not other independent variables (See the results of unadjusted models in Table 2). More specifically, within African American youth, those that DDL were more likely to DWI at W7 (OR = 2.41, 95%CI: 1.09, 5.35, p = .03). This was not the case within White or Latino youth counterparts. Further, within the group of youth who were originally from an urban area in W1 and had DDL, DWI at W7 was less likely (OR = 0.36, 95%CI: 0.33, 0.40, p < .001). This relationship was not found among those who were originally from a suburban/rural area. Finally, within those youth that reported having their first drink at ≤14 yrs., those who delayed licensure were less likely to DWI at W7 (OR = 0.41, 95%CI: 0.24, 0.71, p < .01). Again, this relationship was not found within those youth who had their first drink at >14 yrs. We then conducted the

stratified analyses which included all three variables in the models (See the results of adjusted models in Table 2), the significant association between DDL and DWI remains within the group of youth who were originally from an urban area (OR = 0.26, 95%CI: 0.20, 0.36, p < .001) and within those youth that reported having their first drink at ≤14 yrs. (OR = 0.31, 95%CI: 0.17, 0.59, p < .01); whereas significant association between DDL and DWI turned marginal within African American youth (OR = 2.46, 95%CI: 0.90, 6.71, p = .08).

In the unadjusted models, W7 RWI was associated with DDL in analysis stratified by race/ethnicity, urbanicity, and participant highest education by W7, but not other independent variables (See the results of unadjusted models in Table 3). Specifically, within African American youth, those who delayed licensure were more likely to RWI at W7 (OR = 2.72, 95%CI: 1.15, 6.41, p = .02). A similar relationship was not identified within White or Latino youth counterparts. Moreover, within those youth that were originally from an urban area in W1 and had DDL, RWI at W7 was less likely (OR = 0.54, 95%CI: 0.42, 0.70, p < .001). This same relationship was not found within those youth who were not originally from an urban area. Finally, within those youth that had high school or lower education at W7 and had DDL, RWI at W7 was more likely (OR = 2.51, 95%CI: 1.29, 4.88, p < .01). This relationship was not found within those youth who had some college and bachelor or higher degree. We then conducted the stratified analyses with including all three variables in the models (See the results of adjusted models in Table 3), the significant association between DDL and RWI remains within all three sub-populations: the African American youth (AOR = 3.48, 95%CI: 1.27, 9.58, p = .02), within those youth that had high school or lower education at W7 (AOR = 2.52, 95%CI: 1.23, 5.13, p = .02), and those youth that were originally from an urban area in W1 (OR = 0.69, 95%CI: 0.27, 0.90, p = .02).

DISCUSSION

The findings from our study in this large nationally representative sample contributes to the literature in several ways. First, we show that more than two thirds of U.S. emerging adults delayed their driving licensure. Second, the high prevalence of self-reported teen DWI and RWI constitute a continuing public health concern for youth. RWI remains largely under-studied, particularly given its highly predictive relationship to future youth DWI (Li et al., 2014). The more times a youth rides with an impaired driver without any consequences (e.g., a crash or driver arrest), the more likely they will DWI in the future (Li et al., 2014). Third, to the best of our knowledge, this study is the first to analyze an association between delayed licensure and DWI/RWI. We found a relationship with African American youth, but not with other races or ethnicities. While our study did not find a relationship between DDL and DWI or RWI controlling for the minimum legal drinking age 21 (MLDA-21) laws in the state of the youth, we believe this needs further study.

Although we found no statistically significant association overall between DDL and DWI or RWI, we believe this importantly reflects the complexity of the relationships we explored between DDL-DWI and DDL-RWI due to complex individual, social, and financial factors (Tefft et al., 2014). Furthermore, from our other recent work exploring factors that contribute to teen DDL (Vaca et al., 2020), we acknowledge that there are other unique facets of teen

licensure and cultural factors that may likely weigh on not only decisions to DWI/RWI but also to DDL.

Our findings do suggest that delaying licensure may have important implications for crash-risk and potentially crash-injury among African American teens and among those emerging adults with lower educational attainment. It's reasonable to consider that lower education levels, challenges with finances and employment, and limited availability of a family car may contribute to decisions leading to DDL and as a result contribute to RWI. Similarly, these findings would be of interest to ongoing prevention activities and programs, particularly those focused on more vulnerable youth.

