JP RESEARCH, INC.

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February 25, 2016

Laura Templer
Editor, Injury Prevention
Injury Prevention Editorial Office
Tavistock Square
London, WC1H 9JR
UK

Dear Ms. Templer,

My name is Jeya Padmanaban and I am a statistician with over 30 years of experience in performing automotive safety research and reviewing consumer complaint, customer complaint and field accident and injury data collected by the U.S. Government and State agencies. (Please see my resume, included here as Attachment A.)

I was retained by *Dorel Juvenile Group,* to update a study published in Injury Prevention Journal, December 2007 (Henary et al., 2007) that compared the injury risk between rear facing (RFCS) and forward facing (FFCS) car seats. The study used NASS/CDS data from 1988 to 2003 and compared the injury risk between RFCS and FFCS for children less than 2 years of age in the USA. The study concluded that rear facing car seats are more effective than forward facing car seats in protecting belted children aged 0-23 months. More specifically, when one year olds in frontal impacts were analyzed separately, the study concluded that these children were more likely to be seriously injured when restrained in FFCS.

I repeated the study for the years used by the Henary study (1988-2003) and updated the study to include NASS/CDS data from 1988-2014. I used the same selection criteria and methodology used by the authors. I performed these analyses for frontal crashes and all crashes.

I compared the relative injury risk to children (age 12-23 months) in FFCS and RFCS involved in frontal and all crashes. I performed statistical analyses similar to the methodology used by the Henary study. I ran several sensitivity analyses to assess the stability of our statistical models and the results. The results from our analyses remained consistent. I have presented the results below.

FINDINGS

1. My statistical analyses show that for belted children age 12-23 months in frontal and all crashes, forward facing car seats are much more effective in preventing injury than rear facing car seats. The difference is statistically significant. This finding holds true for the years used in the Henary study (1988-2003) and for the period 1988-2014. The finding holds true for frontal impacts and all impacts. These conclusions directly contradict the conclusions presented in the Henary paper.

2. The NASS/CDS data is a stratified sampling system and any statistical models developed using the sample data must account for sampling stratification. It appears that the Henary study might not have taken stratification into consideration.[1] If this is the case, the study performed by Henary et.al, used an inappropriate methodology for building statistical models.

3. The sample sizes used by the Henary study were small and any omission of proper controls to the data set render their conclusions invalid. Updating the NASS/CDS data to include ten more years (2004-2014) provides 50% more data and consequently, the statistical models are more stable.

SUMMARY

There is no evidence in the NASS/CDS data which shows that, in frontal crashes or all crashes, rear facing seats are much more effective compared to front facing seats for reducing injury to belted children ages 12-23 months. On the contrary, the analysis including more recent field data shows that, the FFCS are statistically significantly more effective in reducing injuries compared to RFCS.

As a researcher and field data analyst, I feel it is important for me to inform you of this updated research and the findings.

Sincerely,

Jeya Padmanaban

Cc: Dr. Dennis Durbin, MD, Children's Hospital Of Philadelphia (CHOPs)
Cc: Lorrie Walker, Training Manager and Technical Advisor, Safe Kids
Cc: Michael Dwyer, President, Juvenile Product Manufacturers Association (JPMA)

[1] The backup data for Henary study logistic models was not available for review.

REFERENCES

Henary et al. "Car safety seats for children: rear facing for best protection". *Injury Prevention*, Vol. 13, No. 6, December 2007, pp 398-402. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2598309/pdf/398.pdf.

Attachment A

Ms. Jeya Padmanaban

Statistician

President, JP Research, Inc.

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Ms. Jeya Padmanaban is the President and founder of JP Research, Inc., a consulting firm predicated on her skills and experience in performing statistical and economic analyses using field performance data. Ms. Padmanaban is a statistician experienced in data analysis and statistical methods to evaluate field performance of vehicles and consumer products. Her key areas of expertise include: automotive research, statistical analysis using motor vehicle injury and accident data; motor vehicle crashworthiness studies; motor vehicle consumer complaint data analysis; warranty data analysis; motor vehicle safety standards assessment; claims data analysis; customer contact data analysis; reliability analysis; survival analysis; comparative risk analysis; economic damages; prediction of diminished value of products after recall; regression analysis; use of non-parametric techniques; label effectiveness evaluation; product safety performance analysis; statistical survey design and implementation (exposure and usage data); safety standards assessment; risk management studies; and failure rate analysis.

