Published in final edited form as:

J Sch Health. 2019 July ; 89(7): 519–526. doi:10.1111/josh.12776.

Effect of school services on academic performance after traumatic brain injury in Hispanic and non-Hispanic students

Nathalia Jimenez, MD, MPH [Associate Professor Anesthesiology],

University of Washington, Departments of Anesthesiology and Pain Medicine, University of Washington, Harborview Injury Prevention and Research Center, 401 Broadway, 4th Floor, Seattle, WA 98122

Alyssa Virtue, BA [Graduate Research Assistant],

University of Washington, Harborview Injury Prevention and Research Center, 401 Broadway, 4th Floor, Seattle, WA 98122

Karen Segar, MA [Research Data Manager],

Harborview Injury Prevention and Research Center, 401 Broadway, 4th Floor, Seattle, WA 98122

Ann Vander Stoep, PhD [Associate Professor], and

Departments of Psychiatry, Behavioral Sciences and Epidemiology, University of Washington, Child Health Institute, P. O. Box 3549, Seattle, WA 98195

Frederick P. Rivara, MD, MPH [Professor of Pediatrics]

Epidemiology and Pediatric Dentistry, University of Washington, Harborview Injury Prevention and Research Center, 401 Broadway, 4th Floor, Seattle, WA 98122

Abstract

BACKGROUND: School reintegration after traumatic brain injuries (TBI) requires school support; however, implementation of services is complex. This study evaluates disparities in receipt of school services for Hispanic children and its effect on academic performance.

METHODS: Secondary analyses of school data on receipt of pre- and post-TBI school services. A logistic regression compared receipt of services between Hispanic and non-Hispanic White (NHW) children, and a linear regression evaluated services' effect on academic performance.

RESULTS: The study includes 419 children; 46 Hispanic, 373 NHW. For NHW children there were no differences in receipt of pre- and post-TBI services; Hispanic children had significant increase in receipt of services from 5% to 27% ($p < .001$). Compared to NHWs, Hispanics had lower GPA at baseline [2.3 (CI: 1.9–2.7) vs. 2.9 (CI: 2.8–3.0)]. No differences in GPA were found between groups after injury among students who received post-TBI services.

CONCLUSIONS: Students who receive post-TBI school services benefit academically. NHW students maintain their academic performance and Hispanics increase their performance to their

Corresponding Author: njimen@uw.edu, Phone: (206) 744-9430.

Human Subjects Approval Statement

This study was approved by the Human Subjects Committee from the University of Washington.

NHW peers' level. This highlights the importance of providing post-TBI school services to ensure better outcomes for all children.

Keywords

disability; rehabilitation; Hispanic; school services; injury control and prevention

Traumatic Brain Injury (TBI) results in long-term functional impairments in up to 60% of children, and is a major cause of acquired disability in children.¹ Comprehensive rehabilitation improves outcomes and decreases disability after TBI, in part by formulating plans for school re-entry and community re-integration. However, only 7% of hospitalized children with TBI receive comprehensive inpatient rehabilitation,² and less than 29% of Medicaid insured children receive any type of outpatient-rehabilitation therapy during the first year after injury.³ Therefore, for most children adequate transitioning to school after hospital discharge is the responsibility of parents and caregivers.^{4,5}

Returning to school is important to ensure educational and social re-integration of the child. However, cognitive, behavioral and physical impairments can pose challenges to returning to school after a TBI. In a recent systematic review of qualitative studies assessing parents' experiences of their child's return to school, adequate information, communication, and collaboration with the school system were identified as critical factors for an adequate hospital-to-school transition.⁶ While federal legislation is in place to address the educational needs of children with disabilities, the process of gaining access to special education and related services is complex, requiring high levels of parental self-efficacy.⁷

Hispanic parents are more likely to have lower levels of health literacy and education in general.⁸ They are also less likely to be familiar with the school system and may be more reluctant to interact with teachers and school administrators in a formal setting due to language barriers. This is problematic because Hispanic children are disproportionately affected by TBI. Hispanic children are more likely to be injured earlier in life and to sustain more severe and intentional injuries. They also experience long term disparities in health-related quality of life, communication and self-care abilities after a TBI when compared to their non-Hispanic white (NHW) peers.⁹

