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An investigation of awareness, perceptions, and usage of child car seats in Pakistan



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ABSTRACT

Introduction: The objectives of this study were to investigate the level of awareness and usage of child car seats in Pakistan, identify problems that influence non-usage among the knowledgeable parents, as well as to explore the need and interventions for conducting effective awareness campaigns or educational programs for parents in the country.

Methods: Total 375 vehicles with children occupants and 622 children were observed at several schools, day-care centers, pediatric departments in hospitals, and children recreational places within 3 cities of Pakistan. Child safety restraints usage was almost negligible in the study sample. Out of the total 375 vehicles, 318 parents/drivers participated in the interview survey.

Results: Almost half of the participants were found to be unaware of child car safety restraints. Those who knew, most commonly expressed unavailability, time taken in child car seat installation, and absence of law as the reasons behind not using the child car seats while another common reason was their misperception about the children age group for using child car seats. Driver's education level was found to be the most significant ($p < 0.0001$) demographic characteristic associated with the driver's awareness on child car seats as well as support towards their usage, initiation of awareness campaigns, and law implementation.

Conclusions: The findings of the study indicate a great need and potential for child car seat educational programs as well as market for such devices especially among educated and affluent parents. The findings of the study also identify parents' behaviors and attitudes, existing problems, and highlight several challenges and recommendations for planners, policy makers, transportation safety specialists, pediatricians, law enforcement agencies, as well as manufacturers for promoting children road safety.

1. Introduction

Globally, a large number of child deaths, injuries, and disabilities are caused due to being involved in a road traffic accident. Children in developing countries suffer even more, in this context, due to lack of education and awareness among general public particularly on road safety measures, inadequate accident reporting system, as well as lack of public policy, laws, and law enforcement on road safety regulations. According to the (WHO) Report on Child Injury Prevention (2008), worldwide 93% of the road traffic accidents involving young children occur in developing countries including both low and middle income ones. As far as the type/severity of injury is concerned, the report indicates head and limb fractures to be the most common injuries in children during

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Table 1
City wise reported children road traffic crashes from year 2014–2018.

City	RTA involving Children below 11 Years of Age					Average RTA of Years 2014–2016	Population according to 2017 Census	RTA involving Children Age 01–10 per 100,000 Population
	Year	Year	Year	Year	Year			
	2014	2015	2016	2017 ^a	2018			
Lahore	1706	1869	1726	1995	3411	2141.4	11,126,285	19.25
Multan	334	176	293	162	159	224.8	1,871,843	12.01
Gujranwala	724	776	617	840	1102	811.8	2,027,001	40.05
Faisalabad	1259	1453	1209	1065	1125	1222.2	3,203,846	38.15
Rawalpindi	328	352	339	340.5	298	331.5	2,098,231	15.80

^a Conversion made on 8 months available data.

road accidents. Child's ejection from the vehicle in the event of a crash has been frequently found to be associated with fatality (Howard et al., 2003), which can be prevented by using appropriate restraints for children in vehicles.

It is not mandatory by law in Pakistan to use child car seats. Recently, road safety laws such as wearing seat-belts, prohibiting cell phone usage while driving, helmet use for motorcyclists and few others have been implemented and enforced in the major cities of Pakistan however, children road safety is still being neglected that require immediate attention by the legislators. Each year thousands of children, in Pakistan, die or experience severe injury or disability due to being involved in a road traffic accident. Table 1 presents the number of reported road traffic crashes (Rescue 1122 Daily Road Traffic Crashes Report) involving children below 11 years of age along with the population (2017 Census of Pakistan) in some of the major cities within the most populous state (Punjab) in Pakistan. The city of Lahore (LHR), which is also the capital of the state and second most populous city, has the highest road traffic accidents involving children in the last 5 years. However, RTA per 100,000 populations is highest in the city of Gujranwala among these cities. Due to unavailability of the census population data for years 2014–2016, average RTA was compared to 2017 population (Table 1).

Due to increase in car sales, vehicle fleet, and number of pre-schools, day-care centers, children play areas, and pediatric centers, particularly in the major cities of Pakistan, exposure of children to road traffic as well as risk of being involved in a road traffic accident has increased. However, no actions have been taken/proposed yet to implement the children road safety. On the other side, parents have been frequently observed not taking necessary safety precautions while driving with children. For instance, (i). children are frequently observed sitting in the front passenger seat, unrestrained (ii). many times, children are observed sitting together in the front passenger seat, all unrestrained. Qualified and affluent parents have also been observed not using the car child seats for their children. Therefore, there is a great need to educate parents, investigate and identify problems on the non-usage of child car restraints, as well as explore potential and strategies for effective policies, awareness programs and law implementation.

In this context, the primary objective of this study was to investigate the parents' knowledge/awareness regarding child car seats, the usage, and their willingness to learn and adopt these devices for the safety of their children as well as identify problems/factors that are influencing the non-usage of such safety devices by the knowledgeable parents. An underlying objective was also to 'spread the word' among parents and to assess parents' support/willingness on running educational programs/campaigns for them and enforcing law on the use of child car seats.

2. Literature review

Research studies have frequently reported significant reduction in the injury severity to child occupants in an accident due to correct use of child car seats. Studies have shown that the use of child restraints, child safety seats and booster seats play an essential role in reducing the deaths and injuries in RTAs (Paine et al., 2003; Durbin et al., 2005; Daly et al., 2006; Barss et al., 2008). If not restrained, children have much more probability of being thrown out of the window than adults, during an accident, and hence being killed or seriously injured. American College of Emergency Physicians (ACEP, 2002) and National Highway Traffic Safety Administration (NHTSA, 2006) have reported that 44% of unrestrained passengers' deaths in accidents are due to being thrown out of the vehicle as compared to only 5% of restrained passengers. According to the World Report on Road Traffic Injury Prevention by WHO (2004), the risk of serious and fatal injury can be reduced between 40% and 65%, if the seatbelts are used.

