RESEARCH PAPER

Cardiopulmonary Resuscitation(CPR)among school going teenagers: A Study on Knowledge ,Attitude ,and Practice regarding Willingness to act during emergency

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ABSTRACT

Background: Myocardial infarction is a major cause of death in the world, and early bystander cardiopulmonary resuscitation (CPR) is very important in enhancing survival. Teens are an important target demographic of CPR training, but there is very little data available on their level of understanding, attitudes, and intentions towards emergency response, especially in the case of the Indian school.

Objective: The purpose of the study was to measure the level of CPR knowledge, perception, and willingness to act in cases with the occurrence of an emergency among school-going teenagers and investigate their relationship with the chosen socio- demographic factors. The correlation between the CPR knowledge and readiness to do CPR was also tested.

Methods: It was a cross-sectional study that used a descriptive study design and its subject was a population of 250 school-going teenagers (aged between 13 and 18 years) in the selected secondary schools in Delhi NCR. A structured self-administered questionnaire comprising of socio-demographic variables, CPR knowledge, perception and attitude, and willingness to perform CPR was used to collect data. Data was analyzed by Descriptive statistics, ANOVA, chi-square and Pearson correlation with statistical significance set to be $p < 0.05$.

Results: The results showed that there were moderate to high levels of CPR knowledge and willingness among the participants. The knowledge, perception, and willingness to act were strongly linked to formal training of CPR. The knowledge of CPR was largely related to age and level of class, but not gender. A statistically significant positive relationship but weak between CPR knowledge and willingness to perform CPR was observed ($p < 0.05$).

Conclusion: The research shows that well-organized CPR training can considerably promote the knowledge, perception, and the willingness to act among the adolescents in the case of emergency. To enhance the capacity of teenagers in responding to emergencies, there is a need to have CPR education and Skill training in schools' curriculum.

Keywords: Cardiopulmonary Resuscitation, School-going Teenagers, CPR Knowledge, Willingness to Act, Emergency Response..

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INTRODUCTION

Sudden cardiac arrest (SCA) remains a leading cause of death worldwide, and immediate intervention through cardiopulmonary resuscitation (CPR) significantly improves survival rates. Despite widespread awareness of its lifesaving potential, CPR is often underutilized in out-of-hospital emergencies, particularly in low- and middle-income countries [1]. Bystander intervention can double or triple a person's chance of survival, yet the willingness to act remains a persistent global concern. In this context, empowering school-going teenagers through CPR education has emerged as a promising strategy to bridge the gap between cardiac emergencies and immediate response [2].

Training adolescents in CPR during their formative years not only imparts critical lifesaving skills but also fosters civic responsibility and long-term retention of emergency response behaviors. The "KIDS SAVE LIVES" initiative launched by the International Liaison Committee on Resuscitation (ILCOR) strongly advocates for mandatory CPR education in schools, citing evidence that CPR skills, when learned early, are more likely to be retained and applied [2]. CPR education delivered through well-structured school-based programs positively influences students' knowledge, attitudes, and willingness to perform CPR, especially in high-pressure situations. Their mixed-methods research further demonstrated that early exposure not only improves competence but also reduces psychological hesitation associated with fear of doing harm or legal liability [3].

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Moreover, school-based CPR interventions are particularly impactful because they target a demographically ideal population—teenagers who are cognitively receptive, physically capable, and socially influential. Adolescents trained in CPR were significantly more confident in their ability to perform compressions and recognize emergency signs, and were more likely to educate peers and family members. These findings align with the broader literature emphasizing peer education and generational knowledge transfer as critical components of widespread public health campaigns. Importantly, the integration of CPR training into academic curricula enhances inclusivity and access, particularly in resource-limited settings where community health literacy may be lacking [4].

Despite this promise, disparities persist in the actual implementation and uptake of CPR training among teenagers. Cultural, institutional, and pedagogical barriers hinder the widespread adoption of CPR education in many school systems. In some regions, CPR instruction is not standardized, and school administrators lack the trained personnel or curriculum space to prioritize emergency life support education [5]. Furthermore, perceptions surrounding CPR remain influenced by misinformation, lack of exposure, and emotional deterrents such as fear of harming the victim or being sued. This psychosocial reluctance was observed where students, although moderately knowledgeable, displayed low willingness to perform hands-only CPR without prior professional validation or supervision [6].