Despite the higher risk for poor outcomes after TBI among Hispanic children, there are no studies describing how well Hispanic children are able to access post-TBI academic services. Furthermore, the few studies that include Hispanic children are limited to children of English-speaking Hispanic families. The present study aims to determine if there are disparities in receipt of school services by ethnicity. We assess receipt of formal school services such as Individualized Education Programs (IEP) and 504 Accommodations, other school accommodations such as tutoring, and school provided non-academic support such as speech, occupational and physical therapy for Hispanic children versus NHW children with TBI. The effect of school services on academic performance after TBI is also evaluated.

METHODS

Participants

Patients included in this study are a subsample of a prior research cohort, Child Health After Injury (CHAI). This cohort of children was treated for a TBI between March 1, 2007, and September 30, 2008. A detailed description of this cohort has been published previously.¹⁰ In brief, the CHAI cohort recruited children 0–18 years of age discharged from the emergency department or as inpatients; and who were treated for a TBI at the Children's Hospital of Philadelphia, Seattle Children's Hospital, Harborview Medical Center (a level 1 trauma center in King County, Washington), and 4 level 3 and one level 4 trauma centers randomly sampled in King County. Children and their parents were followed for a period of 3 years during which parental reports of functional outcomes and receipt of school services were obtained, as well as school reports including provision of specific school services and overall Grade Point Average (GPA).

For the purpose of this study, the initial cohort was restricted to children who had a TBI in Washington State, who self-identified as Hispanic of any race or as NHW; and for whom information on receipt of school services was available through parental report and/or school data. Participants from other racial or ethnic backgrounds were excluded because groups were too small to be analyzed separately. Participants recruited at the Children's Hospital of Philadelphia were also excluded because school systems differed from Washington State, making comparisons difficult. Participants younger than 5 years of age were included in the analyses because they are eligible to receive services through the school system under the Individual Family Service Plan (IFSP) Act for children up to 3 years old, and under an IEP for children 4 years of age. For analyses on the effect of receipt of services on academic outcomes as measured by Grade Point Average (GPA), only patients 5 years and older were included.

TBI was defined per the US Centers for Disease Control and Prevention definition as a blunt or penetrating injury to the head with one or more of the following signs or symptoms: decreased level of consciousness, amnesia, objective neurologic or neuropsychological abnormality, or diagnosed intracranial lesion. Severity of injury was determined by Glasgow Coma Scale (GCS) at the time of the first medical evaluation and GCS, at the time of Emergency Department discharge or 24 hours after injury if hospitalized. Detailed description is available elsewhere.¹⁰ Mild TBI was defined by worst GCS score of 13 to 15 at the time of the first medical evaluation and a GCS score of 15 at discharge. Mild TBI was further subdivided into 3 categories: mild I, no abnormalities on computed tomography [CT] or no CT was performed; mild II, a skull fracture without intracranial hemorrhage; and mild III, intracranial hemorrhage but case still meet criteria for mild TBI. Moderate TBI was defined by a best motor GCS score 24 hours after injury of 4 to 5 or a score of 6 for cases that did not meet criteria for mild TBI. Severe TBI was defined as best motor GCS score 24 hours after injury of one to 3.

Instruments

Data on receipt of school services were gathered simultaneously from parental report and from administrative school data. School services were categorized as (1) Individualized Education Plan (IEP)/Infant Family Service Plan (IFSP), (2) 504 Accommodation Plan, and (3) Tutoring or Learning Assistance Programs. The IEP and the 504 Accommodations are mechanisms within the federal civil rights law that enable schools to meet expectations that prohibit discrimination against public school students with disabilities. As a legal document, the IEP outlines all aspects of the student's special education program and needs. It includes several components such as assessment of present levels of performance, annual goals, measures to track progress, need for related services like speech therapy, time for each activity, modifications needed and plans to keep parents informed. An Infant Family Service Plan (IFSP) is a plan for special services for young children with developmental delays or disabilities. An IFSP only applies to children from birth to 3 years of age. Once a child turns 3 years old, an IEP is put into place. A 504 Plan provides a child with needed accommodations for a physical or mental impairment when the child does not meet the criteria for an IEP plan. It specifies the accommodations and/or modifications a student will receive to enable her/him to take advantage of regular curricular offerings. Accommodations do not alter the educational content or expectations for the student, rather ensure the content is accessible to the child, such as by providing more time to take a test. Modifications, on the other hand, alter the content the student should learn.