According to the latest edition of handbook of road safety measures (Elvik et al., 2009), unrestrained children sitting in the front seats have higher risk (~25% more) of getting injury than those in the back seat, as shown in Table 2. Children in the front seat also have the risk of injuries caused by passenger airbags. In addition to the safe seating place, it is also imperative to use the appropriate type of child seat according to the weight and height of the child as the effectiveness of the child restraint is directly related to the type used. For example, for up to 4 years old children, rear-facing restraint is much more effective in reducing injury (~70% lower risk) than the forward-facing one (55% lower risk). If seat-belt is used instead, the effectiveness goes down to 32% in reducing injury. If restrained through child car seats, children between the ages of 1–7 years are 70% less likely to be injured than if restrained only by seat belts (Elvik et al., 2009).

According to the National Highway Traffic Safety Administration statistics on child car seat safety, it is estimated that car seats reduce the risk of fatal injury by 71% for infants (younger than 1 year old) and by 54% for toddlers (1–4 years old) in passenger cars (NHTSA, 2018). In case of light trucks, the fatal injuries for infants and toddlers are reduced by 58% and 59%, respectively (Kahane,

Table 2Effects of child restraints in cars on the child's risk of injury as a car passenger (Source: *The Handbook of Road Safety Measures*, 2nd Ed, 2009).

Injury severity	Percentage change in the number of injuries		
	Type of accidents affected	Best estimate	95% Confidence Interval
Restraining babies using carry cots			
All injuries	All accidents	–25	–75 120
Restraining children with child seats and seat belts			
All injuries (0–4 year old children)	All accidents (forward facing seat)	–55	–76 –39
All injuries (0–4 year old children)	All accidents (rear-facing seat)	–71	–83 –51
Severe injuries/fatalities (0–4 year old children)	All accidents (rear-facing seat)	–90	–96 –77
All injuries (5–9 year old children)	All accidents	–57	–64 –50
Restraining children using child car seats instead of seat belt only			
Severe injuries (1–7 year old children)	All accidents	–71	–79 –59
Restraining children using seat belts only			
All injuries (0–4 year old children)	All accidents	–32	–35 –29
All injuries (5–9 year old children)	All accidents	–24	–34 –14
All injuries (10–14 year old children)	All accidents	–46	–52 –39
Severe injuries (10–14 year old children)	All accidents	–71	–79 –59

2015).

In developing countries, road traffic accident (RTA) deaths and injuries are excessively high and human factor is considered to be the main reason in these accidents (McIlvenny et al., 2004). The risk of road traffic casualties can be reduced by applying the safety measures, for instance enforcing the use of seatbelts for vehicle occupants and child restraints (Abu-Zidan et al., 2012). In this context, it is important to consider that, in addition to legislation, there may still be a great need for interventions according to public behavior and perceptions to enforce the law as well as to educate and train parents on correct use of child restraint system. This is particularly important for those countries which are recently adopting and implementing national child restraint laws such as indicated by the findings of survey performed by Koppel et al. (2013a) in Victoria, Australia after the new legislation on child safety car restraints. In this particular study, almost 99% of the participants indicated that they use child safety restraints in their vehicles however; more than half of the participants were unaware of the appropriate age limit for booster seat and adult seat belt while about 20% did not know about the age limit for a child to sit in the front seat. The findings also revealed that general safety attitudes and behaviors during driving such as preventing alcohol usage, and knowledge about child safety car restraints were significantly associated with knowledge regarding children occupants' safety during travel. In another study after the new law in Australia on child safety restraints, Koppel et al. (2013b) investigated the misuse and inappropriate use of child occupant restraints by the means of proper inspection program of child restraint system by the system fitting specialists. A large number (almost 79%) of incorrect and/or improper use was reported in the inspection of 2674 sample such as harness strap errors, incorrect use of seat belts, and improper lock of the buckle clip while significant differences existed between different restraints types. When compared the before and after legislation results, the study found no significant difference in the child restraints incorrect/inappropriate use.

Not only low income economies but an emerging economy such as China also needs to adopt and promote national policies on child safety restraints usage in vehicles. According to Chen, et al. (2014) study in the city of Shantou located in the southeast part of China, very low usage rate (22 out of 3333 children 0.6%) of child safety seats was found and even like low income countries a large number of children (more than 50%) were found riding on the laps of adults. When surveyed, most of the drivers were in agreement that child car seats should be used. Their study found higher education and use of car seat belts related with increased use of child car safety restraints.

In Pakistan, Siddiqui et al. (2014) performed a survey study through face-to-face interviews based on a convenience sample of University employees in one of the major cities of Pakistan. The study aimed at evaluating the awareness, knowledge and attitudes towards the use of child car restraints and reasons for not using them among the learned/educated population of the city. The employees included in the study were parents of children younger than 12 years of age and had a car. The findings of this study indicated ignorance as the main issue among the educated parents as compared to lack of awareness. Majority of the survey participants were of the view that child car restraints are inconvenient to use, expensive, and unnecessary. This study involved only educated population of a University and did not include any observational and survey data of general public in the city.

Even though, the trend of pre-schools and day care facilities has increased, over the past decade, in the major cities of Pakistan, the awareness among parents regarding importance of safely traveling with infants and children has not improved. Both law implementation and increased education of parents, in this respect, can play a vital role in protecting children from fatalities, injuries, and disabilities due to road traffic accidents. In this context, this study targets to investigate the general public awareness, regarding children road safety and use of child car seats, by approaching parents and drivers at schools, day-care centers, recreational places, and pediatric departments in hospitals, so that comprehensive findings could be shared with the policy makers in Pakistan.