We recognize that our study has limitations. First, there is the threat to causal inference due to endogeneity, meaning that access to alternative transportation (e.g., via friends or ridesharing) and public transportation might be causing DDL. Second, the potential for social desirability bias in the longitudinal survey results exist and this could have led to an underreporting of DWI and RWI. Third, recall bias could also potentially have influenced our results as the survey requires participants to reflect on the past 30 days for DWI and the past 12 months for RWI, which could lead to some underreporting. RWI measured the participants' perception of the drivers' alcohol consumption and not their actual behavior or amount consumed. However, because alcohol is most often consumed in social setting among this age group (Beck et al., 2008), it is probable that participants' perception often reflect their observations of driver's behavior. Fourth, it would have been ideal to know the exact date on which participants obtained their driver's license so that DDL could be more accurately estimated. However, these data are not explicitly available in the NEXT survey data. As a result, we are limited to calculating and approximating the DDL variable. Finally, although the question measuring DWI has been derived from YRBS, it is not a validated measure. Given that the threshold for drinking and driving is much stricter for adolescents, the DWI measure in this study may conflate the illegal act of drug use (including underage drinking) and driving, which is still problematic and important, with impaired driving among adolescents.

With regard to the lack of a finding concerning the presence and strength of the various MLDA-21 laws in the states, it could be due to a lack of enforcement of the laws and/or the lack of knowledge of the laws by the youth in the NEXT survey. Alternately, it may be due to the only partial representation of states in the sample, as the study was designed to be nationally representative at the participant but not state level. There is also the threat to unit independence due to respondents being nested within schools.

While overall DDL did not appear to be associated with DWI or RWI, our findings point toward important racial/ethnic differences that could have implications for prevention activities and programs as well as for behaviors that influence teen risk of crash injury. Educating parents on the risk of both DWI and RWI, educating the youth on the various MLDA-21 laws, and visible enforcement of the MLDA-21 laws and DWI could have an effect on these behaviors.

One key finding in our study was that over two-thirds of young novice drivers delay driver licensing. This could be positive in that their exposure to crash risk is reduced. However, this could conceivably be negative if they miss the first two stages of GDL that intentionally offer exposure to driver safety components of GDL. Further investigation is needed to bring clarity to this issue.

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Table 1.

Wave 7 frequencies of DWI, RWI, and demographic variables

	N	Weighted %	95% CI	
DWI				
No	1311	76.50	72.72	80.28
Yes	438	23.50	19.72	27.28
RWI				
No	1539	67.58	64.01	71.16
Yes	754	32.42	28.84	35.99
Delay in driving licensure[$]				
No	560	30.71	21.52	39.91
Delay 1-2 years	887	38.93	31.22	46.64
Delay >2 years	1078	30.36	22.96	37.76
Delay in driving licensure[$]				
No	560	30.71	21.52	39.91
Yes	1965	69.29	60.94	78.48
Race/ethnicity				
Latinos	695	19.55	12.03	27.08
African Americans	595	19.32	9.58	29.07
Whites	914	56.61	44.28	68.95
Other	113	4.51	2.09	6.93
Sex				
Female	1347	58.70	55.08	62.33
Male	976	41.30	37.67	44.92
Family Affluence				
Low	648	23.17	17.55	28.78
Moderate	986	48.67	45.13	52.20
High	458	28.17	22.55	33.78
Urbanicity				
Urban	761	13.79	0.00	28.27
Suburban/rural	1341	86.21	71.73	100
Highest Education of either parent				
High school or lower	809	32.74	26.81	38.68
Some college	784	39.54	35.14	43.94
Bachelor or higher	528	27.72	20.76	34.68
Participant highest education by W7				
High school or lower	707	31.99	27.75	36.23
Some college	1035	45.31	40.65	49.97
Bachelor or higher	551	22.70	17.02	28.38
Family structure				
Both biological	1118	53.13	48.63	57.62
Biological + stepparent	324	18.31	15.89	20.73

	N	Weighted %	95% CI	
Single parent	427	19.75	16.52	22.99
Other	224	8.81	6.89	10.73
Onset age of alcohol use[#]				
≥ 14 years	1552	75.95	72.50	79.39
14 or younger	447	24.05	20.61	27.50
MLDA-21 overall score				
< 0.44	1293	46.10	32.32	59.89
≥ 0.44	1482	53.90	40.11	67.68

CI: confidence interval; MLDA-21: minimum legal drinking age 21; DWI: driving while impaired; RWI: riding with an impaired driver.