For over 20 years, Ms. Padmanaban has examined the field performance of passenger vehicles (cars, sport utility vehicles, pickup trucks, and vans), consumer products, motorcycles, heavy trucks, vehicle/product parts and systems (airbags, seatbacks, seat belts, brakes, transmissions, child seats, booster seats, axles), amusement park rides and trams, dishwashers, recreational vehicles, HVAC systems, toilet connectors, elevators and escalators, waterbed heaters, forklifts, shoes, slides, cable cars, tractor trailer underrides, tractor trailer backings, golf carts, boats, and off-road vehicles.

Ms. Padmanaban has published extensively and received numerous awards and industry recognition—including the prestigious 2001 SAE WEC BREED award for technical leadership for women and the SAE Outstanding Achievement Award for her contribution. She is frequently invited by the National Highway Traffic Safety Administration (NHTSA) to make presentations at Government and Industry meetings, NHTSA's ESV conferences, and technical symposiums, and by the Office of Defects Investigation (ODI) to address field performance of motor vehicles and components. She has served on the Board of Directors for the Association for the Advancement of Automotive Medicine (AAAM) and the Editorial

Advisory Board for the journal *Accident Analysis and Prevention.* She has gained world-wide recognition for her work using data from motor vehicle injury and accident databases, and has extensive experience analyzing data from consumer claims files and warranty, customer and financial records across a wide range of industries. Ms. Padmanaban has published extensively in the areas of automotive and consumer product safety, and has frequently been recognized for taking leadership roles in helping to direct vehicle/product safety research, both in the United States and abroad.

Ms. Padmanaban has been involved in the design and implementation of sampling strategies and evaluating statistical studies and survey data that use sampling techniques including random samples, stratified samples and convenient samples. Ms. Padmanaban has frequently evaluated on-line and telephone surveys to determine the representativeness of the population. In particular, Ms. Padmanaban has testified on proper statistical survey methodologies, non-responsiveness, biased selection, measurement errors and descriptive statistics used to make valid inferences and estimate the margin of sampling errors.

In addition, Ms. Padmanaban has been involved in several statistical studies using warranty/customer contact or claims data to predict the number of claims/failures and the annual claim/failure rates for various consumer products including: automotive vehicles, vehicle components, cosmetic products, dishwashers, engine/power train, toilet connectors, gas connectors, truck hubs, bearings, gaskets, and motorcycle components. Ms. Padmanaban has been involved in projects assessing the effect of chemical sprays on plant growth, effect of product design modifications on risk of injury/accidents, and risk of injury associated with recreational products, as well as reviewing economic valuation for class action settlements, damage assessment, and financial analyses based on claims rates.

Ms. Padmanaban is also actively involved in field data research for organizations around the world. She is the Chair of the Road Accident Sampling System – India (RASSI) International Consortium, whose objective is to collect accident data through in-depth crash investigations in India. She is also an invited member of the Initiative for the Global Harmonization of Accident Data (iGLAD) committee, whose goal is to harmonize statistical accident data collection and accident investigation activities across developing countries. Globally, Ms. Padmanaban has offered automotive safety workshops, chaired technical sessions, participated in panels promoting product safety, and organized vehicle safety seminars in India, Europe, Japan and South East Asia. Ms. Padmanaban has performed several projects for the World Bank (International Road Assesment Program) to implement safety speed limits for Indian roads.

Employment History

President (1995-Present)
JP Research, Inc., Mountain View, California;
JP Research, Inc., Auburn, Michigan; and
JP Research India, Pvt. Ltd., Chennai, Tamil Nadu
Principal Managing Scientist (1981-1995)
Exponent / Failure Analysis Associates, Inc., Menlo Park, California
Senior Operations Research Analyst (1978-1979)
Mathematica, Inc., Princeton, New Jersey
Statistical Consultant (1977-1978)
Arthur Young & Company, Washington, D.C.