For the purpose of this research, any supplemental academic support services separate from an IEP or 504 Plan, and provided in the school setting, was labeled as tutoring services. Such services include Learning Assistance Programs, or one-on-one academic support. Learning Assistance Programs offer supplemental services for K-12 students scoring below grade-level standard in English language arts and mathematics to address barriers preventing students from accessing core instruction. Data on receipt of related services provided by the school system such as speech, occupational and physical therapies were also analyzed. Analyses excluded information provided by schools on Title 1 funding since this is a school-wide grant, rather than a service provided to individual students. Another service reported by schools but excluded from analyses was the provision of "resource rooms," since students must first have an IEP in place to qualify for their use. Categories of receipt of services are mutually exclusive therefore students that are already categorized as receiving Special Education (IEP/IFSP) are not included in other categories even if their IEP provides these services. For example, since students must first have an IEP in place to qualify for use of a "Resource Room," receipt of this service was not included. Some schools reported provision of "other" services, however given that it was not possible to determine which type of service was provided, services in this category were not included in the analyses.

School academic performance data was provided directly by schools. Academic performance was measured using Grade Point Average (GPA) which represents the average value of the accumulated final grades earned in courses. Because participants sustained their TBI at different times during the school academic year, quarterly GPA measures were used to calculate the average GPA the year after and the year before injury. Subsequently, the

change in each individual student's academic performance from pre-TBI to one year post-TBI was also calculated.

Other variables included in the analyses were child's age at the time of injury, type of health insurance, race, and ethnicity reported by parents; as well as parental language of preference and household income. Additional school information included grade level in school at the time of injury, and type of school (ie, public versus private).

Data Analysis

Baseline demographic, injury, and school characteristics were compared between Hispanic and NHW children using chi square tests for categorical variables and t-tests for continuous variables. Logistic regression analyses were used to compare receipt of services between Hispanic and NHW students, and linear regression analyses were used to evaluate the effect of school services on the association between race and academic performance measured by GPA. Receipt of school services post-TBI was evaluated as both an outcome and as a potential moderator of the difference in change in academic performance pre- to post-TBI for Hispanic and NHW students. Injury severity, student age, family income, and receipt of school services prior to TBI were treated as covariates and were controlled for in multivariate analyses. The final linear regression model included an interaction term between in-school services and ethnicity that was used to predict GPA change from pre to post TBI. All analyses were conducted by using STATA 14.2.

RESULTS

A total of 419 children were included in this study, of whom 46 were Hispanic, and 373 were NHW. There were no significant differences in injury severity, age at the time of injury and sex between groups. There were statistically significant differences in the type of insurance and household income. Hispanic children were more likely to be non-insured or insured by Medicaid and to live in families with lower household incomes. (Table 1) Of the initial sample, 287 (68%) participants had data provided by the school; characteristics of these children were similar to the original sample except for age at the time of injury, since children younger than 5 years of age do not have school data. (Table 1)

Receipt of School Services Reported by Parents

According to parental report, overall the proportion of children receiving services before and after injury varied by group. Among Hispanic children, there was a significant increase in receipt of any service after injury. For NHW children there was no difference in the proportion of children who received services before and after the TBI. When looking at individual type of services, among Hispanic children tutoring services increased significantly after injury. For other services, there was an increase in receipt of services but it did not reach statistical significance (Figure 1).