3. Materials and methods

The study methodology involved taking direct observations and interviews of randomly selected parents/drivers traveling with young children (up to 12 years) at various schools, day-care facilities, pediatric centers in hospitals, and recreational parks in the city

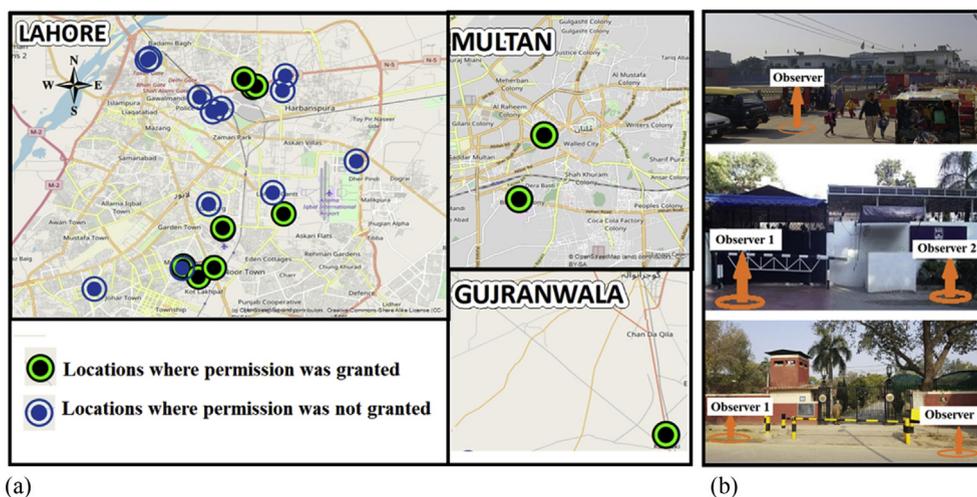


Fig. 1. (a) Visited locations (b) Observers location outside different schools.

of Lahore, Pakistan. This city is the second most populous city in the country as well as one of the wealthiest cities in the country with an estimated GDP by purchasing power parity (PPP) of \$40 billion in 2008 which is almost half of country's largest economic hub of Karachi with GDP by PPP of \$78 billion (Global City GDP Rankings, 2008–2025, Pricewaterhouse Coopers UK Economic Outlook, 2009). Additionally, few surveys were also collected from relatively small cities within the state of Punjab including Kamoke (near Gujranwala city) and Multan.

The study locations/schools were selected with a consideration to cover areas of different economic status (e.g. middle-income, affluent) and where most of the parents come themselves to drop off/pick-up their children, as well as those locations where data could be collected on various children age groups (up to 12 years). Many schools, day care centers, hospitals, and recreation places were approached to perform the surveys within or in the neighborhood of three major cities in the state of Punjab. At almost half of the total visited locations, permission was not granted to perform the surveys. Fig. 1 shows the graphical locations of all the visited sites.

3.1. Data collection

Data collectors were trained on collecting the required observational data of vehicles and child occupants as well as on conducting interviews from the parents. Vehicular observations included type, make, and presence of latches and seat belts in vehicle. The observations on children occupants included details on number of children in vehicle, each child's age, seating position, use of car seat, type of car seat (if used) and improper use, if any. Most of the observed child occupants were up to 12 years of age (2 observations included children 13–14 years of age).

Most of the time, two observers worked together by standing near the pick-up/drop-off area outside the schools or at the parking area of the other study sites. One of the observers approached a parent/driver at the study location, briefed the parent/driver about the study and asked for the parent/driver's permission for participating in the interview while the second observer took the required observations on vehicle and child occupants in the meantime. Those who agreed to participate in the interview survey were asked several questions in addition to participants' demographic information (gender, education, occupation, income level, frequency of driving etc.). The research instrument/data collection form contained 31 items including both observational details and survey questions. The questions were asked with the perspective of obtaining information on parents' knowledge about child car seats, awareness on safety benefits, source of information, knowledge on safest seating place for children in vehicle, knowledge on the use of rear facing child car seats, reasons for not using child car seats, willingness to know about the child car seats benefits, as well as support for their usage, awareness campaigns, and law implementation.

Those parents who were using child car seats for their children were asked additional questions on the appropriate use of child car seats i.e. appropriate type according to the age, weight, or height of a child, correct way to install the device, frequency of usage, and about their experience. The data collected through the survey forms were coded to be used for statistical analyses. Data collectors were thoroughly trained for reporting the observational and interview data as well as on coding the data in spreadsheets. A few coding errors identified in the dataset were removed. IBM SPSS Software Package 23 was used to perform the statistical analyses.

4. Results

4.1. Observational data findings

A total of 375 vehicular and 622 children observations were collected through randomly selected vehicles with children

Table 3
Summary of the direct observational data.