Education and Professional Honors

M.S. (Operations Research / Statistics), George Washington University
B.S. (Mathematics), India

Awards

Ashoka Changemakers (with Underwriters' Laboratories):
"Early Entry" Awardee and *Finalist* (with JPR India) in the Changemakers challenge "Safer Roads, Safer India: Gamechanging Innovations that Save Lives", 2014
http://www.changemakers.com/saferoads#competition
Society of Automotive Engineers (SAE):
Outstanding Technical Paper Award, 2007
Transactions Award, 2005
WEC/BREED Award for Women's Technical Leadership, 2001
Association for the Advancement of Automotive Medicine (AAAM):
Best Scientific Paper Award, 39th Annual AAAM Conference, 1995

Boards/Technical Committees/Memberships

Board Member:
Association for the Advancement of Automotive Medicine, 2008-2010
Editorial Advisory Board:
Accident Analysis and Prevention Journal, 2009-2013
Selected Member of the iGLAD Committee-Initiative for the Global Harmonization of Accident Data
Crashworthiness Subcommittee Member,
NHTSA, Event Data Recorder working group, 1998
Scientific Program Committee Member,
Association for the Advancement of Automotive Medicine, 1995-1998
Safety Advisory Panel,
Society of Automotive Engineering TOPTEC
Member:
American Statistical Association
Forensic Expert Witness Association
Watermark Association of Women Leaders
Society of Automotive Engineers

Society for Risk Analysis

Other Honors

Keynote Speaker:

Symposium on International Automotive Technology (SIAT), 2015
Symposium on International Automotive Technology (SIAT), 2007

Invited Speaker:

NHTSA's Mass-Size-Safety Symposium
SAE TOPTEC conferences, IRCOBI conferences, AAAM workshops, DRI conference
Government/Industry Meetings, Traffic Record Forums
SGMA conference

Selected Publications and Presentations

"Frequency of Accidental CO Deaths Due to Vehicle Exhaust in Enclosed Areas," SAE World Congress, April 2015.

"Benefit Cost Analysis in the Context of Product Liability Litigation," DRI Product Liability Conference, Las Vegas, February 2015 (with Andrea Studley Knowles and Stephen P. Goldberger).

"A New Methodology for Determining Accident and Injury Contributing factors, and its Application to Road Accidents on the Mumbai-Pune Expressway," VDI International Automotive Conference, Safety Systems 2014, Frankfurt, Germany, June 2014.

"Estimating Side Underride Fatalities Using Field Data," 57th Annual AAAM Conference Proceedings, Association for Advancement of Automotive Medicine, Quebec City, Canada, September 2013.

"Pedal Misapplication: Crash Characteristics and Contributing Factors," SAE World Congress, April 16, 2013 (with Matthew Fitzgerald).

"Effectiveness of Rollover-Activated Side Curtain Airbags in Reducing Fatalities in Rollovers," International IRCOBI Conference on the Biomechanics of Injury, September 12, 2012 (with Matthew Fitzgerald).

"Size/Mass Effects Study," SAE Government/Industry Meeting, Washington DC, January 25-27, 2012.

"A Comparative Study of Rollover Crashes Involving Passenger Cars With and Without Electronic Stability Control," Society of Automotive Engineers World Congress and Exhibition, Paper No. 2011-01-0951, Detroit, Michigan, April 14, 2011.

"Lies, Damn Lies, and Statistics-True?" 2011 SGMA Litigation & Risk Management Summit (LRMS), April 5, 2011.

"NHTSA Mass-Size-Safety-Symposium," NHTSA's Mass-Size-Safety Symposium, Washington DC, February 25, 2011.

"Safety, Is it Green?" Keynote Speaker, The Symposium on International Automotive Technology (SIAT) 2011, Pune, India, January 20, 2011.

"A Comparative Study of Rollover Crashes Involving Vehicles With and Without Electronic Stability Control (ESC) Systems," IRCOBI Conference on the Biomechanics of Impact, September 16, 2010 (with Vitaly Eyges).

