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Factors Contributing to Delay in Driving Licensure Among U.S. High School Students and Young Adults

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A B S T R A C T

Purpose: More teens delay in driving licensure (DDL). It is conceivable they miss Graduated Driver Licensing (GDL) safety benefits. We assessed prevalence, disparities, and factors associated with DDL among emerging adults.
Methods: Data used were from all seven waves (W1–7) of the NEXT Generation Health Study (W1 in 10th grade [2009–2010]). The outcome variable was DDL (long-DDL [delayed >2 years], intermediate-DDL [delayed 1–2 years] versus no-DDL), defined as participants receiving driver licensure ≥1 year after initial eligibility. Independent variables included sex, urbanicity, race/ethnicity, family structure, parental education, family affluence, parental monitoring knowledge, parent perceived importance of alcohol nonuse, and social media use. Logistic regressions were conducted.
Results: Of 2,525 participants eligible for licensure, 887 (38.9%) reported intermediate-DDL and 1,078 (30.1%) long-DDL. Latinos (adjusted odds ratio [AOR] = 2.5 vs. whites) and those with lower affluence (AOR = 2.5 vs. high) had higher odds of intermediate-DDL. Latinos (AOR = 4.5 vs. whites), blacks (AOR = 2.3 vs. whites), those with single parent (AOR = 1.7 vs. both biological parents), whose parents' education was high school or less (AOR = 3.7 vs. bachelor+) and some college (AOR = 2.0 vs. bachelor+) levels, and those with lower affluence (AOR = 4.4 vs. high) had higher odds of long-DDL. Higher mother's monitoring knowledge (AOR = .6) was associated with lower odds of long-DDL, but not intermediate-DDL.
Conclusions: Some teens that DDL "age out" of protections afforded to them by GDL driver restrictions. Minority race/ethnicity, socioeconomic status, urbanicity, and parenting factors contribute to DDL. Further study of these factors and their individual/collective contributions to DDL is needed to understand potential unintended consequences of GDL, particularly in more vulnerable youth.

IMPLICATIONS AND CONTRIBUTION

Delay in driving licensure was widespread and nearly 70% of eligible adolescents delayed at least one year to obtain their licensure. This study identifies the variety of factors that contribute to teen delaying driving licensure that could potentially lead some vulnerable teens to miss GDL policy driver safety benefits.

Conflicts of interest: The authors have no conflicts of interest to declare.
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Young drivers (15–20 years) account for 5.4% (12.1 million) of the total U.S. driving population [1]. They are at an increased risk for fatal and nonfatal vehicle crashes [2]. Sixteen- to 19-year-old drivers have the highest crash risk compared to any other age group [3]. The fatal crash rate is highest in 16-year-old U.S. teenage drivers [4]. When compared to 20-year-old drivers, those 16- to 19-year-olds were almost three times more likely to be involved in a fatal crash (per mile driven) [5].

Graduated Driver Licensing (GDL) is a state-level policy system intentionally developed to gradually introduce young novice drivers into the driving population in a safe and graduated fashion. Between 1996 and 2006, all U.S. states had adopted some form of GDL [6]. These programs vary from state to state on the number of hours required for supervised practice driving and passenger and nighttime driving restrictions [7]. GDL policies have been pivotal in reducing young driver injury and fatal crashes [8,9]. Arguably, two of the most important components of state GDL programs are restrictions on nighttime driving and number of young passengers in the vehicle. Policies that restrict nighttime driving for young drivers have been shown to reduce fatal crashes [8,10,11]. Driving with young passengers is a risk factor for fatal crashes and is commonly restricted in GDL programs [8,12]. The association between the age at which drivers actually obtain their license and crash rates has been studied [13]. Previous studies have examined the effect of minimum age of licensure on crash risk and found that novice drivers at the age of 16 years have the highest crash rates when compared to their older counterparts [14]. Studies also suggest that raising licensing age may achieve reduction in teen crashes [14,15]. Therefore, the timing of licensure is of critical importance, particularly given that crashes remain the leading cause of death for U.S. young drivers [16].