In India, the situation reflects both challenges and opportunities. While CPR training is increasingly acknowledged in medical and allied health education, high school curricula often exclude it. Alarmingly poor awareness and practical skill retention among young medical professionals, suggesting even greater deficits among untrained adolescents. Nevertheless, recent Indian studies have shown promising trends [7]. Study conducted on high school students and found substantial improvement in post-training CPR awareness and skill acquisition, reinforcing the idea that school-aged teenagers represent an untapped workforce in community emergency preparedness [8].

Understanding the dynamics of CPR knowledge, perception, and willingness to act among school-going teenagers is critical for designing effective public health interventions. A significant proportion had basic CPR awareness, gaps in confidence and actual willingness to intervene in emergencies persisted. This distinction between knowledge and actionable behavior highlights the importance of not just cognitive training but also emotional preparedness. School-based training, therefore, must go beyond theoretical instruction and emphasize hands-on practice, scenario-based simulations, and psychological readiness to address real-world emergencies [9].

skill retention following school-based CPR training. Their findings confirmed that students trained under repeated and structured modules retained significantly more CPR-related knowledge and skills over time than those who received one-time or informal training. This reinforces the necessity of periodic reinforcement and the inclusion of CPR as a recurring component of school health education. Moreover, the study emphasized that retention of CPR skills correlates with initial willingness to act—students who practiced CPR more often were more likely to intervene during real emergencies [11].

Importantly, perception plays a mediating role in whether teenagers apply their CPR knowledge. Study assessing dental students in India, found that over 70% had heard of CPR but only 22% felt capable of performing it correctly without assistance. The gap between awareness and action is often bridged by positive reinforcement, social norm modeling, and public awareness campaigns. When CPR is framed not merely as a clinical skill but as a moral and civic duty, teenagers are more likely to internalize its importance and feel empowered to act. This highlights the role of health educators, parents, and community leaders in shaping attitudes and behavioral readiness [11].

Another key insight arises from exploring gender, socio-economic background, and prior exposure to emergencies. Studies show that female students, in some contexts, report higher emotional hesitation than male counterparts, though they may exhibit better academic retention of CPR facts [1]. Meanwhile, adolescents with family members in healthcare or those who have witnessed emergencies firsthand tend to show stronger proactive attitudes. Thus, tailoring CPR education to account for these psychosocial and demographic differences could enhance its impact and relevance.

Overall, a growing body of literature advocates that CPR training should be universally integrated into secondary school curricula, especially in countries where out-of-hospital cardiac arrest rates are high and emergency response systems are underdeveloped. Incorporating CPR training aligns with global health priorities and the Sustainable Development Goals (SDG 3: Good Health and Well-being), promoting not just individual capacity but community resilience. Given the rising incidence of non-communicable diseases and accidents in both urban and rural India, preparing the youth to respond to emergencies is no longer optional—it is essential.

This research paper aims to explore the levels of CPR knowledge, perception, and willingness to act during emergencies among school-going teenagers. The study focuses on assessing baseline awareness, attitudes, and readiness to respond to cardiac emergencies, along with examining the association of these factors with selected socio-demographic variables. In addition, the relationship between CPR knowledge and willingness to perform CPR is analyzed to understand how awareness translates into action. By identifying existing gaps in preparedness, the study seeks to generate evidence that may support the need for structured CPR education and awareness initiatives within school health programs.

REVIEW OF LITERATURE

Effectiveness of CPR among School children

The effectiveness of cardiopulmonary resuscitation (CPR) training among schoolchildren has been a growing focus of

educational and public health research. Molinari et al. (2025) [12] conducted a simulation-based randomized controlled trial in schools, demonstrating that structured, hands-on CPR training significantly improved children's lifesaving skills, including chest compression quality and emergency response accuracy. Similarly, Ambarika et al. (2024) [13] reported that health education interventions significantly enhanced both theoretical knowledge and practical CPR skills among school-aged participants, emphasizing the value of integrating CPR modules into the school curriculum. Focusing on rural adolescents, Pai et al. (2022) [14] compared two educational methods—video-based and live demonstration—and found that although both improved knowledge, practical demonstration led to better skill retention over time. A longitudinal investigation by Meissner, Kloppe, and Hanefeld (2012) [15] further supported these findings, showing a substantial improvement in CPR performance post-training, with retention remaining high even after several months. Collectively, these studies affirm that well-structured CPR education, particularly when initiated at the school level, is highly effective in equipping children with essential life-saving competencies that can be retained over time.