"Use of State Accident Data for Vehicle Safety Research," International Forum on Traffic Records & Highway Information Systems, July 26, 2010.

"Use of Statistical Accident Rate Comparison Evidence," DRI Product Liability Conference, April 7-9, 2010.

"SGMA Litigation and Risk Management Summit Presentation on CPSIA," 2010 SGMA Litigation and Risk Management Summit, April 6, 2010.

"Challenges in Helmets, Seats, Seatbelts, Airbags and Collapsible Steering," 2010 Road Traffic Accidents and Safety Measures Conference, India, March 13, 2010.

"An Update on Rollover Crash Data," SAE Government/Industry Meeting, Washington DC, January 26-29, 2010.

"Characteristics of Motorcycle Crashes in the U.S.," International Road Traffic and Accident Database (IRTAD) Conference, September 16-17, 2009 (with Vitaly Eyges).

"Study of Airbag Effectiveness in High Severity Frontal Crashes," International IRCOBI Conference on the Biomechanics of Impact, September 9-11, 2009 (with Vitaly Eyges).

"Relationship between Seatback Stiffness/Strength and Risk of Serious/Fatal Injury in Rear-Impact Crashes," Occupant Protection: Rear Impact Session paper 2009-01-1201, Society of Automotive Engineers World Congress and Exhibition, Detroit, Michigan, April 20-23, 2009 (with Roger Burnett and Andrew E. Levitt).

"Updated Evaluation of Size and Mass Effects in Front-to-Front Crashes Involving Light Vehicles," Occupant Protection: Structural Crashworthiness and Occupant Safety Session paper 2009-01-0375, Society of Automotive Engineers World Congress and Exhibition, Detroit, Michigan, April 20-23, 2009 (with Vitaly Eyges).

"Evaluation of Light Vehicle Side Underride Collisions into Combination Trucks," Society of Automotive Engineers, Paper No. 08CV-0240, October 2008 (with Benjamin Martz and Joshua Salvage).

"Seat Integrated and Conventional Restraints: A Study of Crash Injury/Fatality Rates in Rollovers," Annual Conference of the Annals of Advances in Automotive Medicine, October 2008 (with Roger Burnett).

"A Comprehensive Review of Rollover Accidents Involving Vehicles Equipped with Electronic Stability Control (ESC) Systems," Annual Conference of the Annals for the Advancement of Automotive Medicine, October 2008 (with Lee Shields, Robert Scheibe and Vitaly Eyges).

Comments on IIHS Paper: "Roof Strength and Injury Risk in Rollover Crashes," International IRCOBI Conference on the Biomechanics of Impact, September 17-19, 2008 (with Edward Moffatt).

"JP Research's Response to IIHS Docket Submission of May 13, 2008," submitted to the Roof Crush Resistance Docket, No. NHTSA-2008-0015, May 31, 2008 (with Edward Moffatt).

"Roof Strength and Injury: One More Time," SAE Government/Industry Meeting, Washington DC, May 12-14, 2008.

"Real World Injury Patterns in Narrow Object Frontal Crashes: An Analysis of US Field Data," Occupant Protection-Biomechanics Session paper 2008-01-0527, Society of Automotive Engineers World Congress and Exhibition, Detroit, Michigan, April 14-17, 2008 (with Tomosaburo Okabe).

"Evaluation of IIHS Study: Roof Strength and Injury Risk in Rollover Crashes," submitted to the Roof Crush Resistance Docket, No. NHTSA-2008-0015, March 27, 2008 (with Edward Moffatt).

Biomechanics, Vehicle Safety and Accident Analysis, Instructor and co-organizer of this second annual Automotive Safety Seminar, sponsored by JP Research Inc. and the Automotive Research Association of India. Courses presented included: "Accident Data and Analyses-U.S.," Pune, India, December 2007.

"Field Performance Study of Electronic Stability Control System Effectiveness in US Fatal Crashes," International IRCOBI Conference on the Biomechanics of Impact, Maastricht, Netherlands, September 19-21, 2007.

