SAFE AND SOUND

PAVING THE WAY

2019 Annual Report

CChIPS I Center for Child Injury Prevention Studies
PARTNERING FOR SAFETY

Welcome to the CChIPS 2018-2019 Project Year!

The Center for Child Injury Prevention Studies (CChIPS) takes a unique approach to child safety research. For over a decade, CChIPS has been a hub of innovation and collaboration for industry members and academic researchers committed to improving the safety of children and adolescents.

A Message From Our Directors

The Center’s research portfolio continues to cover our core areas of focus: child passenger safety, pediatric biomechanics, and young driver safety, while also evolving to address current challenges and emerging issues in child injury prevention, as guided by science and our IAB member companies. For example, a large CChIPS effort involved the evaluation of a new anthropomorphic test device, taking our biomechanics and testing research to the cutting edge.

In other CChIPS research, we are informing current and future efforts in optimizing Advanced Driver Assistance Systems and autonomous vehicles. CChIPS research is informing how young drivers, older drivers, and parents react to autonomous features, such as examining the safety of new vehicle seating configurations (e.g., swiveling) that may be possible in autonomous vehicles and how parents view the safety of their passengers under these conditions.

Our leadership in this space has continued beyond the confines of research projects: CChIPS Aditya Belwadi, PhD was named Autonomous Vehicle Special Interest Group Leader for the Association for the Advancement of Automotive Medicine (AAAA); Dr. Bebawi and CHOP colleagues Helen Loch, PhD and Thomas Scarratt, MBE presented their research at the Automated Vehicles Symposium in Orlando, FL; and Kristy Arbogast, PhD, CChIPS co-director, presented to industry on important considerations for children and youth in autonomous vehicles at the Automotive Safety Council Annual Meeting in San Antonio, TX. Julie Manusfield, PhD of OSU presented at the SAE World Congress in Detroit, MI and the AAAM Annual Conference in Nashville, TN, as well as at several state-wide conferences for Child Passenger Safety Technicians. We are proud to be a driving force behind innovation research that continues to push the envelope in working to improve child safety.

In addition, CChIPS – through its parent center at CHOP, the Center for Injury Research and Prevention (CIRP) – utilizes a team of outreach and communication experts to translate CChIPS research findings into appropriate messages and materials designed to reach target audiences. They use digital communication strategies to share information, such as social media, email blasts, and the cchips.research.chop.edu and injuryresearch.chop.edu websites. The two websites garnered nearly half a million page views in calendar year 2018. We look forward to sharing our achievements over this past year and in years to come, as together, we improve the safety of our roads for youth.

For current IAB membership, please visit cchips.research.chop.edu.

IAB MEMBER COMPANIES

CChIPS Mission Statement

The CChIPS mission is to advance the safety of children, youth, and young adults by facilitating scientific inquiry into childhood and young adult injuries and to translate these findings into commercial applications and educational programs for preventing future injuries.

For current IAB membership, please visit cchips.research.chop.edu.
FUNDING THE RESEARCH

CChIPS is made possible through a grant from the National Science Foundation (NSF), as well as through sponsorships from its Industry Advisory Board (IAB) members comprised of the leaders in industry, small business, nonprofits, and government agencies that engage in and value scientific research and development to improve child safety. In 2018, each full voting IAB member contributed $65,000 to support the CChIPS mission. Nonprofit organizations and small businesses are also given the opportunity to join for a reduced annual fee. Government agencies support CChIPS as non-voting members and contribute to the science as project mentors. Membership in CChIPS has fostered industry and small business commitment to the CChIPS mission and spurred innovation. To become a member or to sponsor research with CChIPS investigators, please contact us at cchips@email.chop.edu.

HOW DO WE CALCULATE THE CCHIPs ROI?

The CChIPS Industry Advisory Board (IAB) has three different membership types tied to varying annual fees:
- Large Business: $65,000
- Government/Nonprofit: $25,000
- Small Business: $15,000

13 Members

$352,397 in research funds excluding supplemental funds.

The research pool funded 9 projects in 2018-2019, which fall within five interest areas. Projects are often categorized in more than one area.

- Child Restraint Design and Performance: 7 Projects, $538,715*
- Consumer/Driver Behavior: 4 Projects, $416,542*
- Crash Avoidance & Autonomous Vehicles: 4 Projects, $357,120*
- Vehicle Restraint Performance: 5 Projects, $585,389*
- Dummy Biofidelity: 4 Projects, $257,890*

What Does the CChIPS ROI Look Like for One Member?