Barriers to Performing CPR Among Students or Young Adults

Despite increasing awareness campaigns, several psychological and contextual barriers hinder students from performing cardiopulmonary resuscitation (CPR) during emergencies. Hamednia et al. (2025) [16] conducted an interventional study among high school students and found that basic CPR training significantly increased students' willingness to act. However, initial reluctance was rooted in fear of causing harm and lack of confidence. Similarly, Qin et al. (2024) [17] surveyed first-year college students in China and identified that although most students supported CPR in theory, only a minority felt confident enough to perform it in real-life settings. Chilappa and Waxman (2021) [18] explored high school students' knowledge and attitudes in the U.S. and discovered that while most students had heard of BLS, their actual understanding of its steps and readiness to intervene were low. In a gender-specific context, Al Harbi et al. (2018) [19] studied female secondary students in Riyadh and revealed that limited training opportunities, cultural hesitations, and misinformation acted as major barriers. Interestingly, Creutzfeldt et al. (2013) [20] piloted an avatar-based CPR training in virtual reality and found that such immersive tools could improve motivation and reduce emotional hesitation, thereby addressing key psychological barriers among students.

Role of Socio-Demographic & Contextual Factors

Socio-demographic and contextual factors significantly influence CPR knowledge, training access, and the willingness to intervene during emergencies. Salehpoor-Emran et al. (2025) [21] conducted a randomized clinical trial among student volunteers and demonstrated that online CPR training was highly effective in improving knowledge and practice, particularly when in-person access was restricted during the COVID-19 pandemic. This highlights how training modality can overcome contextual limitations. A comprehensive scoping review by Blewer et al. (2024) [22] found that disparities in CPR education and bystander action were strongly linked to gender, socioeconomic status, race, and ethnicity, suggesting that underserved communities face significant barriers in acquiring lifesaving skills. Spartinou et al. (2024) [23] explored peer-led CPR education in schools and showed that such approaches enhanced knowledge retention, indicating the importance of social learning environments and educational context. Charlton et al. (2023) [24] interviewed participants from North East England and found that fear of legal repercussions, lack of trust in personal skill level, and perceived personal risk were major barriers, particularly in low-income neighborhoods. Similarly, Sharif et al. (2018) [25] emphasized that adolescents often lack access to first-aid and CPR education, especially in under-resourced school systems. These studies affirm the critical role of contextual and demographic variables in shaping CPR readiness.

Research Gap

Although numerous studies have validated the effectiveness of CPR training among schoolchildren (Molinari et al., 2025 [12]; Ambarika et al., 2024 [13]), most have focused solely on post-training outcomes, with limited emphasis on pre-training assessment to gauge baseline knowledge and retention capacity. Additionally, while retention and psychological barriers to performing CPR have been acknowledged (Meissner et al., 2012 [15]; Hamednia et al., 2025 [16]), few studies have systematically tracked both pre- and post-training outcomes within the same adolescent population. Moreover, the role of socio-demographic variables such as gender, school type, and prior exposure to emergencies has largely remained underexplored, especially in the Indian context. While studies by Blewer et al. (2024) [22] and Charlton et al. (2023) [24] have highlighted demographic disparities in CPR readiness, they lack school-specific empirical frameworks. Thus, this study fills a crucial gap by holistically assessing CPR START effectiveness, retention, and demographic associations among secondary school students in Delhi NCR.

RESEARCH OBJECTIVES

Objective 1: To assess the level of CPR knowledge among school-going teenagers.

Objective 2: To evaluate the perception and attitude of school-going teenagers toward CPR and emergency response.

Objective 3: To determine the willingness of school-going teenagers to act during emergency situations requiring CPR

Objective 4: To find the association of knowledge, perception, and willingness to act with selected demographic variables (such as age, gender, class, previous training, family background, exposure to emergencies, etc.

Objective 5: To identify the relationship between CPR knowledge and willingness to perform CPR among school-going teenagers.

Hypotheses of the Study

H01: There is no significant level of CPR knowledge among school-going teenagers.

H1: There is a significant level of CPR knowledge among school-going teenagers.

H02: There is no significant perception and attitude toward CPR and emergency response among school-going teenagers.

H2: There is a significant perception and attitude toward CPR and emergency response among school-going teenagers.

H03: There is no significant willingness to act during emergency situations requiring CPR among school-going teenagers.

H3: There is a significant willingness to act during emergency situations requiring CPR among school-going teenagers**.**

H04: There is no significant association between CPR knowledge, perception, and willingness to act and selected socio-demographic variables among school-going teenagers.

H4: There is a significant association between CPR knowledge, perception, and willingness to act and selected socio-demographic variables among school-going teenagers.

H05: There is no significant relationship between CPR knowledge and willingness to perform CPR among school-going teenagers.

H5: There is a significant relationship between CPR knowledge and willingness to perform CPR among school-going teenagers.