"NHTSA's Benefit Model in the Proposed FMVSS 216 Roof Strength Standard," Rear Impact, Rollover and Side Impact Session paper 2007-01-0373, Society of Automotive Engineers World Congress & Exhibition, Detroit, Michigan, April 16-19, 2007 (with Edward Moffatt).

"Road Safety Around the World," Keynote Address for the Symposium on International Automotive Technology, Pune, India, January 2007.

"Kid in the Middle: A Discussion of Effectiveness of Center Rear-Seat Restraint Systems," 50th Annual AAAM Conference Proceedings, Association for Advancement of Automotive Medicine, Chicago, Illinois, October 2006.

Road Safety – Miles to Go Before We Sleep?, Instructor and co-sponsor of JP Research. Inc. and 5th Generation Technologies' Automotive Safety Seminar. Courses presented included: "Overview of Motor Vehicle Crash Data by Country," "Effectiveness of Seat Belts, Air Bags, and Child Safety Seats," "Crash Data Collection/Maintenance/ Application by Federal and State Transportation Agencies in the US" "Injuries to Children," and "Pedestrian Accidents and Injuries in Asia, Europe, and the US," Mahabalipuram, India, August 11, 2006.

"Alliance Rollover Study of NASS/CDS Data: Phase II Final Report," SAE Government/Industry Meeting, Washington D.C., May 8-10, 2006, (presenting results by JP Research, KEVA Engineering, and Ivy Consultancy).

"The Alliance Rollover Study of NASS and FARS Data, Phase 2: In-Depth NASS-CDS Case Reviews" submitted to Roof Crush Resistance Docket as Submission No. NHTSA-2005-22143-194, February 27, 2006.

"The Nature of Serious Injury in US and UK Rollover Crashes," Proceedings of the 2005 International IRCOBI Conference on the Biomechanics of Impact, Prague, Czech Republic, September 21, 2005 (with Mickael Delahaye, Ahamedali M. Hassan, and Murray Mackay).

"Occupant Injury Experience in Rollover Crashes: An In-Depth Review of NASS/ CDS Data," 49th Annual AAAM Conference Proceedings, Association for Advancement of Automotive Medicine, Boston, Massachusetts, September 2005 (with Stein Husher).

"Alliance Rollover Study of NASS/CDS Data: Phase 1," 2005 Government/Industry Meeting, Washington D.C., May 9-11, 2005, (presenting results by JP Research, Inc., KEVA Engineering, and Ivy Consultancy).

"Factors Influencing the Likelihood of Fatality and Serious/Fatal Injury in Single-Vehicle Rollover Crashes," Rollover Session paper 2005-01-0944, Society of Automotive Engineers World Congress & Exhibition, Detroit, Michigan, April 11-15, 2005 (with Edward A. Moffatt and Debora R. Marth).

"Rollover Data Analysis," Invited speaker at the Society of Automotive Engineers World Congress & Exhibition, Detroit, Michigan, April 14, 2005.

"Crash Data Examination and Analysis," Invited speaker at the Society of Automotive Engineers World Congress & Exhibition, Detroit, Michigan, April 12, 2005.

"Some Key Applications of NASS CDS Data," Invited speaker at the National Highway Traffic Safety Administration's National Center for Statistics and Analysis NASS Update Training Conference, Orlando, Florida, November 16-19, 2004.

"The Alliance Rollover Study of NASS and FARS Data, Phase 1: NASS Injury Statistics" submitted to Roof Crush Resistance Docket as Submission No. NHTSA-1999-5572-119, December 23, 2004.

"Problems with Comparing Vehicle Compatibility Issues in US and UK Fleets," Proceedings of the 2004 International IRCOBI Conference on the Biomechanics of Impact, Graz, Austria, September 22, 2004 (with Mickael Delahaye, Ahamedali M. Hassan, and Murray Mackay).

"U.S. FARS and NASS Crash Data Files," IRCOBI Seminar on Accident Research – From Mass Data to Single Cases, Graz, Austria, September 21, 2004.