In 2018-2019, a large business with an interest in child restraint design and performance contributed $65,000 for access to research valued at $538,716.

* These values include the cost of individual projects coupled with the institutional indirect rates from academic partners to more accurately represent the actual cost of conducting research.
WHAT WAS THE PURPOSE OF THIS PROJECT?
We quantified the response of a pediatric ATD in rear-facing CRS with and without load legs in frontal and oblique crashes. Load legs are structural supports that go from the base of the child seat to the floor of the rear row of the vehicle. Load legs are not new to CRS; they have been around in the European Union for close to a decade but have only been available in the US for the past five years. Load legs can lessen the impact of a frontal crash through energy absorption and rotation prevention. However, data were not only needed to prove that they work, but also how they work, to prevent injury during a crash.

WERE ANY OF THE RESULTS SURPRISING?
While we expected to see benefits of adding the load leg to CRS, it was a big surprise to see a 60 percent reduction in head injury criterion (HIC36) in a frontal crash with the load leg versus without it. That is substantial.

WHAT ARE THE INDUSTRY IMPLICATIONS FOR THESE FINDINGS?
We hope these findings will provide the evidence needed for broad adoption of load legs as part of CRS design across the industry. Currently, there are no regulations guiding manufacturers’ use of load legs in the US.

WHAT HAPPENS NEXT WITH THIS PROJECT?
In Year 1 of this study, we looked at smaller rear-facing seats. We plan to now examine wider and bulkier CRS with load legs that are used to restrain older children up to 55 pounds. There is much more force on load legs when children are larger, but I still think that load legs will come out winning.
**LARGE OMNIDIRECTIONAL CHILD (LODC) ATD: ROUND ROBIN TESTING**

**Principal Investigator:**
John H. Bolte IV, PhD, The Ohio State University

**Project Team Members:**
- Thomas Soerriet, MBE, Children’s Hospital of Philadelphia; Arrianna Willis, MS, The Ohio State University

**Students:**
- Rahul Akkem, Drexel University; Gregory Changas, Drexel University; Madeline Griffith, University of Pennsylvania; Christine Holt, Drexel University

**IAB Mentors:**

**HOW DID YOU CONDUCT YOUR RESEARCH?**

Since NHTSA is a CHIPS member, linking its dummy development to the cohort of other IAB members made this project efficient and effective. Each IAB member company was able to have one or more of the LODCs at their facility over the past 18 months to run a variety of different tests – including certification tests, vehicle crash tests, sled tests, and even an airplane drop test.

They were also able to document and share information about how the ATD performed. This allowed both our research team and NHTSA to see the results of the dummy’s testing in multiple labs under various testing conditions.

**WHAT DID YOU FIND AND WHAT’S NEXT?**

The preliminary findings highlight some durability issues with the dummy and identified changes that should be made to ensure the LODC can withstand repeated testing. The feedback and finalized data will ultimately be utilized by NHTSA to improve the overall biofidelity of the LODC.

**WHAT WAS THE PURPOSE OF THIS PROJECT?**

The Large Omnidirectional Child (LODC) is a new crash test dummy created by NHTSA to represent a 10-year-old child and will be used to test the safety of booster seats in rear seat configurations. This project allowed end users of the LODC ATD to be involved in its development by testing the device’s performance and providing feedback to NHTSA.

**LATERAL CERVICAL SPINE STIFFNESS IN CHILDREN**

**Principal Investigator:**
Laura Boucher, PhD, ATC, The Ohio State University

**Co-Investigator:**
Julie Mansfield, PhD, The Ohio State University

**Project Team Members:**
- Aditya Behludi, PhD, Children’s Hospital of Philadelphia; Thomas Soerriet, MBE, Children’s Hospital of Philadelphia

**Students:**
- Yadetsie Zarangoa-Rivera, The Ohio State University

**IAB Mentors:**
- Yihing Shi, PCA US LLC; Amanda Taylor, Federal Aviation Administration; Mark Neal, General Motors Holdings LLC; Michelle Schuffman, General Motors Holdings LLC; Eric Dahle, Goodbaby International; Jerry Wang, Humanetics Innovative Solutions; Arjun Yetikuri, Lear Corporation; Bino Davidson, Lear Corporation; Hiromasa Tanji, TK Holdings Inc.