Observations	Number (n)	Percentage (%)
Total Number of observed vehicles with child occupants	375	
Total Number of observed children in vehicles	622	
Total Number of children in front seat	270	43
Total Number of children in rear seat	352	56.6
Total Number of restrained children	1	0.16
Number of observed vehicles with latches present (both front and rear)	276	73.6
Number of observed vehicles with latches present only in front seats	75	20
Number of observed vehicles without latches	24	6.4
Number of observed vehicles with seat belts present (both front and rear)	225	60
Number of observed vehicles with seat belts present only in front seats	118	31.5
Number of observed vehicles without seat belts	32	8.5
Number of parents/drivers who participated in the interview	318	84.8

occupants. Out of the 375 parents/drivers who were observed and approached, 318 participated in the interview that included survey questions. Each survey included vehicular and child seating observations followed by a brief interview from the parent/driver. Table 3 presents a summary of observational data and include several critical observations with respect to parents or drivers' behaviors regarding children safety measures during road travel. The usage of child car seats in the observed sample was almost none (only 1 child was found to be on a car seat) rather parents/drivers were frequently found to be placing children unrestrained in the front seats with sometimes more than 1 child. A number of vehicles were observed without latches (20%) and seat belts (31.5%) in the rear seats. Almost 6.4% observed vehicles had no latches (front/back) while about 8.5% were without seatbelts.

A variety of vehicle types were observed in the study which were categorized into 4-door saloons (called sedans in the United States), 4-door hatchbacks, hybrids (primarily hatchbacks), pick-up trucks and sport utility vehicles (SUVs) as shown in Fig. 2. The majority of vehicles were found to be 4-door saloons and hatchbacks (46.5% and 44.0% respectively), while next most frequently observed vehicle types were hatchback hybrids and SUVs (~5.0%). It is important to note that amongst these vehicle categories, the most frequently observed/owned vehicle was Suzuki Mehran which is a small sized hatchback passenger vehicle and not equipped with back seat belts (both in current and older models), which indicates a critical lack on the manufacturing part of such vehicles and should be addressed by Suzuki motor corporation.

4.2. Interview data findings

In order to assess the parents/drivers perceptions regarding children safety measures in general and use of child car seats in particular, the observed parents/drivers were approached and asked to participate in the interview survey. Total 318 parents/drivers

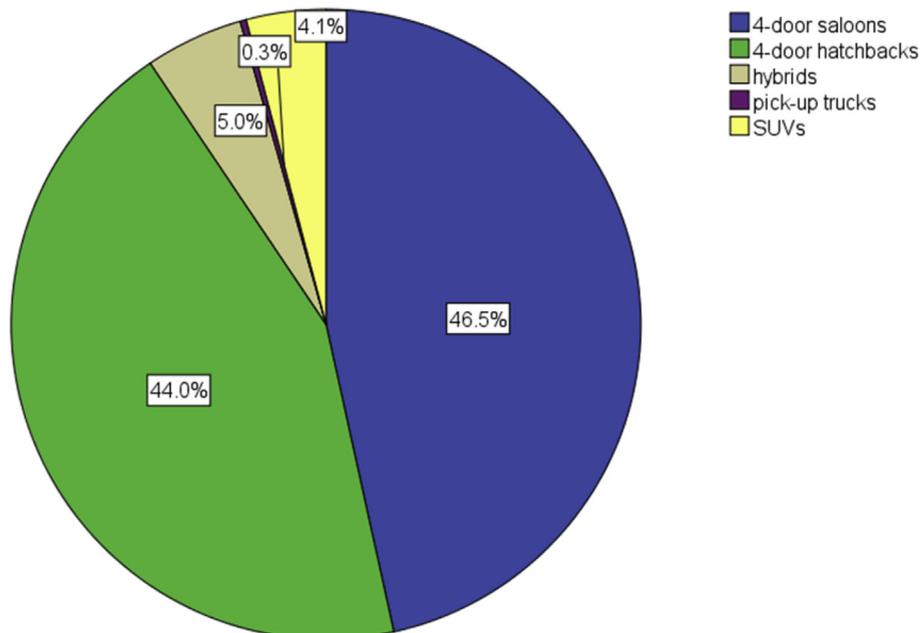


Fig. 2. Types and distribution of vehicles in the study.

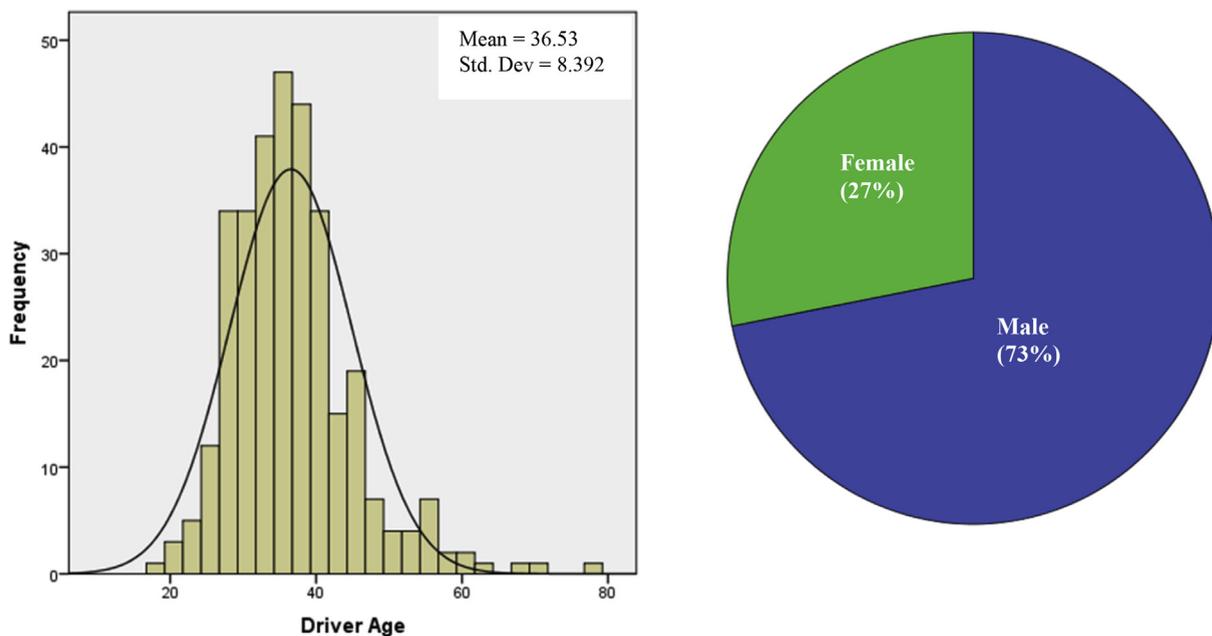


Fig. 3. Distribution of age of drivers (n = 318) and driver gender split.