[$]Among those who were eligible to obtain driver's license, the percentages of participants who did not get their licenses are 36.3% in W1, 35.3% in W2, 40.1% in W3, 30.5% in W4, 29.9% in W5, 19.6% in W6, and 27.4% in W7.

[#]The mean of onset age of alcohol use was 14.39 (SE = 0.07).

Table 2.

Association of DDL with Wave 7 DWI by other independent variables using logistic regression

				W7DWI (Unadjusted model)				W7DWI (Adjusted model)			
	N	DDL	N	OR	95% CI		p				
Race/ethnicity											
Latinos	501	No	361	Ref				Ref			
		Yes	105	1.28	0.48	3.44	.61	1.26	0.41	3.86	.68
African Americans	444	No	278	Ref				Ref			
		Yes	119	**2.41**	**1.09**	**5.35**	**.03**	**2.46**	**0.90**	**6.71**	**.08**
Whites	837	No	587	Ref				Ref			
		Yes	194	0.73	0.42	1.26	.24	0.64	0.34	1.19	.15
Onset age of alcohol use											
≥ 14 years	1267	No	876	Ref				Ref			
		Yes	296	1.21	0.84	1.73	.28	1.14	0.73	1.77	.56
14 or younger	374	No	232	Ref				Ref			
		Yes	111	**0.41**	**0.24**	**0.71**	**<.01**	**0.31**	**0.17**	**0.59**	**<.01**
Urbanicity											
Urban	531	No	369	Ref				Ref			
		Yes	117	**0.36**	**0.33**	**0.40**	**<.001**	**0.26**	**0.20**	**0.36**	**<.001**
Suburban/rural	1185	No	837	Ref				Ref			
		Yes	271	1.004	0.74	1.37	.98	0.91	0.61	1.36	.62

Note: We reported the results of subsequent stratified analyses only if the association of W7 DWI and DDL was statistically significant in any category of other independent variables. OR: odds ratio; CI: confidence interval; DDL: delayed driving licensure; DWI: driving while impaired. The analyses were conducted among those who reported having a license allowing independent, unsupervised driving using the domain analysis.

Unadjusted model: the three independent variables were included in three separate models; Adjusted model: All three independent variables were included in the model.

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Table 3.

Association of DDL with Wave 7 RWI by other independent variables using logistic regression

				W7RWI (Unadjusted model)				W7RWI (Adjusted model)			
	N	DDL	N	OR	95% CI		p				
Race/ethnicity											
Latinos	835	No	216	Ref				Ref			
		Yes	459	0.63	0.27	1.51	.28	0.65	0.25	1.67	.36
African Americans	687	No	385	Ref				Ref			
		Yes	199	**2.72**	**1.15**	**6.41**	**.02**	**3.48**	**1.27**	**9.58**	**.02**
Whites	1106	No	595	Ref				Ref			
		Yes	299	1.23	0.79	1.91	.35	1.37	0.85	2.20	.18
Participant highest education by W7											
High school or lower	979	No	532	Ref				Ref			
		Yes	247	**2.51**	**1.29**	**4.88**	**<.01**	**2.52**	**1.23**	**5.13**	**.02**
Some college	924	No	530	Ref				Ref			
		Yes	242	0.94	0.59	1.49	.78	1.05	0.78	1.41	.86
Bachelor or higher	626	No	327	Ref				Ref			
		Yes	192	1.74	0.91	3.35	.09	1.76	0.83	3.74	.13
Urbanicity											
Urban	905	No	497	Ref				Ref			
		Yes	247	**0.54**	**0.42**	**0.70**	**<.001**	**0.69**	**0.27**	**0.90**	**.02**
Suburban/rural	1629	No	898	Ref				Ref			
		Yes	412	1.28	0.91	1.80	.15	1.54	1.01	2.34	.05

Note: We reported the results of subsequent stratified analyses only if the association of W7 RWI and DDL was statistically significant in any category of other independent variables. OR: odds ratio; CI: confidence interval; DDL: driving while impaired; RWI: riding with an impaired Unadjusted model: the three independent variables were included in three separate models; Adjusted model: All three independent variables were included in the model.