School Data, Receipt of Educational Services

Of the 287 children who were enrolled in school at the time of the injury and whose school provided data to the study, 258 were NHW and 29 were Hispanic. At baseline, among this

group of children, there were no differences in the proportion of those enrolled in elementary, middle, or high school. However, the highest proportion (44%) of children were enrolled in elementary school. All Hispanic children attended public schools, compared to 90% among the NHW group of children. One year after injury, the proportion of NHW students who attended private schools remained the same, while among Hispanic students, 11% attended private schools. (Table 2)

According to parental report, at the time of injury, 28% of NHW participants were receiving at least one type of educational service (IEP/IFSP, 504 Accommodations or Tutoring/Learning Assistance Program) compared to 5% of Hispanic students ($p < .001$). One year after injury, this gap narrowed with 24% of NHW and 29% Hispanic students reporting receipt of any type of services ($p < .416$). (Figure 1) Among NHW children, there were no differences in the proportion of participants receiving educational services before and after the TBI. In contrast, for Hispanic children, not only did the overall proportion of children receiving services increased, but also significant differences were found for tutoring services. This pre-post-TBI difference among Hispanic children in receipt of services was statistically significant after adjusting for injury severity, age, income, and receipt of prior services. (Figure 1) Tutoring increased from 2% to 18% one year after injury ($p < .004$). Other services also increased among the Hispanic group, but these differences did not achieve statistical significance.

Academic Outcomes

Of the 287 children with school data, data on pre and post GPA was available for only 187 children, 173 NHW and 14 Hispanic. Overall, Hispanic students had significantly lower GPAs at baseline compared to NHW children [2.3 (CI:1.9–2.7) versus 2.9 (CI: 2.8–3.0)] respectively, and similar GPAs after injury. The decrease in the gap between Hispanic and NHW students after the TBI was explained by an increase in the post-injury GPA among the group of Hispanic students who received post-TBI educational resources. Among students who received post-TBI educational resources, there was no change in the GPA for NHW students, while for Hispanics there was a significant increase in their GPA. (Table 3)

DISCUSSION

Our study found significant differences in receipt of educational resources between Hispanic and NHW children at baseline, with no differences in receipt of services after injury. It also found that among the group of students who received educational services post-TBI, Hispanic children benefitted the most. There was a significant increase in academic performance among Hispanic students from baseline to one year after injury, which resulted in a narrowing of the baseline academic gap with NHW students. Hispanic children who did not receive post TBI services continued to lag academically when compared to their NHW peers.

The findings of lower receipt of educational services prior to the TBI is in agreement with reports of lower access to educational services for Hispanic children especially among those whose primary language is not English.¹¹ Hispanic parents may have difficulties identifying learning deficits in their children and, as a result, be less likely to advocate for them. As

well, Hispanic children are more likely to attend schools with fewer resources and to have lower academic performance.¹² The significant increase in receipt of services for Hispanic children after TBI can be the result of post-injury deficits and/or prior deficits that were identified at the time of injury. Regardless of the cause, what is important is that once Hispanic children are identified as needing educational services and receive them, the effect of those services on academic performance is as good as or better than NHW students.

These findings have important implications for clinicians, especially for those who care for Hispanic children in acute care settings. Children who are discharged home to initiate outpatient rehabilitation treatments do not benefit from formal school transition plans developed during comprehensive inpatient rehabilitation care. In this situation, parents are left with the responsibility to communicate with school administrators and teachers to advocate for the educational needs of their children after injury. Initiating a parent-school partnership to develop the best transition to school for a child with a TBI can be difficult. It requires a receptive school environment and a parent who recognizes her/his child's needs and is knowledgeable about the school system and its resources.^{6,13–15} However, this is not the case for the majority of Hispanic parents. US Hispanics have the lowest educational attainment of all racial and ethnic groups. Only 40% of US Hispanics have more than a high school education.⁸ Communication barriers also make parent advocacy efforts difficult since 30% of US Hispanics are not proficient in English.⁸

Special attention should be given to guide Hispanic parents when transitioning their children to school after a TBI. Prior research identifies hospital-to-school transitioning services in the form of written or verbal communication as important predictors for receipt of school services.^{4,5} Prior studies also showed a high correlation between parents' concern for speech or behavioral problems, with receipt of formal education support services such as IEP and 504 Accommodations. In agreement with these studies, our study also found that speech therapy was the most frequently received rehabilitation therapy service and actually the only rehabilitation therapy service provided to Hispanic children.