A limitation of GDL is that it typically applies to drivers licensed before age 18. Recent studies show that more teens delay in driving licensure (DDL) now than in previous generations, with approximately one third of newly licensed drivers being 18 years or older [9,17,18]. The National Highway Traffic Safety Administration reports the number of licensed young drivers aged 15 to 20 years decreased by 8.8% from 2007 to 2016 [1,19]. More specifically, the proportion of high school seniors with a driver's license declined from 81% to 72% in 10 years from 2006 to 2015 [20]. While DDL may lead to less crash risk due to the reduced driving exposure and restricting driving under high-risk conditions [21], the initial reduction in crash risk may be reversed later when these youth start driving because of DDL and because of insufficient driving exposure, experience, and instruction [22]. For instance, if teens do not become licensed before the age of 18, they can conceivably miss important graduated driving safety practices that are intentionally designed to reduce crashes among teen novice drivers.

To date, there is a limited understanding of factors associated with DDL. There is some speculation that social media allows youth to connect to friends digitally and decreases the need for in-person connection, thereby reducing the need for a driver's license to travel for connection [23]. Researchers have investigated the built environment (e.g., living in highly walkable environment) [24], GDL (e.g., mandated supervised practice driving hours with adult supervision) [25], and economic limitations such as not being able to afford the cost and maintenance of a vehicle [18,26] as possible explanations for the increased numbers of youth that DDL. Other potential reasons for DDL that have been explored include sociodemographic characteristics such as race (e.g., blacks vs. whites) [18], living with parent(s) [27], family affluence (e.g., low vs. high) [22,28,29], parental approval of licensure (e.g., parent's approval until teens are "ready") [21], lack of a car [29], parent unavailability [29], ability to get around without a car [29], and schedule unavailability in terms of other activities [29].

Parents provide substantial influence on adolescent behavior and have important roles in determining many aspects of novice teen driving [30]. For instance, parental monitoring knowledge, particularly by fathers, was protective against alcohol-impaired/other drug–impaired driving, independent of the effect of substance use, among teenage drivers [31], Although it was suggested that parents should have a greater role in deciding when a child should get their driving license [30], it is still unclear about the relationship between parenting practices (e.g., parental monitoring knowledge) and licensure timing of young drivers.

Previous research has shown a higher proportion of Latino and non-Latino black youth DDL compared to their white non-Latino counterparts and are thus more likely to begin driving without participating in any GDL program [18,22,26]. Previous research has also found black and Latino adult men have higher fatality rates per trip as motor vehicle occupants relative to adult white men [32]. There is also evidence to suggest that GDL has not equally benefitted young Latino drivers in lives saved [33]. Moreover, DDL may result in pursuing licensure at a more socially vulnerable developmental period when alcohol and substance use is more prevalent and rapidly increasing (i.e., at 18 years) [34], positioning young novice drivers at a heightened crash risk compared to their counterparts who completed GDL. Given these findings, there is concern that this already vulnerable population of youth could be disproportionately missing out on crash and injury prevention benefits of state-level GDL policies. Furthermore, low income has been correlated with DDL [28]. This could further exacerbate overrepresentation and/or disparities in crashes among these groups of drivers.

In sum, more comprehensive studies including social, economic, family, and behavioral variables are needed to examine their contribution to DDL. Therefore, we assessed the prevalence, disparities, and factors associated with DDL among teens and young adults.

Methods

Sampling

Data used were from all seven waves (W1–7) of the NEXT Generation Health Study (NEXT), a longitudinal study that followed a nationally representative cohort of U.S. 10th grade students (average age, 16.3 years (se = .03)) into emerging adulthood. This study used primary sampling units (PSU, school districts) from the nine U.S. Census divisions. Schools and classrooms were randomly sampled from the PSUs. One hundred and forty-five schools were invited, and 81 agreed to participate. A total of 2,785 cohort members participated in the study. W1 data collection began in the 2009–2010 school year with 10th grade and continued to survey participants yearly until W7 (2016).

Parental consent and adolescent assent were obtained from 15 to 17 years; participant consent was obtained when participants turned 18 years. African-American participants were oversampled to provide more accurate population estimates and to provide an adequate sample to examine racial/ethnic

differences. The protocol for the study was approved by the Institutional Review Board of the Eunice Kennedy Shriver National Institute of Child Health and Human Development.