participated in the interview part of the survey and were asked several questions in addition to their demographic information as explained in section 2. The distribution of age of drivers in the study (n = 318) along with the gender split is shown in Fig. 3. The figure shows a non-skewed normal distribution of the sample collected. The mean age of the sample was approximately 37 years. Approximately 73% drivers in the sample were male while only 27% were female. This ratio is close to the percentage of male and female drivers generally present in major cities traffic of Pakistan thus avoids the results to get skewed or biased. The lower female drivers' percentage is primarily due to cultural reasons.

In order to study the impact of income of drivers, if any, on the usage of child car seats, the information on driver income was also collected as summarized in Fig. 4. Lower sample (n = 109) in this case is due to the reason that majority of the respondents were not comfortable in sharing their income range. Majority of the drivers who provided this information were in the range of less than 50,000 Pakistani Rupees per month (\cong 500 US\$).

The education of drivers is also shown in Fig. 4 indicating that majority of the drivers acquired education above intermediate which is equivalent to high school in United States. Illiterate or primary education drivers were mainly the ones who were working as drivers to transport children back and forth to schools. In Lahore, the literacy ratio (defined as the percentage of literates (10 years & above) in the total population), is 69.1% as per 1998 census respectively (Bureau of Statistics, [Government of the Punjab, 2017](#)). It may be noted, that the latest census was carried out in 2017. Its detailed results related to education levels are in the compilation stage and still not made publicly available. Since this study targeted more educated people of the society, the data shows lower illiteracy ratio in the sample \sim 2% compared to \sim 31% in the city. The information on driver's occupation in the analyses was categorized as employed, self-employed, un-employed, and chauffeur.

Survey results showed that almost half of the drivers (43%) were unaware of child car seats. Almost 60% of the drivers drove daily with kid(s). The source of information regarding knowledge of child car seats revealed that the campaign in this area is almost non-existent as shown in Fig. 5, which indicates the significance of conducting detailed child safety awareness campaigns and programs.

Those participants who were aware of child car seat but did not use it were further inquired about the reason for not using child car seat. Among those who answered this question, the most common reasons were unavailability (24.1%), time taken in installation (19.1%), absence of law (8.6%), incorrect perception about the importance (7.4%) and age group application for child car seats (\sim 8%). Fig. 6 demonstrates various responses provided by the participants.

Almost 40% of respondents indicated that they do not know the benefits of using child car seats in the vehicles. Similarly, approximately 63% of respondents did not know if the children under 2 years must ride in rear-facing position in child car seat. If larger sample is collected including more cities, this percentage may get higher. More than half of the participants any were found to be either unaware (22%) or had incorrect knowledge (29.5%) regarding safest seating place for child in the vehicle. These stats highlight the need for child safety awareness campaigns in the country.

Overall, significant majority (Table 4) of survey participants indicated lack of awareness regarding importance of child safety restraints and encouraged their use as well as supported the need for a law to enforce the usage of child car seats. Participants also expressed strong support towards conducting awareness campaigns to educate and train the parents.

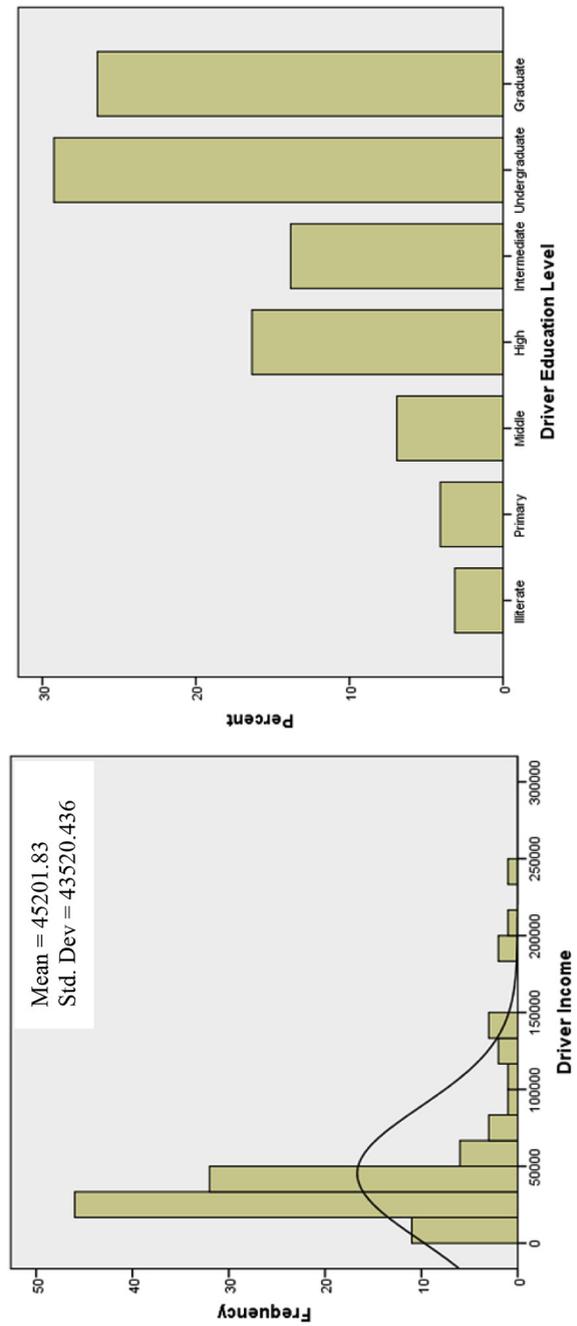


Fig. 4. Histogram of drivers' income (n = 109) and education of drivers (n = 318).