"JP Research Response to NHTSA Request for Comments on the Data Integrated Project Team (IPT) Report," submitted to docket on Initiatives to Address Improving Traffic Safety Data as submission No. NHTSA-2004-17339-16, September 10, 2004**.**

"Evaluation of SAE Paper: 'Near and Far-Side Adult Front Passenger Kinematics in a Vehicle Rollover,' SAE 2001-01-0176, Referenced in the Docket Submission to NHTSA-1999-5572 by Center for Injury Research, July 9, 2004," submitted to Roof Crush Resistance Docket as submission No. NHTSA-1999-5572-93, July 26, 2004.

"Addendum to Docket Submission NHTSA-1999-5572-70, 'Factors Influencing the Likelihood of Fatality and Serious/Fatal Injury in Single-Vehicle Rollover Crashes'," submitted to Roof Crush Resistance Docket as submission No. NHTSA-1999-5572-79, April 27, 2004 (with Edward A. Moffatt and Debora R. Marth).

"Factors Influencing the Likelihood of Fatality and Serious/Fatal Injury in Single-Vehicle Rollover Crashes," report to Ford Motor Company, February 7, 2004; entered by Ford into the Roof Crush Resistance Docket as submission No. NHTSA-1999-5572-70, March 4, 2004 (with Edward A. Moffatt and Debora R. Marth).

"Influences of Vehicle Size and Mass and Selected Driver Factors on Odds of Driver Fatality," Annual AAAM Conference Proceedings, Association for Advancement of Automotive Medicine, Lisbon, Portugal, September 2003.

"Occupant Injuries and Crash Characteristics for Car and Light Truck Rollovers," Government/Industry Meeting, May 2003 (with Rajeev Kelkar).

"Statistical Analysis of SKF Front Hub Bearing Unit Performance," Report to SKF USA Inc., June 2003.

"Examination of Rollover Accident Characteristics, Using Field Performance Data," SAE International, IBEC (International Body Engineering) Conference & Exhibition and ATT (Automotive & Transportation Technology) Congress Conference, Paris, France, paper No. IBEC 2002-01-2056, July 10, 2002 (with Martin Stone Davis).

"Examination of Rollover Accident Characteristics," JP Research Submission to Docket on Roof Crush Resistance, Docket No. NHTSA 1999-5572, Notice 2, April 28, 2002 (with Martin Stone Davis, Christopher J. Hoerter, and Sheryl A. Siebenborn).

"Automotive Safety Analysis Using Accident Data," Guest speaker at the SAE "Injuries, Anatomy, Biomechanics & Federal Regulation" Seminar (in conjunction with the 2001 Future Transportation Technology Conference), August 21, 2001.

"The Aging Driver on the Road," Instructor, 14th Annual Trauma Symposium, Stanford Hospital and Clinics, Center for Education, July 30, 2001.

"Measures of Rollover Risk that Maximize Public Safety," The Transportation Research Board's Committee for the Study of a Motor Vehicle Rollover Rating System, National Academy of Sciences, Washington, DC, May 29, 2001.

"Crash Injury Experience of Elderly Drivers," AAAM Symposium on Aging and Driving, Association for the Advancement of Automotive Medicine, Southfield, Michigan, February 19-20, 2001.

"A Separate Look at Factors Relevant to the Chance of Rollover in Passenger Vehicle Accidents," JP Research Submission to Docket on Consumer Information Regulations — Rollover Prevention, Docket No. NHTSA-2000-6859, November 14, 2000 (with Martin Stone Davis).

"Automotive Safety Research Using Accident Data," SAE Western India Section, Division 2000 presentation, Pune, India, August 2, 2000.

"A Review of Studies and Crash Data Relating to Air Bag Performance," AAAM Conference: Advanced Air Bag Technology in Frontal and Side Impacts (Data Analysis, Evaluation and Clinical Cases session), Association for the Advancement of Automotive Medicine, Southfield, Michigan, June 27-28, 2000.

SAE World Congress 2000, Chairperson of session on Airbag Performance in Real World Crashes, Society of Automotive Engineers, Detroit, Michigan, March 2000.