Measures

Outcome variable. The outcome variable was DDL, which is defined as any delay in licensure past the earliest time a participant is eligible for licensure with consideration of their state's legal requirements. Participants' date of birth was assessed at baseline, and their age was calculated at each wave. Eligibility for licensure was derived from a question regarding their licensure status. At each annual assessment, participants were asked the following question, "Do you have a driver's license?", with possible responses being, no license of any sort; permit to take the classroom component driver education only; permit allowing supervised practice driving with an instructor or licensed adult; license allowing independent, unsupervised driving. In this study, we only included participants who had a license allowing independent, unsupervised driving. For this study, years delayed (i.e., DDL) was categorized into three groups (long-DDL [>2 years], intermediate-DDL [1–2 years] versus no-DDL).

Independent variables. The independent variables included sex (male vs. female), urbanicity, race/ethnicity (Latino, non-Latino blacks, other vs. non-Latino whites), family structure, parental education, family affluence, parental monitoring knowledge, perceived importance of alcohol non-use to parent, and social media use.

Family structure

Information about participants' family structure was collected during the recruitment home visit by asking participants about the home where they lived all or most of the time. They were given the opportunity to respond about a second home, including how much time they lived there. The family structure was categorized as: both biological parents; one biological parent, one step-parent; single parent, mother only; single parent, father only; and other. This information was then collapsed into four groups for the analysis: both biological parents, biological and step parent, single parent, and other.

Parental education

Information about the education of participants' parents was collected during the recruitment home visit. We categorized the higher education level of either parent (biological or stepparent) as less than high school diploma; high school diploma, or GED; some college, technical school, or associate degree; and bachelor's or graduate degree.

Family affluence

Family socioeconomic status (SES) was estimated in W1 in the primary home using the Family Affluence Scale [35] gathering information about cars owned, computers owned, whether the student had his/her own bedroom, and the number of family vacations in the last 12 months. Participants were categorized as low, moderate, and high affluence [36].

Urbanicity

Baseline school urbanicity in W1 was categorized as urban, suburban, and rural based on seven urban-centric locale codes: large central city, mid-size city, urban fringe of large city, urban fringe of mid-size city, large town, small town, and rural.

Parental monitoring knowledge

Parental monitoring knowledge was assessed separately for mothers and fathers and was the mean of a 5-item scale in W1–W3. The scale included how much mothers/fathers knew about who their friends were, how they spent their money, what they did with their free time, where they were after school, and where they went at night (1 = do not have/see parent/guardian; 2 = he/she does not know anything; 3 = he/she knows a little; and 4 = he/she knows a lot). Scores ranged from one to four possible points. Because monitoring knowledge in W1–W3 is highly correlated, we calculated a grand mean of father's and mother's monitoring knowledge separately across W1–W3. The Cronbach's α values mother- and father-related questions were .83 and .95, .88 and .96, and .90 and .97, at W1, W2, and W3, respectively.

Perceived importance of alcohol nonuse to parent

Student's responded to one question asking participants how important it was to their parents/guardians that he or she not use alcohol in W1–W3. The response options ranged on a scale from 1 = not at all to 7 = extremely. Because the responses in W1–W3 are highly correlated, we calculated a grand mean of perceived importance of alcohol nonuse to parent across W1–W3.

Social media use

Participants were asked "How many hours a day do you usually use a computer, the Internet, or cell phone for chatting on-line, emailing, texting, tweeting or similar social networking (other than for a job or school work) during your free time? (0 = none at all; 1 = about half an hour/day; …, to 8 = about seven or more hours/day), separately for weekdays and weekends." Data were recoded to reflect minutes (e.g. 1 = 30 minutes, 2 = 60 minutes). Average daily social media use (minutes) was [(weekday minutes×5)+(weekend minutes×2)]/7 days. Social media use for the wave when a participant was eligible for obtaining driving license was used.

Statistical analysis

Multinomial logistic regressions were conducted to assess the associations between the DDL and the identified independent variables. Unadjusted and adjusted models were conducted and missing data were deleted listwise. Bivariate association of the outcome variable with any of the independent variables was first examined, and those that were associated (at $p = .10$ level, more conservative to guard against the type II error) with the outcome variable were included in adjusted models. The significance level was set at $p = .05$ for the rest of the analyses. We performed all statistical analyses with SAS, version 9.4 (SAS Institute, Cary, NC) and accounted for features of the complex survey design.