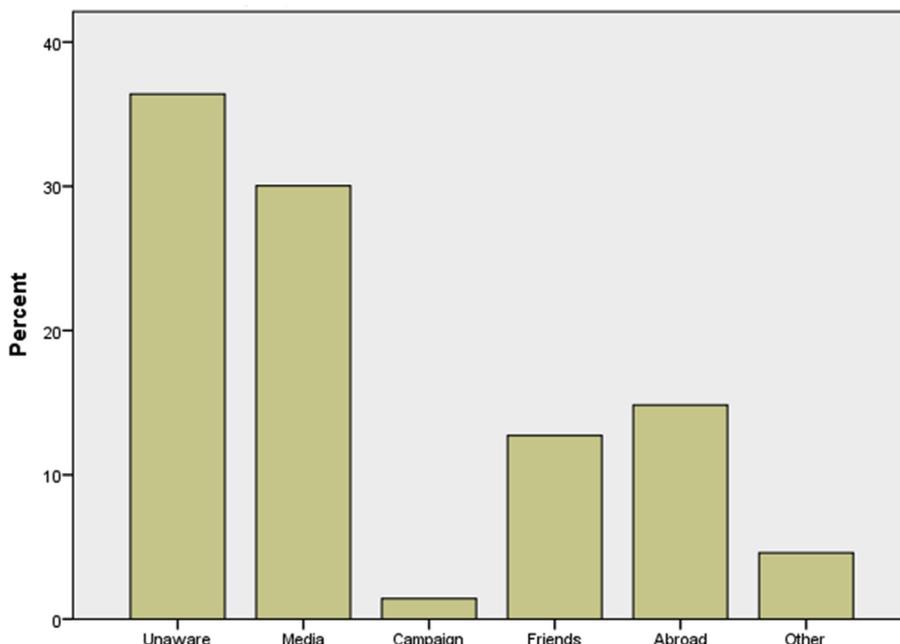


Fig. 5. Source of Information regarding Child Car Seats (multiple answers were allowed).

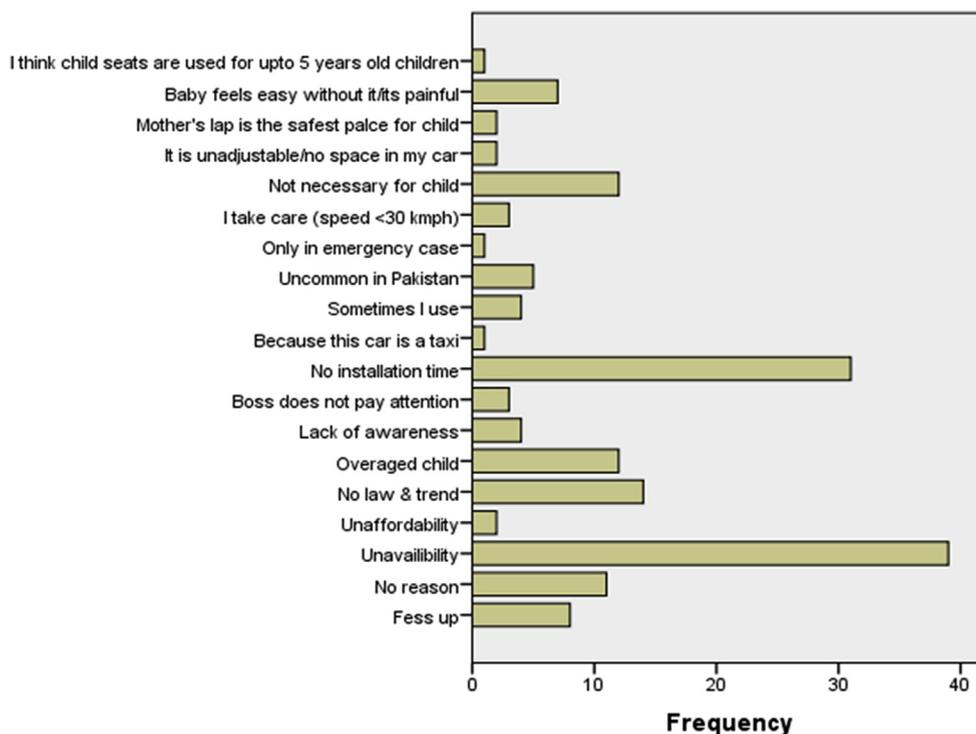


Fig. 6. Reasons for not using child car seats.

4.3. Correlation between variables

Table 5 presents the correlations between responses of the survey participants on various questions related to the usage and importance of child car seats, and their demographic characteristics. The values in bold font show significant correlations. Several relationships can be identified from the correlations shown in Table 5 which can help identifying and understanding the factors that influence the non-usage of child safety devices in vehicles as well as understanding important factors that can help in establishing

Table 4
Opinion of drivers not using child car seats.