**WHAT WAS THE PURPOSE OF THIS PROJECT?**

Human body models are often used in computer simulations when researching unique car crash scenarios or pedestrian crashes. Detailed data on neck range of motion, strength, and stiffness are extremely limited or do not exist at all for children, so this project aimed to gather those data to aid in improving the accuracy of pediatric human body models for computer simulations or dummy biofidelity assessments.

**HOW WAS THE RESEARCH CONDUCTED?**

We collected data from 25 male and female 5- to 7-year-old children to learn about range of motion, strength, and stiffness in their necks. Range of motion of the neck was measured using standard clinical techniques. Strength at discrete positions and stiffness over a continuous range of angles were measured using an isokinetic dynamometer fitted with a custom head fixture.

**WHAT DID YOU FIND?**

In the anterior-posterior direction, older children were stiffer in flexion compared to younger children. However, this same relationship was not observed in extension. When looking at overall motion, all children were significantly stiffer as they initially extended from a chin-to-chest position back to an upright position than in the latter portions of the motion. This was true for both the anterior-posterior and lateral directions of motion. Age differences in stiffness were not observed in the lateral direction for either left or right movements. Additionally, there were no differences in stiffness values between left and right movements.

**WHAT ARE THE IMPLICATIONS FOR THESE FINDINGS?**

Our results revealed it is important to consider initial position of the child during a simulation to correctly assign stiffness values to any model. Overall, children were less stiff when starting from a neutral position, as would be expected in a vehicle. This difference in stiffness might result in added vulnerabilities in automobiles for this young population. Additionally, with these data, we are creating a pediatric neck stiffness corridor that can be used to assess the current 6-year-old ATD neck response.
WHAT WAS THE PURPOSE OF THIS PROJECT?

Drivers of autonomous vehicles may be slow to take over vehicle control in time to avoid a crash. We wanted to understand if a novel take-over warning based on the startle reflex could accelerate take-over reaction times in adults and newly licensed teens. We also wanted to see how age and engagement in the driving task (ready to react versus testing while driving) influence the acoustic warning’s effectiveness.

WHAT WAS THE INDUSTRY IMPLICATIONS FOR THIS RESEARCH?

Our research can help industry to develop more effective take-over warnings. Since the ASPS activates later than forward collision warnings and lane departure warnings, it could be used in conjunction with those systems as a last resort if the driver does not respond to them. Our findings can be used to inform ADAS for all vehicles.

WHAT’S NEXT FOR THIS LINE OF RESEARCH?

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WHAT'S NEXT FOR THIS LINE OF RESEARCH?

Our study only involved male drivers, and we want to find out if the startle reflex could be beneficial to female drivers as well. We also want to understand if the differences we observed with age – where adult drivers’ movements were accelerated by the ASPS but those of teens were not – apply to females as well.

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WHAT WAS THE PURPOSE OF THE PROJECT?

This project aimed to understand how the head and neck of the Hybrid III 6-year-old ATD respond to variability in the neck tension set-up and to determine repeatability over multiple tests. We know that head kinematics of the ATD can be influenced by different initial neck tensions, and repeated tests may change the tension level of the neck center cable, potentially changing the responses of the head. It is important for industry members to better understand the reliability of ATD performance during sled testing.

HOW WAS THE STUDY CONDUCTED?

We developed a mini-sled fixture to simulate a frontal impact scenario and subjected the ATD head and neck assembly to a velocity similar to FMVSS 213 sled tests. We then changed the neck tension to evaluate the sensitivity of the responses. For repeatability we run over 30 tests.
WHAT WAS THE PURPOSE OF THIS PROJECT?

Current self-driving vehicles rely on the driver to monitor the road at all times and quickly take over when necessary. For this to work, the driver must stay engaged. To find out whether drivers remain engaged in self-driving vehicles, we studied 60 participants in three groups – teens (ages 16-19), adults (ages 30-55), and seniors (age 65+). We also interviewed them about their perceptions of self-driving, which led them to better react to the emergency situation. We think the ‘distraction’ woke them out of lethargy to put one hand back on the wheel and their foot back to the pedal.

WHAT DID YOU FIND AND WERE ANY OF THE RESULTS SURPRISING?