Results

Demographic and outcome variable information is displayed overall and by DDL in Table 1. Of 2,525 (female, 45.5%) participants eligible for license, 887 reported DDL by 1–2 years (38.9%, weighted hereafter) or 1,078 by >2 years (30.3%) across seven waves.

Shown in Table 2 are the means and 95% confidence interval for father's and mother's monitoring knowledge, importance of teen's alcohol nonuse to parent, and social media time for those reporting intermediate-DDL, long-DDL, or no-DDL.

As shown in Table 3, five categorical variables (race/ethnicity, family structure, parental education, family affluence, and urbanicity) and two continuous variables (father's and mother's monitoring knowledge) were associated (at $p = .10$ level) with DDL in the unadjusted models so they were included in the adjusted model. Each independent variable adjusted for the other independent variables (Table 4).

Table 4 shows the results of the adjusted model examining the association between DDL and all independent variables. Latinos had 2.5 times and 4.5 times greater odds of intermediate- and long-DDL compared to their non-Latino white counterparts, respectively. Non-Latino blacks had 2.3 times greater odds of long-DDL, but not intermediate-DDL, compared to their non-Latino white counterparts. Compared to those who had both biological parents living in their main household, those who had a single parent had 1.7 times greater odds of long-DDL, but not intermediate-DDL, versus no-DDL. Compared to those whose parents' highest level of education was bachelor or higher, participants whose parents' highest-level education was ≤high school or some college had 3.7 or 2.0 times greater odds of long-DDL, but not intermediate-DDL, versus no-DDL.

Those with low, but not moderate, family affluence were more likely to have intermediate-DDL by 2.5 times of odds and long-DDL by 4.4 times of odds compared to those with high family affluence. Urban and suburban participants had 1.9 and 3.5 times greater odds of long-DDL, but not intermediate-DDL, versus no-DDL. High mother's, but not father's, monitoring knowledge was associated with lower odds of long-DDL by .6 times, but not intermediate-DDL.

Interactions between race/ethnicity and other independent variables were tested, and the significant interaction between family structure and race/ethnicity, and between urbanicity and race/ethnicity was found (data not shown). Specifically, among those who had one biological parent and one step-parent, Latino participants were less likely to long-DDL, but not intermediate-DDL, by .2 times (adjusted odds ratio [AOR] = .2), compared to non-Latino whites. Among urban participants, non-Latino blacks had greater odds of intermediate- (AOR = .2) and long-DDL (AOR = 4.4) versus no-DDL.

Discussion

The large, nationally representative sample of this study contributes to the unique findings to the current body of

Table 1
Descriptive analysis overall and by DDL for categorical variables

	Overall				Intermediate-DDL				Long-DDL			
	N	Weighted %	95% CI		N	Weighted %	95% CI		N	Weighted %	95% CI	
DDL												
No	560	30.7	21.5	39.9	-	-	-	-	-	-	-	-
Intermediate (1–2 years)	887	38.93	31.22	46.64	-	-	-	-	-	-	-	-
Long (>2 years)	1,078	30.36	22.96	37.76	-	-	-	-	-	-	-	-
Sex												
Male	1,255	45.5	42.1	48.9	424	48.20	43.63	52.77	438	38.25	32.42	44.07
Female	1,525	54.5	51.1	57.9	463	51.80	47.23	56.37	640	61.75	55.93	67.58
Race/ethnicity												
Latino	835	19.3	11.6	27.0	187	16.79	9.14	24.45	497	33.80	20.33	47.27
Non-Latino blacks	687	20.2	11.0	29.4	214	19.24	9.12	29.36	353	31.86	18.79	44.94
Non-Latino white	1,106	55.7	43.4	68.0	439	59.90	48.86	70.93	169	30.60	14.24	46.96
Other	142	4.8	2.7	6.9	44	4.07	2.60	5.54	56	3.73	1.55	5.91
Highest education of either parent												
High school or less	979	33.1	27.3	39.0	230	27.05	20.65	33.45	518	49.24	39.87	58.61
Some college	924	39.8	36.2	43.3	325	40.71	34.52	46.90	308	38.29	30.28	46.29
Bachelor or higher	626	27.1	21.1	33.1	254	32.24	23.62	40.86	133	12.47	7.33	17.61
Family structure												
Both biological parents	1,320	52.2	47.6	56.7	430	54.29	48.83	59.75	441	41.51	35.86	47.17
Biological and step parent	419	19.2	16.5	21.9	127	19.76	14.89	24.64	155	16.76	13.71	19.82
Single parent	516	19.5	16.1	22.9	149	19.05	15.34	22.77	234	26.50	20.22	32.78
Other	269	9.2	7.0	11.5	75	6.89	4.20	9.58	136	15.22	11.38	19.06
Family affluence												
Low	807	23.9	18.1	29.7	177	20.08	14.26	25.91	455	38.45	30.02	46.88
Moderate	1,175	48.9	45.9	51.9	409	52.64	47.15	58.13	404	44.98	38.54	51.41
High	541	27.1	22.0	32.3	195	27.27	21.34	33.21	106	16.57	10.04	23.10
Urbanicity												
Urban	905	13.9	.0	28.31	185	8.6	.0	18.7	544	27.1	1.2	53.0
Suburban	865	50.9	30.2	71.58	278	50.8	30.8	70.8	335	57.8	31.3	84.2
Rural	764	35.2	19.6	50.85	318	40.6	24.4	56.8	89	15.1	4.8	25.5