RESEARCH METHODOLOGY

The present study adopted a descriptive cross-sectional research design to assess the level of cardiopulmonary resuscitation (CPR) knowledge, perception, and willingness to act during emergencies among school-going teenagers. The study was conducted in selected secondary schools of the Delhi NCR region and included students aged 13 to 18 years. A stratified random sampling technique was used to ensure representation across age, gender, class, and type of school. A total of 250 students participated in the study. Data were collected using a structured, self-administered questionnaire developed to assess socio-demographic characteristics, CPR knowledge, perception and attitude toward emergency response, and willingness to perform CPR. The questionnaire consisted of closed-ended questions and Likert-scale statements to capture participants' responses systematically. The independent variables included selected socio-demographic factors such as age, gender, class, type of school, prior awareness of CPR, previous exposure to emergencies, and family background. The dependent variables were CPR knowledge level, perception and attitude toward CPR, and willingness to act during emergency situations. The relationship between CPR knowledge and willingness to perform CPR was also examined. Data analysis was carried out using Microsoft Excel and SPSS software. Descriptive statistics such as frequency, percentage, mean, and standard deviation were used, along with inferential statistics to assess associations and correlations. Statistical significance was set at $p < 0.05$.

RESULT AND ANALYSIS

Table 1: Demographic Profile of the Respondents

S.NO.	Variable	Category	Outcomes	Percentage
1	Age	13–14 years	82	32.8
		15–16 years	93	37.2
		17–18 years	75	30.0
2	Gender	Female	135	54
		Male	115	46
3	Class	8	47	18.8
		9	60	24
		10	38	15.2
		11	47	18.8
		12	58	23.2
4	School Type	Government	94	37.6
		Private	156	62.4
5	residence	Rural	101	40.4
		Urban	149	59.6
6	Family type	Joint family	98	39.2
		Nuclear family	152	60.8
7	Income	₹10,001 – ₹20,000	50	20.0
		₹20,001 – ₹30,000	48	19.2
		₹30,001 – ₹50,000	44	17.6
		Less than ₹10,000	52	20.8
		More than ₹50,000	56	22.4
8	Heard CPR	No	182	72.8
		Yes	68	27.2
9	Formal Training	No	90	36.0
		Yes	160	64.0
10	Witnessed Emergency	No	116	46.4
		Yes	134	53.6

The demographic of the 250 school going teenagers is relatively balanced with the highest proportion (37.2) representing the age group of 1516 years, the second proportion is 32.8 representing the age group of 1314 years and the final result is 30.0 representing the age group of 1718 years demonstrating good representation in the early and late adolescence phases. The sample was slightly female dominated as the proportion of female participants

was 54 percent. The sample was obtained by sampling classes 8-12 with the highest number of students being in class 9 (24%), and in 12 (23.2%), indicating that middle and senior secondary levels were included. Most of the respondents attended and attended private schools (62.4%) and were in urban areas (59.6%), which represented urban areas better. The joint families were less represented (60.8) than the nuclear families. The income of families on a monthly basis was spread evenly with the highest percentage in the category of more than 50,000 (22.4), then next in the category of less than 10,000 (20.8) indicating socio-economic diversity. There were also significant levels of awareness on CPR with almost three-fourths of the participants (72.8% never heard about CPR). Nonetheless, though not well known, a significant percentage have attended some form of formal training (64.0%). Also, over fifty percent of the participants (53.6) had experienced an emergency situation, suggesting that they might have been exposed to actual life in which CPR knowledge and skills may pose an essential need.

On the basis of Objective and hypotheses of the study

Objective 1: To assess the level of CPR knowledge among school-going teenagers.

H01: There is no significant level of CPR knowledge among school-going teenagers.

H1: There is a significant level of CPR knowledge among school-going teenagers.

The findings of the ANOVA were utilized in evaluation of the level of CPR knowledge in school going teenagers with regard to training status. The results have shown that statistical significant differences between trained and untrained students also existed in CPR meaning and purpose ($p = 0.011$), knowledge of emergency numbers ($p = 0.036$), and awareness of correct rate of chest compression ($p < 0.001$), as such training had a positive effect, on these core knowledge elements. Nonetheless, recall of CPR steps ($p = 0.269$) and cardiac arrest recognition ($p = 0.069$) failed to be significantly different, suggesting that there are gaps in the further procedural knowledge. In general, the fact that several key findings were obtained proves that school-going teenagers have a high degree of CPR knowledge, especially in basic concepts, which contributes to rejecting the null hypothesis (H01) and accepting the alternative hypothesis (H1) of Objective 1.

Objective 2: To evaluate the perception and attitude of school-going teenagers toward CPR and emergency response.