More than 75 percent of the drivers did not keep their hands on the steering wheel, and over 35 percent did not keep their foot either on or near the pedal. We also observed a high level of boredom, with a few participants even falling asleep at the wheel. What was surprising is that when asked to perform a simulated drive developed as part of Year 1 of this project, we saw a 1- or 2-second delay to react; and the lower right quadrant shows the participant’s foot under the pedal when seeing the emergency situation. We think the ‘distraction’ woke them out of lethargy to put one hand back on the wheel and their foot back to the pedal. WHAT ARE THE INDUSTRY IMPLICATIONS FOR THESE FINDINGS?

This study confirmed the need for industry to understand human factors in autonomous driving. For example, how much experience should be required before operating a self-driving vehicle? Should a special license be required? Should hands on the wheel and foot on or near pedal be required and monitored? More research is needed to determine how much time it takes for drivers to react to emergency situations. A 1- or 2-second warning may not be enough time.

WHAT HAPPENS NEXT WITH THIS PROJECT?

We would like to continue validating these findings with more participants and different driving scenarios.

WHAT WAS THE PURPOSE OF THIS PROJECT?

Highly automated vehicle (HAV) technology is advancing rapidly with the promise of reducing injuries and deaths caused by motor vehicle crashes. A future vehicle with complete autonomy and minimal human intervention could allow drivers to engage in other activities, such as working, reading, or conversing with others in the vehicle. This sounds great, but what happens when these HAVs are involved in a crash or near-crash? We still need systems that protect occupants should a crash or severe event occur.

WHAT DID YOU FIND?

With this project we analyzed how crashes with HAV seating scenarios could impact the pediatric occupant. Since proposed HAV seating concepts have swiveling and reclining seat structures, we used computational modeling to explore two swiveled and reclined seating conditions in frontal crashes. A frontal impact in a traditional seat becomes a rear impact for the occupant that is swiveled around. The qualitative assessment of the kinematics in the crashes studied in this pilot study pave the way to conduct additional research in HAV crash scenarios to provide optimal protection to occupants. After studying the impact of a HAV crash on a single pediatric occupant in two seating configurations, moving forward we believe it is important to simulate more conditions, more seating positions, and more recline angles, as well as more occupants inside the vehicle, to provide the foundation for optimal safety in crash scenarios that might come with HAVs.

WHAT'S NEXT?

The invention of HAVs brings new challenges to researchers. As an engineer, I wanted to meet the challenge of helping auto manufacturers design safety systems and vehicles that can protect occupants inside HAVs. We used the PIPER six-year-old human model as the pediatric occupant model, the Position and Personalize Advanced Human Body Models for Injury Prediction (PIPER) were developed by the PIPER EU Consortium. The child model is scalable through a dedicated module within the PIPER application and has been extensively validated with experimental data from scientific literature.

WHAT DID YOU FIND?

After testing the swiveling condition with two different recline angles for a traditional low-back booster seat, we found that across all rearward-facing frontal impact simulations (i.e., front passenger vehicle seat swiveled around to face rearward), the child rides along the seat recline during the impact. This causes an asymmetrical rotation of the child’s torso about the 3-point lap-shoulder belt. These kinematics should be explored further to understand their implications.
### Effectiveness of Boosters vs. Forward-Facing Five-Point Harness Restraints

**Principal Investigator:** Julie Mansfield, PhD, The Ohio State University  
**Co-Principal Investigator:** John H. Bolte IV, PhD, The Ohio State University  
**Project Team Member:** Rakshita Ramachandran, PhD, The Ohio State University  
**IAB Mentors:**  
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- Nick Rydberg, Minnesota HealthSolutions; Jason Stammen, National Highway Traffic Safety Administration; Julie Kleinert, Technical Advisor; Uwe Meissner, Technical Advisor  
**Student:** Li Li, The Ohio State University  

**What was the purpose of this project?**  
Best practice recommendations for CRS are partly determined by studying injury outcomes using federally available crash databases. While these sources have been studied for rear-facing versus forward-facing (FF) CRS, the literature is lacking information for the transition from a FF CRS to a belt-positioning booster (BPB) seat. This is a gap that crash testing cannot easily fill, as ATDs restrained in these two belt-positioning booster (BPB) seat. This is a gap that crash testing cannot easily fill, as ATDs restrained in BPB cannot easily fill, as ATDs restrained in these two restraint types may not be able to discriminate these nuanced differences. This project’s aim was to analyze this crucial transition point to ascertain if there are age, height, or weight differences. This project’s aim was to analyze this crucial transition point to ascertain if there are age, height, or weight differences.