	Strongly Agree	Agree	Disagree	Strongly Disagree
	n (%)	n (%)	n (%)	n (%)
Do you think parents should use child car seats?	217 (74.6%)	71 (24.4%)	3 (1.0%)	0 (0.0%)
Do you think there is lack of awareness regarding importance of child car seats?	252 (79.2%)	61 (19.2%)	4 (1.3%)	1 (0.3%)
Do you think there should be a law to enforce the use of child car seats?	249 (78.5%)	49 (15.5%)	17 (5.4%)	2 (0.6%)
Do you think Government should run awareness campaigns to educate/train parents/drivers for child car seats?	261 (82.3%)	52 (16.4%)	4 (1.3%)	0 (0.0%)

Note: The numbers represent only those participants who responded to these particular questions and also were correctly reported in the survey forms, and not necessarily all the survey participants.

Table 5
Spearman Correlations (ρ) between participants' demographics and responses to individual questions.

Survey Questions	Possible Response		Gender	Age group	Employment Status	Income	Education level	Frequency of Driving with Kid(s)	Number of Children in Vehicle
Do you know about child car seats?	No/Yes	ρ	.108	-.080	-.172**	.253**	.366**	.101	-.022
		p-value	.055	.157	.003	.008	.000	.072	.690
		n	318	317	301	109	318	318	318
Do you know about the benefits of using child car seats?	No/Yes	ρ	.096	-.084	-.169**	.262**	.391**	.142*	-.020
		p-value	.111	.162	.006	.009	.000	.017	.740
		n	279	278	264	100	279	279	279
Do you know that children under 2 years must ride in rear-facing position in child car seat.	No/Yes	ρ	.102	-.050	.063	-.021	.066	.018	-.026
		p-value	.069	.379	.276	.832	.238	.749	.639
		n	318	317	301	109	318	318	318
Do you know which is the safest seating place for child in a vehicle?	Unaware/ Front/Back Window Sides/ Back Center	ρ	.109	.035	.074	-.068	.176**	.093	-.102
		p-value	.053	.537	.198	.483	.002	.099	.071
		n	317	316	300	109	317	317	317
Do you think parents should use child car seats?	Likert Scale	ρ	.010	-.122*	-.093	.221*	.233**	.062	-.163**
		p-value	.869	.038	.125	.036	.000	.293	.005
		n	291	290	274	90	291	291	291
Do you think there is lack of awareness about importance of using child safety seats in vehicles?	Likert Scale	ρ	.029	-.018	-.134*	.282**	.229**	.087	-.045
		p-value	.600	.745	.020	.003	.000	.121	.428
		n	318	317	301	109	318	318	318
Do you think there should be a law to enforce the use of child car seats during travel?	Likert Scale	ρ	.036	-.062	-.075	.175	.200**	.004	-.069
		p-value	.522	.273	.194	.069	.000	.938	.220
		n	317	316	300	109	317	317	317
Would you like to get more information about properly using child car seats and their benefits?	Likert Scale	ρ	.036	-.110	-.041	.250**	.096	-.024	-.012
		p-value	.527	.051	.477	.009	.089	.675	.834
		n	318	317	301	109	318	318	318
Do you think Government should run awareness campaigns to educate and train parents/drivers for using child car seats in vehicles?	Likert Scale	ρ	.044	-.113*	-.097	.165	.195**	-.022	-.048
		p-value	.437	.044	.092	.087	.000	.699	.395
		n	317	316	301	109	317	317	317

* $p < 0.05$, ** $p < 0.01$.

Likert Scale = Strongly Disagree, Disagree, Agree, Strongly Agree.

effective policy and programs for increasing awareness and promoting children road safety measures in developing countries.

The p-values against gender suggest that there could be a significant difference between male and female drivers with regard to their awareness regarding child car seats (first four questions in Table 5) however, in order to have a stronger evidence larger sample size should be analyzed. As expected, knowledge about child car seats was found to be significantly associated with higher education level, higher income, and also with employment status (those participants having a job were aware as compared to the unemployed ones and chauffeurs). Driver's knowledge on safety benefits of child car seats was found to be related with education level, income, employment status, and frequency of traveling with kid(s). Education was the only demographic characteristic found to be significantly related with the driver's knowledge regarding safe seating place for child in vehicle.

Drivers with higher education and income level significantly expressed their agreement that there is lack of child car seat

Table 6
Logistic regression analysis of Driver's awareness on child car seats.

	Coefficient	Standard Error	P value	OR	95% C.I for OR	
					Lower	Upper
Constant	1.365	1.236	.269	3.916		
Male (vs. Female)	-.094	.334	.778	.910	.473	1.752
Driver's age-group (vs. 61–80 years)						
18–30 years	.376	1.123	.738	1.457	.161	13.157
31–40 years	.346	1.112	.756	1.413	.160	12.502
41–60 years	-.387	1.128	.731	.679	.074	6.193
Employment Status (vs. Chauffeur)						
Job holder	-.186	.432	.667	.830	.356	1.936
Self employed	.395	.437	.366	1.484	.630	3.494
Unemployed	-.384	.482	.427	.681	.265	1.754
Education Level (vs. Graduate)						
Illiterate	-3.397	1.167	.004	.033	.003	.330
Primary	-2.201	.729	.003	.111	.027	.462
Middle	-2.048	.655	.002	.129	.036	.466
High	-2.080	.456	.000	.125	.051	.306
Intermediate	-1.636	.436	.000	.195	.083	.457
Undergraduate	-.870	.369	.018	.419	.203	.864

C.I = Confidence Interval; OR = Odds Ratio.

awareness in the society. Supporting the usage of child car seats was also found to be significantly associated with the driver's education and income level. In the study sample, mostly more educated people had relatively higher income level, so the impact of income can also be indirectly attributed to the respondents' education level. Respondents' belonging to older age groups indicated less support for the usage of child car seats as compared to younger participants. A possible reason could be that the younger people are more informed and adaptive to new devices as compared to older people.