CI = confidence interval; DDL = delay in driving licensure.

Table 2
Descriptive analysis overall and by DDL for continuous variables

	Overall				No-DDL				Intermediate-DDL				Long-DDL			
	N	M	95% CI		N	M	95% CI		N	M	95% CI		N	M	95% CI	
Father's monitoring knowledge (W1–3 grand mean)	2,780	2.9	2.8	2.9	560	3.1	3.0	3.2	886	2.9	2.8	3.0	1,077	2.6	2.4	2.7
Mother's monitoring knowledge (W1–3 grand mean)	2,781	3.5	3.4	3.5	560	3.6	3.5	3.7	886	3.5	3.5	3.5	1,077	3.4	3.3	3.5
Importance of teen's alcohol nonuse to parent (W1–3 grand mean)	2,778	5.7	5.5	5.8	560	5.8	5.6	6.0	886	5.7	5.5	6.0	1,077	5.6	5.4	5.8
Social media sedentary time	2,718	3.9	3.7	4.1	560	4.0	3.6	4.4	887	3.8	3.6	4.1	1,076	3.8	3.6	4.1

DDL = delay in driving licensure; M = mean.

research. DDL was found to be widespread. Nearly 70% of adolescents and youth who were eligible to obtain a driver's license in their state delayed at least one year or did not obtain the license during the study period. The findings of this study show that participants with lower parental education to be marginally more likely to report DDL compared to participants with higher parental education. Additionally, our study focused on possible young driver group overrepresentation and/or disparities. Latino and non-Latino black teens were found to disproportionately report DDL compared to non-Latino white participants. Low parental income was associated with higher odds of DDL.

Given that DDL could result in some teens missing out on driver safety and crash reduction benefits of GDL programs [22], and that disparities in DDL could potentially lead to overrepresentation in crashes in more vulnerable youth groups, understanding the factors that contribute to DDL is of interest. Overall, low-income participants were found more likely to have DDL. This could possibly be due to the financial demands of vehicle ownership [22]. Moreover, previous research in the U.S. covering 1996–2010 showed that the economic recession (December 2007–June 2009) led to reductions of high school senior licensure rates [18]. In our study, low-income status showed similar effects on DDL (i.e., greater likelihood of DDL).