**What did you find?**  
We looked at injury outcome data for children near the FF CRS to BPB transition size. Data were analyzed from the two systems within the National Automotive Sampling System (NASS) – the General Estimates System (GES), which pulls from police reports, and the Crashworthiness Data System (CDS), which contains detailed data on a sample of crashes. Due to limitations with the data, including the number of cases and level of detail across both sub-sets of the NASS database, we were not able to determine with statistical certainty if there is an overall risk of a child receiving a moderate to severe injury was typically less than 2 or 3 percent in both restraint types. Due to limitations with the data, including the number of cases and level of detail across both sub-sets of the NASS database, we were not able to determine with statistical certainty if there is a safety benefit of a child of this age and size using one type of restraint over another.  

**What are the implications for these findings?**  
The results of this study, which looked at the most recent federal data available, suggest that other sources are needed to answer the research question with certainty. Both types of restraints appear to work well since the risk of injury was low for both. Best practice guidelines currently recommend using FF CRS for as long as possible because children have less freedom of movement to wiggle out of the ideal position in this type of CRS.

**What did you find?**  
We found that, as expected, younger and smaller children tended to be seated in FF CRS, while older and larger children tended to be restrained in BPB. The overall risk of a child receiving a moderate to severe injury was typically less than 2 or 3 percent in both restraint types. Due to limitations with the data, including the number of cases and level of detail across both sub-sets of the NASS database, we were not able to determine with statistical certainty if there is a safety benefit of a child of this age and size using one type of restraint over another.  

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**How was it conducted?**  
The outboard vehicle seat tended to better support the child than the side and off the vehicle seat cushion. We found substantial movement in the BPB, in particular. However, we also found that adjacent upright vehicle seats helped to control the motion of the child seat and the ATD. When CRS were installed in the narrower center position, there was overhang of the CRS relative to the vehicle seat that impacted testing performance; those CRS moved farther to the side and off the vehicle seat cushion. We found substantial movement in the BPB, in particular.

**What is next?**  
Based on the findings of this study, a 2019-2020 CChIPS project will investigate LATCH vs. non-LATCH installations for BPBs in impacts.

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### Effects of Adjacent Seat Positions on CRS Performance in Side Impacts

**Principal Investigator:** Julie Mansfield, PhD, The Ohio State University  
**Co-Investigator:** Yun Seok Kang, PhD, The Ohio State University  
**Student:** Gretchen Baker, The Ohio State University  
**IAB Mentors:**  
- Susan Mostofizadeh, American Honda Motor Co., Inc.; Emily Thomas, Consumer Reports; Suzanne Johansson, General Motors Holdings LLC; Mark LaPlante, Graco Children’s Products Inc.; Justin Robinson, Graco Children’s Products Inc.; Brian Davidson, Lear Corporation; Schuyler St. Lawrence; Toyota USA; HyunJung Kwon, Transportation Research Center; Julie Kleinert, Technical Advisor; Uwe Meissner, Technical Advisor

**What was the purpose of this project and how was it conducted?**  
Today’s vehicle fleet features increasingly adaptable vehicle interiors, particularly in family vehicles. The CChIPS IAB was interested in investigating how CRS interact with the adjacent vehicle seat and if the position of the vehicle seat has an impact on CRS performance in a crash. Dynamic side impact sled tests were conducted to define the performance outcomes of rear-facing (RF) and forward-facing (FF) CRS and belt positioning boosters (BPB) in these conditions. Using vehicle seats from an IAB member company, a CRS or BPB was installed in either the outboard or center position with the adjacent seat either upright, folded, or removed. We analyzed the resulting kinematics, or movement, of the child seat and the ATD.

**What did you find?**  
The outboard vehicle seat tended to better support the child restraint in terms of the width and lateral movement of CRS. When CRS were installed in the narrower center position, there was overhang of the CRS relative to the vehicle seat that impacted testing performance; those CRS moved farther to the side and off the vehicle seat cushion. We found substantial movement in the BPB, in particular. However, we also found that adjacent upright vehicle seats helped to control the motion of the CRS bases.