"Review of the Technical Paper: 'Effectiveness of Lap/Shoulder Belts in the Back Outboard Seating Positions,' " Comments on the National Highway Traffic Safety Administration Docket for NHTSA DOT HS 808 945, November 1999 (with Philip M. Besuner).

"Comparison of Real World Side Impact Collisions Which Occurred in the United Kingdom and United States," AAAM Conference Proceedings, Association for the Advancement of Automotive Medicine, Barcelona, Spain, September 1999 (with Ahamedali Hassan, Murray Mackay, and Martin Davis).

"Re-Evaluation of Rear Seat Restraint System Effectiveness in Preventing Fatalities, Using Recent Fatal Accident Data," AAAM Conference Proceedings, Association for the Advancement of Automotive Medicine, Barcelona, Spain, September 1999 (with Martin Davis).

"Accident Data and Statistics" SAE Passenger Car Rollover TOPTEC, January 21, 1999, Speaker.

"Injuries, Anatomy, Biomechanics & Federal Regulation," SAE seminar, Aug 10-12, 1998, Guest Lecturer.

"Observations Relating to Rear Seat Belt Performance in Severe Frontal Collisions," ISATA Conference on Ergonomics and Vehicle Safety, Duesseldorf, June 2-5, 1998.

"Evaluation of Airbag Systems," Emerging Issues in Motor Vehicle Product Liability Litigation, Phoenix, AZ, April 2-3, 1998.

"Usage and Effectiveness of Rear-Seat Belt Restraints in Severe Crashes," ISATA, Florence, Italy, June 16-19, 1997 (with Dr. Charles Warner and Uwe Meissner).

"Accident Experience of Passenger Vehicles with Four Wheel Antilock Braking Systems," Association for the Advancement of Automotive Engineering, Vancouver, British Columbia, October 1996 (with Edmund Lau).

"Overview of Accident Data Analysis," SAE, Detroit, Michigan, May 31, 1996.

"The Relationship Between Vehicle Roof Strength and Occupant Injury in Rollover Crash Data," Association for the Advancement of Automotive Medicine, Chicago, Illinois, October 1995 (with E.A. Moffatt).

"Performance of Passive Restraints in Real World Accidents," Organizer and Speaker, TOPTEC, Society of Automotive Engineering, San Francisco, California, May 1995.

"Comparison of Automatic Front-Seat Outboard Occupant Restraint System Performance," Association for the Advancement of Automotive Medicine, 38th Annual Proceedings, Lyon, France, September 1994 (with R.M. Ray).

"Assessment of Airbag Effectiveness in Reducing Non-Fatal Injury Risk," American Society of Mechanical Engineers Winter Annual Meeting, New Orleans, Louisiana, November 1993 (with R.M. Ray and J.M. Weiss).

"Characterization of Heavy Truck Involved Fatal Accidents," TOPTEC, Society of Automotive Engineering, Atlanta, Georgia, April 1993.

"Safety Performance of Rear Seat Occupant Restraint Systems," STAPP Car Crash Conference, Seattle, Washington, November 1992.

"Logistic Regression in Passenger Vehicle Rollover Research," American Society of Mechanical Engineers Winter Annual Meeting, Anaheim, California, November 1992.

"Statistical Analysis of Rollover Accident Performance," TOPTEC, Society for Automotive Engineering, Phoenix, Arizona, September 1992.

"Rear Seat Belt Effectiveness for Passenger Cars," World Congress of The International Association for Accident and Traffic Medicine, Helsinki, Finland, June 1992 (with R.M. Ray).

"Risk Analysis of Home Appliance Fires," Engineering Applications of Risk Analysis III, American Society of Mechanical Engineers, 1991, p. 47-50 (with R.M. Ray. L.W. Anderson and R.L. McCarthy).

"Automatic Seat Belt System Risk Assessment," American Society of Mechanical Engineers Winter Annual Meeting, Atlanta, Georgia, December 1991 (with R.C. Lange, et al.)

"An Assessment of the Accident Experience of Front Seat Outboard Occupants in 1987-1989 Motor Vehicles Equipped with Automatic Seat Belt Systems," Failure Analysis Associates, Inc. Report, October 1990 (with R.L. Lange and R.M. Ray).