Table 3
Unadjusted logistic regressions of DDL on independent variables

	DDL by W7							
	Intermediate-DDL versus no-DDL				Long-DDL versus no-DDL			
	OR	95% CI		p	OR	95% CI		p
Categorical variables								
Sex								
Male	1.12	.88	1.42	.33	.75	.49	1.14	.16
Female	Ref				Ref			
Race/ethnicity								
Latino	3.5	3.0	6.5	<.001	14.0	6.6	29.5	<.001
Non-Latino blacks	2.3	1.0	5.2	.04	7.5	3.3	17.0	<.001
Other	1.0	.2	4.4	.98	1.8	.4	7.2	.41
Non-Latino whites	Ref				Ref			
Family structure								
Biological and step parent	1.2	.7	2.0	.41	1.4	.9	2.2	.18
Single parent	1.8	1.1	3.2	.04	3.3	2.1	5.3	<.001
Other	1.7	.7	4.3	.23	5.0	1.8	13.7	.003
Both biological parents	Ref				Ref			
Highest education of either parent								
High school or less	1.6	1.1	2.5	.03	7.7	4.3	13.5	<.001
Some college	1.6	1.0	2.6	.78	2.6	1.7	4.0	<.001
Bachelor or higher	Ref				Ref			
Family affluence								
Low	1.6	1.5	2.5	<.001	9.9	5.4	17.9	<.001
Moderate	1.8	1.1	2.8	.06	2.2	1.3	3.9	.007
High	Ref				Ref			
Urbanicity								
Urban	1.4	.4	5.4	.62	11.7	1.9	74.0	.01
Suburban	1.4	.5	3.7	.53	4.2	1.9	8.9	<.001
Rural	Ref				Ref			
Continuous variables								
Father's monitoring knowledge (W1–3 grand mean)	.8	.6	.96	.02	.5	.4	.6	<.001
Mother's monitoring knowledge (W1–3 grand mean)	.7	.4	1.17	.17	.5	.3	.7	<.001
Importance of teen's alcohol nonuse to parent (W1–3 grand mean)	1.0	.9	1.12	.77	.9	.8	1.1	.22
Social media sedentary time	1.0	.9	1.03	.32	1.0	.9	1.1	.49

CI = confidence interval; DDL = delay in driving licensure; OR = odds ratio.

Table 4
Adjusted logistic regressions of DDL on independent variables

	DDL by W7[a]							
	Intermediate-DDL versus no-DDL				Long-DDL versus no-DDL			
	OR	95% CI		*p*	OR	95% CI		*p*
Categorical variables								
Race/ethnicity								
Latinos	2.5	1.3	4.7	.005	4.5	2.4	8.6	<.001
Non-Latino blacks	1.5	.8	3.0	.22	2.3	1.1	4.9	.03
Other	.7	.2	3.2	.64	.6	.1	4.1	.62
Non-Latino whites	Ref				Ref			
Family structure								
Biological and step parent	1.1	.7	1.7	.79	1.1	.7	1.7	.79
Single parent	1.4	.8	2.5	.27	1.7	1.0	2.8	.04
Other	1.2	.5	2.9	.72	2.2	.8	6.3	.15
Both biological parents	Ref				Ref			
Highest education of either parent								
High school or less	1.1	.7	1.7	.72	3.7	1.8	7.3	<.001
Some college	.9	.6	1.4	.66	2.0	1.2	3.3	.007
Bachelor or higher	Ref				Ref			
Family affluence								
Low	2.5	1.5	4.1	<.001	4.4	2.5	7.7	<.001
Moderate	1.4	.9	2.2	.12	1.6	.8	2.9	.16
High	Ref				Ref			
Urbanicity								
Urban	1.1	.3	4.0	.83	7.7	1.9	31.4	.004
Suburban	1.4	.5	3.9	.53	3.5	1.5	8.0	.004
Rural	Ref				Ref			
Continuous variables								
Father's monitoring knowledge (W1–3 grand mean)	1.0	.7	1.2	.77	.9	.7	1.1	.16
Mother's monitoring knowledge (W1–3 grand mean)	.8	.5	1.2	.21	.6	.4	.9	.01

AOR = adjusted odds ratio; CI = confidence interval; DDL = delay in driving licensure.
[a] Adjusted model: all variables in the table are included in the model and control for each other.

We found higher proportions of DDL among Latino and non-Latino black youth compared to non-Latino white youth. These findings are consistent with a previous study indicating Latinos (29%) and non-Latino blacks (37%) were less likely to be licensed compared to their non-Latino white counterparts (67%) before their 18th birthday [26]. The disproportionate DDL in these vulnerable groups of teen drivers may be positioning them to miss the demonstrated driver safety benefits of GDL programs and potentially contribute to disparities in crash rates. Research shows Latino and non-Latino black men are at an increased risk of experiencing a fatal car crash compared to non-Latino white men based on the national fatality data with ages limited to 25–64 years [37,38], and if hospitalized, non-Latino blacks (aged≥15 years) are less likely to survive car crash–related injuries [39]. Additionally, drivers from low SES neighborhoods are 1.9 time more likely to experience hospitalization for crash-related injuries compared to drivers from high SES areas [40].

