

FIG 1. Year-wise distribution of number of eyes with primary IOL implantation and primary aphakia. Note, 2018 = eyes operated before August 31, 2018.

IATS, in unilateral cases, primary IOL implantation was more often chosen when compared to bilateral cases (61% vs 47%). Primary IOL implantation after IATS is less common in both the unilateral and the bilateral cataract cases compared to the pre-IATS era.

Our results show that in the post-IATS era, more bilateral-ataract cases were implanted than unilateral cases (23% vs 6%). From our data we cannot be sure why the reduction of primary IOL implantation has been more common in the unilateral group. Perhaps it is because the IATS was performed for infants with unilateral cataract, and thus this group more closely matches the randomized trial data. Parents were partners in the treatment decision, and our recommendations for primary aphakia may have been stronger when the infant fit all of the criteria used in the IATS, including unilateral involvement. A recently published survey on global practice patterns in the treatment of infantile cataracts reported primary IOL implantation by 7% and 4% of pediatric cataract surgeons for patients undergoing unilateral and bilateral cataract surgery, respectively.⁴

A year-wise calculation shows that the decrease in primary IOL implantation began in 2010 and 2011 slightly, following the publication of the 1-year results of the IATS in 2010. A greater decrease occurred in 2015, following the publication of the 5-year results of the IATS.³ The IATS design publication in 2010 stated it was yet to be determined whether a primary IOL implantation would lead to an improved visual acuity outcome and whether any improvement would be offset by a higher incidence of postoperative complications.¹ The IATS 1- and 5-year results showed no improvement in visual acuity outcome when an IOL was implanted in infants with unilateral cataract but a substantial increase in unexpected returns to the operating room compared to those left aphakic.

The results of this study are limited by the fact that it reports the effects of IATS on treatment decisions of a

single surgeon; nevertheless, we believe these data are generalizable. The IATS had specific exclusion criteria (eg, corneal diameter <9 mm, eyes with stretched ciliary process). No eyes were excluded in this retrospective study. We would have been less likely to implant in the IATS-excluded eyes before IATS as well as after IATS.

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Driver licensing and motor vehicle crash rates among young adults with amblyopia and unilateral vision impairment

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This retrospective cohort study investigated whether unilateral vision impairment (UVI) or amblyopia are associated with driver licensing and crash risk among young adults. Electronic health

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records for New Jersey residents who were patients with the Children's Hospital of Philadelphia's healthcare network were linked to statewide driver licensing and crash data. We compared young adults with a diagnosis of UVI and/or amblyopia to peers without such a diagnosis. Young adults with UVI or amblyopia were less likely to acquire a driver's license than those without these conditions. However, among licensed drivers, the risk of a police-reported crash was similar in all three groups.

Unilateral vision impairment (UVI) and amblyopia (a cause of UVI) can result in reduced stereopsis. Although emerging evidence suggests that these conditions may also affect visuomotor tasks,¹ relatively little is known about how reduced stereopsis affects driving—a visually intensive task that requires good central acuity and peripheral vision.² All US states have licensing requirements for minimum visual acuity in the better-seeing eye, but good vision in both eyes is not usually required.³

Previous studies indicate that monocular adult drivers may have reduced field of vision,⁴ diminished contrast sensitivity, and impaired depth perception,⁵ suggesting that monocular-ity could potentially increase crash risk.⁶ Newly licensed adolescent and young adult drivers (hereafter, young adults) are at high risk for motor vehicle crashes, with failure to appropriately detect and respond to hazards being important proximate causes.⁷ No studies have assessed the relationship between UVI or amblyopia and driving in young novice drivers. In the current study, we used a unique data source to assess whether UVI or amblyopia are associated with licensure and crash risk among young adults.

Materials and Methods

This study was approved by the Children's Hospital of Philadelphia (CHOP) Institutional Review Board. Study data were from the NJ Traffic Safety Outcomes data warehouse—a unique linked data source that includes data from CHOP network's unified electronic health record (EHR) system and NJ's licensing and crash databases over an eleven-year period (2004-2014).⁸ We identified all NJ residents born from 1987 to 1997 who were patients at one of CHOP's 50 network locations at age 12-15, maintained a NJ address through their last visit (to establish NJ residency), had not been diagnosed with an intellectual disability, and were age-eligible to acquire a driver's license (ie, ≥ 17 years and 1 month old at the end of the study period).⁸

Vision impairment was classified based on the presence of ICD-9 diagnostic codes for amblyopia (368.00-368.03) or UVI (369.6-369.8) in the EHR from either an office visit or the patient's list of known chronic conditions. For amblyopia, the diagnosis code had to be noted in the medical record after age 6 to maximize the likelihood that it affected binocularity. Young adults with diagnosis codes of both amblyopia and UVI were included only in the latter group. Additionally, because best-corrected visual acuity of 20/50 or better in at least one eye is required to obtain a driver's license in NJ, we reviewed EHRs for young adults with either condition to exclude those whose best-corrected visual acuity was worse than 20/50 in the better-seeing eye.