This study has several limitations. It analyzes data collected 8 years ago, and the availability and accessibility of school services might have changed over time. However in a recent study documenting receipt of school services among mostly NHW children with moderate and severe TBI, the proportion of participants who received school services was similar to ours.¹⁶ Furthermore, the finding of an association between receipt of services and academic performance should not vary over time. Another important limitation is the small sample size, especially for the Hispanic group. Nonetheless, there are virtually no studies evaluating receipt of services in this population, and the only study that reported inclusion of Hispanic students¹⁶ had only 2 Hispanic subjects in their sample. Another limitation is that we do not have data on children's actual service needs.

IMPLICATIONS FOR SCHOOL HEALTH

These findings have important implications for school educators and administrators. School needs of children with functional disabilities secondary to TBI are different from those of traditional special education students. Families of students who sustain a TBI face new

challenges for which they had little time to process and to adjust, especially among those with moderate injuries that did not require comprehensive inpatient rehabilitation but that still have associated functional deficits. Families not only have difficulties finding resources and learning about procedures for accessing them, but also might be reluctant or unable to recognize new deficits in their children.^{1,5}

School health professionals are uniquely positioned to help parents recognize and accept these new deficits, as they are typically the most consistently available professional in a child's life.¹⁸ Hispanic parents may also be reluctant to advocate for their child due to language or immigration barriers. Educators and administrators can actively initiate and facilitate this communication by the use of interpretation or advocacy from bilingual educators, school interpreters, and formal parent liaisons. Furthermore, schools should help facilitate this transition for children not just to ensure their physical needs are being met, but also their psychosocial needs.¹⁹ To facilitate and standardize communication with families, schools should develop policies that mandate meetings with families after a traumatic brain injury.²⁰ All meetings should include interpretive services, if needed. Protocol for policy implementation should include best practices for teachers and administrators to follow when a child returns to school after a brain injury.²⁰

Another important lesson for schools is to recognize that functional deficits after a TBI are dynamic; some deficits get better while others develop or are recognized only after some time. School services for students with a TBI should be fluid, and schools should be ready to modify services according to current need. Therefore, communication with parents and if possible with the health system over time is encouraged. Children spend the majority of their time at school; academic and social growth happens at school and therefore, adequate reintegration to school after TBI is essential for a child's recovery.

Specifically, we recommend that schools:

1. Provide culturally sensitive, translated materials in accessible language that informs families about services available when a child returns to school after a brain injury.
2. Set up an initial meeting with the family and health care providers to streamline rehabilitation services/accommodations available to students when they return to school after a brain injury.
3. Increase funding for interpreters and bilingual educators to help facilitate communication between the school team and the family.
4. Train teachers and other school personnel about the effects and symptoms of brain injuries to help them identify students who need accommodations or extra support when they return to school. This training should also inform teachers how they can best support children in the classroom after a brain injury.
5. Develop a protocol to check up on student's progress periodically over time to reassess for services needed. For example, reassess children annually for services needed, even if the child does not qualify immediately post injury.

ACKNOWLEDGEMENTS

This work was supported by the National Institute of Child Health and Human Development (grant K23HD078453-04 to Dr. Jimenez) and Harborview Injury Prevention & Research Center's INSIGHT Student Internship Training Program.