Interestingly, high mother's monitoring knowledge, and not father's monitoring knowledge, was significantly associated with less DDL. This is congruent with current literature showing parental primarily mother's, perception of driving readiness is associated with timing of licensure [21]. As for the mother-father difference found in our study, this could be due to traditional gender roles regarding caregiving and child responsibility largely falling on mothers. Thus, mothers may predominately be the decision-makers regarding how developmentally ready a teen is for licensure. This study is unique in assessing both mother's and father's monitoring as an influence on timing of licensure, as the literature usually does not typically distinguish between the effects of mothers and fathers in this area.

High social media use was not found to be associated with odds of either intermediate- or long-DDL in this study. This finding is inconsistent with our expectation that digital connections among friends reduce the need for teens to obtain their license. Le Vine et al. [27] found Internet use among young people to be associated with having a driver's license. Conversely, Sivak et al. found online interaction can act as a replacement for in-person interaction [23], implying that connecting directly with particular friends in ways that could "replace" the in-person connections, and in turn may lower the needs for licensure. Considering that access to media platforms and devices may differ by economic status, we examined the interaction between social media use and family affluence. Here, no significant interaction was found indicating that the association between social media use and DDL did not vary by SES. Given these mixed finding, more research is needed to fully understand the association between online activities and DDL.

As a public health issue, further research is also needed to assess DDL association(s) with known disparities experienced by Latino, non-Latino black, and low-income youth. While DDL could reduce overall driving exposure, inherently contributing to reductions in the risk of crash injury, it would also reduce exposure to GDL policies, which would undermine safe driving should the youth decide to become a licensed novice driver outside of the GDL program age limit (never having been exposed to GDL). More broadly from a lifespan perspective,

differential timing of licensure, in the absence of safe, affordable, and reliable public/other forms of transportation, could contribute to missed opportunities for higher education, employment, access to health care, and exacerbate disparities in vehicle crash–related injuries and fatalities.

Limitations

We recognize that our study has limitations. First, the school-based recruitment limits the generalization to youth in school at 10th grade. Second, 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. Third, only a limited number of covariates were collected and analyzed, which may exclude other important factors that contribute to DDL. Fourth, our study uses participant self-reports instead of direct parent reports in assessment of parental monitoring knowledge and parental support of not using alcohol. This inherently introduces potential for reporting bias. Fifth, while family affluence is a well-established and validated measure [35,36], it is not to be equated as household income. Sixth, some demographic information was not obtained in every single interview wave but was collected at baseline only (e.g., family affluence and structure) and parental monitoring knowledge was collected in W1–W3 only. Therefore, the data may not reflect all the dynamic life transitional changes of the participants.

Conclusion

Latino and non-Latino black teens are more likely to DDL. SES and parenting factors appear to contribute to DDL. Young drivers who are not subject to GDL policies, because of DDL until after age 18, may miss out on crash and injury prevention benefits the GDL program provides. Policy modifications such as extending GDL to include older novice drivers (i.e. $\geq$ 18 years) could broaden the base of GDL's demonstrated safety benefits. The results from this analysis should not be taken as to imply that it would be better for teens to receive their driver's licensure at an earlier age simply to avoid DDL. Our study did not primarily aim to explicitly conclude if receiving a driver's license earlier promotes safe driving outcomes. However, given the known prevention effects of GDL programs in the U.S., the experience of other countries implementing older novice driver GDL requirements (e.g., Australia, Canada), and ongoing considerable debate about older novice driver GDL policies at all state levels (despite implementation of such policy in some states [e.g., Indiana, Maryland, New Jersey to name a few], we believe our findings provide valuable additional information to the older novice driver-GDL discussion (i.e., generally novice drivers aged $\geq$ 18 years) [9]. Finally, in conjunction with a state GDL policy modification, interventions to bolster parenting practices (e.g., parent monitoring knowledge), may help to reduce DDL or apply GDL-type restrictions to teens who "age out" of GDL age limits. Furthermore, exploring cultural and other socioenvironmental reasons for the identified DDL disparity could ultimately inform interventions yield targeted benefits to more vulnerable youth groups. Future research should address the individual economic and safety impact that DDL may have on adolescents.

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