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**Risk of Maximum Abbreviated Injury Scale (MAIS) 2+ injury**  
<table>
<thead>
<tr>
<th>Age (years)</th>
<th>FF CRS</th>
<th>Booster</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>4.0</td>
<td>3.0</td>
</tr>
<tr>
<td>4</td>
<td>3.0</td>
<td>2.0</td>
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<tr>
<td>5</td>
<td>2.0</td>
<td>1.0</td>
</tr>
</tbody>
</table>
WHAT WAS THE PURPOSE OF THIS PROJECT?

We wanted to prepare for a world where children may ride unaccompanied in autonomous vehicles to get to school or other programmed destination, such as a police station or public library. As a society, we will have to figure out how to provide a vocabulary of spoken commands and queries that children could be trained to use when communicating with autonomous vehicles. In addition, we would like to develop passenger training for safe use of autonomous vehicles.

WHAT ARE THE INDUSTRY IMPLICATIONS FOR THIS RESEARCH?

Our results can be used to guide additional research efforts to inform autonomous vehicle design. For example, children want speech-based interaction, and parents want communication from autonomous vehicles to keep them informed when their children are riding unaccompanied, such as an alarm if a child is not buckled up and a notification when the child arrives at the destination.

WHAT’S NEXT FOR THIS LINE OF RESEARCH?

We would like to develop a vocabulary of spoken commands and queries that children could be trained to use when communicating with autonomous vehicles. In addition, we would like to develop passenger training for safe use of autonomous vehicles.

Feedback From Parents

<table>
<thead>
<tr>
<th>Range of Ages</th>
<th>Solo child</th>
<th>Stay home</th>
<th>Ride alone in a bus or train</th>
<th>Ride alone in a taxi</th>
<th>Ride alone in a self-driving car</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 – 13 years</td>
<td>12 – 16 years</td>
<td>10 – 13 years</td>
<td>8 – 18 years</td>
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<td>11 years</td>
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<td>16 years</td>
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</table>

Each parent focus group started with a discussion about the minimum age at which a parent would allow a child to stay home alone, followed by the minimum age that they would allow a child to use different forms of transportation without a chaperone.
The Center for Injury Research and Prevention (CIRP) at CHOP (the administrative home of CChIPS) hosts an NSF REU Injury Science Site grant, with an emphasis on providing research experiences to racial and ethnic minorities who are underrepresented in research, students with disabilities, women, and students from STEM-limited schools with minimal internship opportunities and no available doctorate program. In our seventh summer offering this program, we received over 340 applications for 12 REU internship positions. The diverse group of student scholars selected from schools across the country spent the summer working with CIRP researchers and receiving mentorship and hands-on research experience, as well as formal training in research ethics, research methodology, and presentation of research findings. Many of these students worked on CChIPS projects with CChIPS faculty. Several students also had the opportunity to shadow clinicians at CHOP, one of the nation’s top children’s hospitals.

The CChIPS site at The Ohio State University has been a leader in student development in injury biomechanics via the annual Injury Biomechanics Symposium (IBS). In its 15th year, the IBS stimulates and rewards strong injury biomechanics research among trainees by providing a welcoming atmosphere for novice researchers to present original work in a non-threatening environment. In May 2019, it hosted 120 attendees, including 30 student presenters from 13 universities, including five international universities. CChIPS student researchers were well-represented at the conference. Among the presenters were Madeline Griffith, a master’s student at CHOP/Penn who presented on the “Can the Startle Reflex be Manipulated to Reduce Take-over Time in Pre-crash Scenarios for Autonomous Driving?” project (see project summary on Page 9) and Reagan Di Iorio, an undergraduate student at OSU who presented on the “Sensitivity Analysis on Factors that Influence Head Responses of the Hybrid III 6-Year-Old ATD” project (see project summary on Page 10). CHOP and OSU were also represented by students presenting high-quality biomechanics work outside of CChIPS. They included Colin Huber, a PhD student at CHOP/Penn; Angela Teany, a PhD student at OSU; Vikram Pradhan, a PhD student at OSU; and Akhara Seelidhar, a master’s student at OSU.

Acknowledgements
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Be Part of a Safer Future

Additional partnerships are needed to successfully and efficiently reduce the burden of child injury. CChIPS looks to broaden its membership by adding new companies and other organizations vested in child safety and seeks to expand its scientific collaboration by linking with new academic partners. If your organization is interested in being part of this exciting movement to address a significant societal problem, please contact us at cchips@email.chop.edu.