Driver's education was found to be the most influential demographic characteristic towards supporting awareness campaigns as well as enforcement of law regarding use of child car seats. The number of children riding in the vehicle did not have any effect on the drivers' awareness level as well as responses on other questions regarding the importance of child car seats. An interesting correlation indicated that people driving with more number of children are less supportive towards the use of child safety restraints. This is most likely due to unwillingness to spend on safety restraints for all children.

A binary logistic regression analysis was also performed to predict the impact of various demographic factors on the driver's awareness about child car restraints. Table 6 presents the binary logistic regression results which clearly show that child car seat awareness is significantly associated with the respondent's education level. Respondent's gender, age group, employment status, and income were found to be insignificant in the logistic regression analysis.

In order to know the overarching remarks and comments of drivers in the context of awareness related to child car seats and their usage, the most common response by respondents suggested that the government should initiate active response to mass-aware general public. The significance of child car seats can only be realized if people are made aware. The governmental level could be the best platform due to availability of resources and nature of continuing awareness task. The second common response from the participants was appreciation for the efforts of the team conducting this study as it highlighted a long-ignored area of traffic safety and presented a lot new information for majority of the respondents.

5. Discussion

Child restraints usage in vehicles was found to be almost none; only 1 restrained child was found in the sample of 375 vehicles and 622 children observed in this study. A large number of children (almost 43.4%) were observed sitting in the front seat unrestrained. A number of vehicles were observed without latches (20%) and seat belts (31.5%) in the rear seats. Almost 6.4% observed vehicles had no latches (front and back) while about 8.5% were without seatbelts (front and back). Majority of vehicles in the study sample found to be Suzuki Mehran (~40.5%) which is a small sized hatchback passenger vehicle and not equipped with seat belts in the back seats which indicates a lack at this particular automobile manufacturer's part.

Out of the total observed vehicles, 318 parents/drivers agreed to take part in the interview containing survey questions. Almost half of the survey participants were unaware of child car seats. Those who were aware of child car seats reported media, friends, or foreign country experience as the sources of information indicating no/less awareness campaigns on this subject. The respondents most commonly expressed unavailability, time taken in child car seat installation, and absence of law as the reasons behind not using the child car seats while another common reason was their misperception about the children age group up to which child seats should be used.

Regarding participants' knowledge on the safest place for child in a vehicle, about 26% (n = 83) were found to have no idea about it. A large number of participants (98.7%, n = 315) agreed that there exist a lack of awareness in the country regarding child car seats. Despite of being unaware or insufficiently knowledgeable on the safety benefits of child car seats, a significant number of the

parents/drivers expressed strong interest in getting more information on proper use and benefits of such devices, as well as indicated support and need for running awareness campaigns (98.7%, $n = 315$) by the government and implementing the law (93.6%, $n = 299$) on using child car seats. Overall, the driver's education level was found to be the most significant ($p < 0.0001$) demographic characteristic with regard to the driver's awareness on child car seats, positive response towards its usage, support for the initiation of awareness campaigns as well as enforcement of law regarding use of child car seats. The survey participants also showed a great appreciation towards conducting such studies and knowledge sharing.

The survey findings provide a useful insight into understanding parents' knowledge, opinion, interest, and willingness to know about the safety benefits of child car seats as well as the need and strategies for educational programs and awareness campaigns in the country. This information should be utilized by the planners and policy makers to plan strategies to raise the parental awareness, promote the use of child safety car seats, and reduce the children injuries/fatalities in Pakistan. As the study revealed, the educated and affluent parents were not only more knowledgeable but also more supportive towards the usage of child safety car restraints, this indicates a potential for child car seat educational programs and market for such devices. The awareness campaigns and educational/training programs should be conducted for parents in schools, day-care centers, and pediatric departments within hospitals by involving transport safety experts, pediatricians, school teachers, law-enforcement agencies, media, as well as manufacturers. The lack that exists at the vehicle manufacturer part for not providing back seat belts such as in Suzuki Mehran must be addressed as well because this vehicle type is owned and used by a large population in the country.

In addition to that, considerations must be given in the policy making or planning process to encourage the usage of child car seats among parents by addressing affordability and accessibility issues. In this context, possible options could be to subsidize the purchase of car safety seats for children, initiate a rental program to encourage parents who cannot purchase child car seats at higher costs, and/or facilitate local industry to develop locally manufactured child car seats (meeting required safety standards) in order to bring the prices in the buying range of low- and average-income parents.

5.1. Limitations and future work

This study is the first direct observational and survey study in Pakistan performed at schools, day-care centers, hospitals, and children recreational places on studying the awareness level and behaviors of parents on child road safety in general and use of child car seats in particular. Due to security issues in the country as well as being the first study of its kind, it has been extremely challenging to collect data and get cooperation particularly from schools for conducting surveys. The management at almost half of the total visited locations (including schools, day-care centers, hospitals, and children recreational places) denied permission to perform the surveys. Due to this reason, there has not been a comparable representation in the data from all kinds of locations and socio-economic groups of population within the cities. Additionally, although data from three cities have been collected in the state of Punjab, Pakistan, most of the data come from one major city (Lahore) and do not represent other major cities (particularly Islamabad and Karachi) in the country.

The future work of the authors target to collect more data on the subject in other major cities of the country as well as to conduct adequately planned awareness campaigns for parents on child safety measures in general and use of child car seats in particular, at various schools. A pre and post campaign studies on parental knowledge, attitudes, and adoption of child car seats are proposed to be performed.

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