REFERENCES

1. US Centers for Disease Control and Prevention. Traumatic brain injury & concussion. 2017 Available at: <https://www.cdc.gov/traumaticbraininjury/index.html>. Accessed March 15, 2018.
2. Greene NH, Kernic MA, Vavilala MS, Rivara FP. Variation in pediatric traumatic brain injury outcomes in the United States. *Arch Phys Med Rehabil*. 2014;95(6):1148–1155. [PubMed: 24631594]
3. Jimenez N, Symons RG, Wang J, Ebel BH, Vavilala MS, Buchwald D, et al. Outpatient rehabilitation for medicaid-insured children hospitalized with traumatic brain injury. *Pediatrics*. 2016;137(6):e20153500. [PubMed: 27244850]
4. Glang A, Tyler J, Pearson S, Todis B, Morvant M. Improving educational services for students with TBI through statewide consulting teams. *NeuroRehabilitation*. 2004;19(3):219–231. [PubMed: 15502255]
5. Glang A, Todis B, Thomas CW, Hood D, Bedell G, Cockrell J. Return to school following childhood TBI: who gets services? *NeuroRehabilitation*. 2008;23(6):477–486. [PubMed: 19127001]
6. Andersson K, Bellon M, Walker R. Parents' experiences of their child's return to school following acquired brain injury (ABI): A systematic review of qualitative studies. *Brain Inj*. 2016;30(7):829–838. [PubMed: 27057776]
7. Carney J, Porter P. School reentry for children with acquired central nervous systems injuries. *Dev Disabil Res Rev*. 2009;15(2):152–158. [PubMed: 19489086]
8. Flores A, Lopez G, Radford J, Pew Research Center. Facts on Latinos in America: current data. Available at: <http://www.pewhispanic.org/2017/09/18/facts-on-u-s-latinos-current-data/>. Accessed March 15, 2018.
9. Jimenez N, Ebel BE, Wang J, Koepsell T, Jaffe K, Dorsch A, et al. Disparities in disability after traumatic brain injury among Hispanic children and adolescents. *Pediatrics*. 2013;131(6):e1850–e1856. [PubMed: 23650302]
10. Koepsell TD, Rivara FP, Vavilala MS, Wang J, Temkin N, Jaffe K, et al. Incidence and descriptive epidemiologic features of traumatic brain injury in King County, Washington. *Pediatrics*. 2011;128(5):946–954. [PubMed: 21969286]
11. US Department of Education. IDEA section 618 data products: static files. Available at: <https://www2.ed.gov/programs/osepidea/618-data/static-tables/index.html>. Accessed March 21, 2018.
12. Gándara P, Rumberger R, Maxwell-Jolly J, Callahan R. English learners in California schools: unequal resources, unequal outcomes. *Educ Policy Anal Arch*. 2003;11(36). Available at: <https://epaa.asu.edu/ojs/article/viewFile/264/390>. Accessed March 21, 2018.
13. Roscigno CI, Fleig DK, Knafl KA. Parent management of the school reintegration needs of children and youth following moderate or severe traumatic brain injury. *Disabil Rehabil*. 2015;37(6):523–533. [PubMed: 24969697]
14. Savage RC, Pearson S, McDonald H, Potoczny-Gray A, Marchese N. After hospital: working with schools and families to support the long term needs of children with brain injuries. *NeuroRehabilitation*. 2001;16(1):49–58. [PubMed: 11455103]
15. Gfroerer SD, Wade SL, Wu M. Parent perceptions of school-based support for students with traumatic brain injuries. *Brain Inj*. 2008;22(9):649–656. [PubMed: 18608201]
16. Prasad MR, Swank PR, Ewing-Cobbs L. Long-term school outcomes of children and adolescents with traumatic brain injury. *J Head Trauma Rehabil*. 2017;32(1):E24–E32.
17. Kingery KM, Narad ME, Taylor HG, Yeates KO, Stancin T, Wade SL. Do children who sustain traumatic brain injury in early childhood need and receive academic services 7 years after injury? *J Dev Behav Pediatr*. 2017;38(9):728–735. [PubMed: 28953005]

18. Sabin JA, Zatzick DF, Rivara FP. A role for school health personnel in supporting children and families following childhood injury. *J Sch Health*. 2005;75(4):141–144. [PubMed: 15988840]
19. Botcheva L, Hill KE, Kane J, Grites K, Huffman LC. School reintegration for children in different phases of serious illness. *J Sch Health*. 2004;74(2):68–71. [PubMed: 15077502]
20. Lyons VH, Moore M, Guiney R, Ayyagari RC, Thompson L, Rivara FP, et al. Strategies to address unmet needs and facilitate return to learn guideline adoption following concussion. *J Sch Health*. 2017;87(6):416–426. [PubMed: 28463445]

Figure 1.
Proportion of School Services Received One Year Before and One Year after Injury,
Stratified by Ethnicity

Table 1.