"Strengths and Weaknesses of Occupant Restraint Data in State Accident Data Bases," National Safety Council conference on Traffic Forum, July 1990.

"An Analysis of Fatal Rollover Risk Associated with Utility Vehicles and Selected Passenger Cars," American Society of Mechanical Engineers Conference, December 1989 (with R.L. McCarthy, R.M. Ray, and R.L. Lange)

"An Examination of the Relationship Between Vehicle Mass, Wheelbase, and Safety," American Society of Mechanical Engineers Conference, December 1989 (with R.L. McCarthy, R.M. Ray, and R.L. Lange).

"An Analysis of the Safety Related Impact of 'Comfort Feature' Introduction in General Motors Vehicles," Association for the Advancement of Automotive Medicine, 33rd Annual Proceedings, October 1989 (with R.L. McCarthy and R.M. Ray).

"An Evaluation of the NTSB Report Entitled 'Safety Study-Performance of Lap Belts in 26 Frontal Crashes' NTSB/55-86/03," Failure Analysis Report, July 1987 (with R.L. McCarthy and C.S. Davis).

"An Examination of the Correlation Between Vehicle Performance in FMVSS216 Versus Injury Rates in Rollover Accidents," SAE International Congress and Exposition, February 1985 (with J.K. Plastiras, R.C. Lange, and R.L. McCarthy).

"A Risk Analysis of Unattended Vehicle Movement," Failure Analysis Associates Report to U.S. Department of Transportation, August 1983 (with R.L. McCarthy and R.C. Lange, and C.S. Davis).

"A Model of Expected Time to Failure by Intergranular Stress Corrosion Cracking in 304 Stainless Steel," Failure Analysis Report to Electric Power Research Institute, November 1982 (with E.D. Eason).

"Risk Analysis of Western Controls Ultratherm Waterbed Heater," Failure Analysis Associates Report to Western Controls Ultratherm, June 1982 (with R.L. McCarthy and R. Kadlac).

"An Analysis of Industrial Lift Truck Accidents," Failure Analysis Associates Report to Wildman, Harold, Allen & Dixon, May 1982 (with R.L. McCarthy and P.M. Taylor).

Publications and Presentations Relating to Road Accidents in India

JP Research India is involved in pioneering the collection and investigation of traffic crash data in India. This research has led to the development of the Road Accident Sampling System of India (RASSI) Database, which allows researchers to create an awareness of automotive safety issues and examine trends in an effort to improve safety on Indian roads. Below are papers and presentation that have resulted from the research:

"In-Depth Crash Data Analysis," Keynote address, Symposium on International Automotive Technology (SIAT), Pune, India, January 2015.

"The New In-Depth, At-the-Scene, Accident Investigation Database in India," IRCOBI Conference on the Biomechanics of Impact, September 12, 2013 (with N. Rameshkrishnan, A. Sathyakumar, S. Balakumar, A. M. Hassan, R. Rajaraman, J. Padmanaban).

"Creation of an In-depth Road Traffic Crash Database for India: The Coimbatore Rural District Case Study," presented at the 22nd International Technical Conference on the Enhanced Safety of Vehicles, Washington, DC, June 13-16, 2011.

"Analysis of Fatal Crashes Involving Chennai City's Metropolitan Transport Corporation (MTC) Buses," ICRASH 2010, Washington DC, September 23, 2010 (with Ravishankar Rajaraman).

"Analysis of In-Depth Crash Data on Indian National Highways and Impact of Road Design on Crashes and Injury Severity," International ESAR Conference, Hanover, Germany, September 17, 2010 (with Swastik Narayan).

"Challenges in Helmets, Seats, Seatbelts, Airbags and Collapsible Steering," Road Traffic Accidents and Safety Measures Conference, India, March 13, 2010.

"Accident Data Collection Methodology for Building a Traffic Accident Database for Tamil Nadu and India," Symposium on International Automotive Technology, organized by The Automotive Research Association of India (ARAI), January 2009.