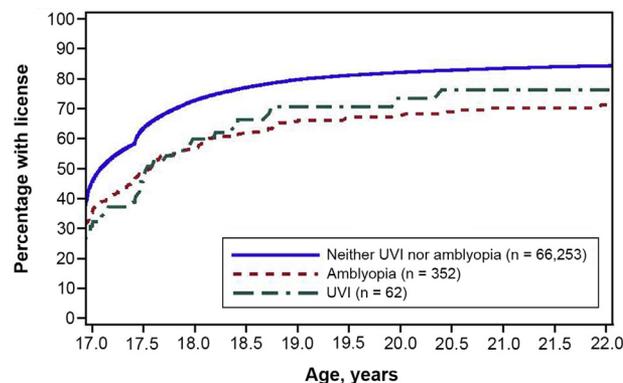


FIG 1. Cumulative percentage of adolescents who acquired a license from age 17, by vision group. Minimum age for licensure is 17.0. Percentages were estimated via Kaplan-Meier failure curves. Log-rank test P value < 0.01 .

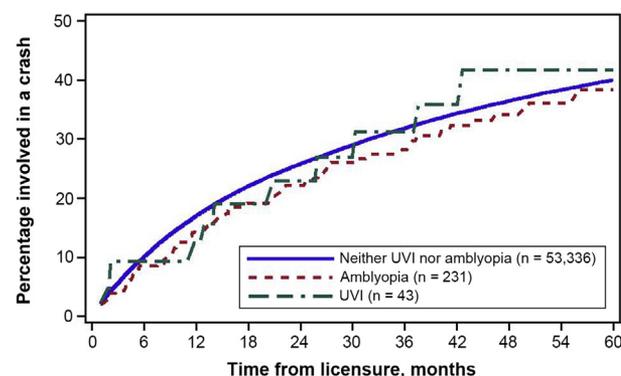


FIG 2. Time (months) from licensure to first crash, by vision group. Minimum age for licensure is 17.0. Percentages were estimated via Kaplan-Meier failure curves. Log-rank test P value = 0.75.

Licensing data included exact dates of birth and driver licensure. NJ residents become eligible for a driver's license at age 17. Crash data included data from police-reported crashes occurring in NJ; a crash is reportable in NJ if it results either in injury or over \$500 in property damage.⁹

For licensing, young adults were followed from age 17.0 until they obtained a driver's license, the end of the study period, or death, whichever occurred first. For assessing crash risk, we followed young adults from the date at which they obtained a license until first crash, end of study, or death. We used the Kaplan-Meier method and hazard ratios to compare the time to licensure and first crash for young adults with and without amblyopia or UVI. Adjusted hazard ratios were estimated using Cox regression, controlling for sex, race/ethnicity, and whether or not they had private health insurance (payor status) as a proxy for socioeconomic status. Analyses were performed in SAS version 9.4 (SAS Institute Inc, Cary, NC).

Results

The analytic cohort consisted of 66,253 young adults (mean age at first crash or censoring, 20.8 years; range, 17-28 years), including 62 with UVI and 352 with amblyopia. There were differences in sex (% female in no

impairment group, 48.8%; in amblyopia group, 50.0%; in UVI group, 56.5%), race (% non-Hispanic white in no impairment group, 70.6%; in amblyopia group, 80.3%; in UVI group, 75.8%) and payor status (% with private insurance in no impairment group, 94.5%; in amblyopia group, 92.2%; in UVI group, 98.3%). Only payor status was statistically significant.

Young adults with UVI or amblyopia were less likely to acquire a license (UVI, 69.4% [$P < 0.01$]; amblyopia, 65.6% [$P = 0.02$]) than those with no impairment (81.0%). See Figure 1. Among licensed drivers, neither UVI nor amblyopia was associated with an elevated crash rate compared with those without UVI/amblyopia (Figure 2, UVI adjHR = 1.08 [95% CI, 0.60-1.95]; amblyopia adjHR = 1.08 [95% CI, 0.85-1.38]).

Discussion

Our findings suggest that although UVI or amblyopia may reduce license acquisition among young adults, there is no evidence that, given licensure, crash risk differs from that of other young adults.

Reduced licensing among those with UVI and/or amblyopia could result from an inability of some to qualify for a license because of co-occurring medical conditions. We attempted to account for this possibility by excluding young adults with reduced vision in both eyes and/or intellectual disabilities. We were unable to account for current visual acuity or degree of stereopsis because of limited availability of data and the retrospective nature of medical record review. Modifications in drivers' training or driving behaviors to reduce crash risk may be more common among those with UVI/amblyopia at the direction of a parent or healthcare provider.¹⁰ If this is the case, our results suggest that these young adults are modifying their driving in a way that does not leave them more vulnerable to crashes.

Understanding the potential effect of UVI and amblyopia on licensure and driving risk among novice drivers is important for assessing whether this population needs additional support for driving safely. Our results find no evidence that UVI or amblyopia affect crash risk. Further prospective studies are needed to identify the primary underlying reasons for differences in licensing rates and to understand how vision impairments might affect driving behaviors and how to optimize training for young adults with UVI or amblyopia who would like to acquire a driver's license.

Literature Search

The authors conducted a MEDLINE search on July 31, 2018, using the following terms: (motor vehicle crash OR drivers license) AND (UVI OR amblyopia OR monocular).

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Band keratopathy in children previously treated with diode laser for type 1 retinopathy of prematurity

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