Baseline Demographic and Clinical Characteristics of the Study Population

Children with TBI and parental reports of school services (N=419)				Children with data provided by the school (N=287)		Children with GPA data at baseline and 1 year after injury (N=187)	
Characteristic	NHW (N=373)	Hispanic (N=46)	p-value	NHW (N= 258)	Hispanic (N=29)	NHW (N= 173)	Hispanic (N=14)
Injury Severity	%	%	.068	%	%	%	%
Mild (1&2)	74.3	60.9		70.9	58.6	75.1	57.1
Mild Complicated, Moderate and Severe	25.7	39.1		29.1	41.4	24.9	42.8
Child's Sex			.426				
Male	67.8	63.0		70.9	65.5	76.3	57.1
Female	32.2	37.0		29.1	34.5	23.7	42.9
Age at injury (years)			.588				
0–4	10.2	8.7		0	0	0	0
5–9	26.3	30.4		25.9	27.6	27.2	21.4
10–14	35.7	28.3		41.1	27.6	45.1	42.9
15–17	27.9	32.6		33.0	44.8	27.8	35.7
Health Insurance			<.0001				
None	3.8	8.7		3.9	10.3	3.5	0
Medicaid	12.6	73.9		12.8	72.4	8.7	71.4
Private	82.3	15.2		81.3	13.8	85.6	28.6
Other	1.3	2.2		1.9	3.5	2.3	0
Household Income, \$			<.0001				
<\$30,000	11.3	69.6		10.1	65.5	5.8	64.3
\$30,000-\$60,000	18.0	15.2		19.8	17.2	17.9	21.4
>\$60,00	67.6	10.7		68.2	10.3	74.6	14.3
Unknown	3.2	4.4		1.9	6.9	1.7	0

Table 2.

School Characteristics at Time of Injury and One Year after, Stratified by Ethnicity

School Report	Baseline		P value	1 year after injury		P value
	NHW N=258	Hispanic N=29		NHW N=217	Hispanic N=18	
School Level	%	%	.677	%	%	.870
Elementary	44.6	37.9		44.2	38.9	
Middle	22.1	20.7		18.0	22.2	
High School	33.3	41.4		37.8	38.9	
School Type			.062			.844
Public	89.2	100		90.3	88.9	
Private	10.8	0		9.7	11.1	
Educational Type			.516			.121
General Education	83.7	89.7		85.2	66.7	
Gen Ed w/504	3.9	0		2.8	5.6	
Special Education	12.4	10.3		12	27.7	
Type of Special Education			.759			.770
Self-Contained	9	0		12	0	
Regular Class	3	0		85	100	
Resource Room	88	100		4	0	
Therapy Services Received						
Occupational Therapy	1.3	0	.536	1.0	0	.684
Speech Therapy	4.8	0	.229	3.1	6.3	.492
Physical Therapy	0.9	0	.614	1.5	0	.536
Behavioral Services	4.8	3.5	.738	4.6	6.3	.764
Mean GPA (95% CI)						
All children	2.9 (2.8–3.0)	2.3 (1.8–2.7)	NA	3.0 (2.9–3.1)	2.7 (2.4–3.0)	NA
Children with services after TBI	2.8 (2.6–2.9)	2.2 (1.6–2.9)	NA	2.8 (2.6–3.0)	2.8 (2.4–3.1)	NA
Children without services after TBI	3.1 (3.0–3.2)	2.5 (1.7–3.2)	NA	3.1 (3.0–3.2)	2.5 (1.9–3.2)	NA

Table 3.

Mean GPA Difference One Year before and One Year after Injury, Stratified by Ethnicity and School Services Received

N = 335	Difference in GPA Before and After Injury (95% CI)		
	with School Services after injury	without School Services after injury	Difference (with – without services)
Hispanic children	0.29 (–.07, .64)	–0.35 (–.75, .06)	0.64 (0.11, 1.12)
Non-Hispanic White children	0.02 (–.11, .15)	–0.01 (–.10, .08)	0.03 (–.13, .19)