H02: There is no significant perception and attitude toward CPR and emergency response among school-going teenagers.

H2: There is a significant perception and attitude toward CPR and emergency response among school-going teenagers.

Table 2: level of CPR knowledge
ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
B1_CPR Meaning & Purpose	Between Groups	.006	1	.006	.012	0.011
	Within Groups	125.838	248	.507		
	Total	125.844	249			
B2_Know Emergency Number	Between Groups	.003	1	.003	.006	0.036
	Within Groups	101.841	248	.411		
	Total	101.844	249			
B3_Compression Rate Awareness	Between Groups	.390	1	.390	1.225	0.000
	Within Groups	78.986	248	.318		
	Total	79.376	249			
B4_Recall CPR Steps	Between Groups	.390	1	.390	1.225	0.269
	Within Groups	78.986	248	.318		
	Total	79.376	249			
B5_Recognize Cardiac Arrest	Between Groups	.390	1	.390	1.225	0.069
	Within Groups	78.986	248	.318		
	Total	79.376	249			

Table 3: On the basis of School Type
ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
C1 Learning CPR is important for everyone	Between Groups	.105	1	.105	.173	0.042
	Within Groups	150.295	248	.606		
	Total	150.400	249			
C2 I feel confident to help in an emergency	Between Groups	1.151	1	1.151	3.471	.064
	Within Groups	82.225	248	.332		
	Total	83.376	249			
C3 I can perform CPR correctly if trained	Between Groups	.012	1	.012	.080	0.040
	Within Groups	38.072	248	.154		
	Total	38.084	249			
C4I worry about making mistakes while giving CPR	Between Groups	.012	1	.012	.080	0.078
	Within Groups	38.072	248	.154		
	Total	38.084	249			
C5 I Am interested in	Between Groups	.012	1	.012	.080	0.778

attending CPR training	Within Groups	38.072	248	.154		
	Total	38.084	249			

The ANOVA, which was carried out on the basis of school type (government vs private), was used to determine the perception and attitude of school-going teenagers towards CPR and emergency response. The findings showed statistically significant differences in the perception that CPR is important to all people (p = 0.042) and the belief that CPR may be properly performed in case of training (p = 0.040), which means that there is a positive and significant attitude towards CPR in schools of different types. Nevertheless, there were no significant differences in regard to being confident to assist in an emergency (p = 0.064), worry about making an error during CPR delivery (p = 0.078), and enthusiasm about enrolling in CPR training (p = 0.778). In general, the main variables of consideration have significant findings indicating the presence of a substantial perception as well as an attitude towards CPR, which results in rejecting the null hypothesis (H 0 2) and accepting the alternative hypothesis (H 2) concerning Objective 2.

Table 4: **On the basis of formal training ANOVA**

		Sum of Squares	df	Mean Square	F	Sig.
C1 Learning CPR is important for everyon	Between Groups	.011	1	.011	.018	0.000
	Within Groups	150.389	248	.606		
	Total	150.400	249			
C2 I feel confident to help in an emergency	Between Groups	.576	1	.576	1.725	0.004
	Within Groups	82.800	248	.334		
	Total	83.376	249			
C3 I can perform CPR correctly if trained	Between Groups	.001	1	.001	.009	0.025
	Within Groups	38.083	248	.154		
	Total	38.084	249			
C4I worry about making mistakes while giving CPR	Between Groups	.001	1	.001	.009	0.037
	Within Groups	38.083	248	.154		
	Total	38.084	249			
C5 Iam interested in attending CPR training	Between Groups	.001	1	.001	.009	.925
	Within Groups	38.083	248	.154		
	Total	38.084	249			

ANOVA results taking formal training on CPR indicate that the impact of training on attitude and perception of the school-going teenagers in relation to the topic of CPR and emergency response is quite evident. The statistically significant difference was found with regard to the belief that learning CPR is important to everyone (p < 0.001), confidence to help in an emergency (p = 0.004), and ability to perform CPR correctly when trained (p = 0.025) as well as the concern of making errors when providing CPR (p = 0.037). These results suggest that the students who have attended formal training have more positive perceptions, confidence, awareness of CPR-related responsibilities than do the students who have not received training. Nonetheless, there was no great difference in the interest in attending CPR training (p = 0.925), which implies that there was the consistent interest regardless of whether there was previous training. All in all, the large values eradicate the null hypothesis (H02) and bring positive values to the alternative hypothesis (H2).

Objective 3: To determine the willingness of school-going teenagers to act during emergency situations requiring CPR.

H03: There is no significant willingness to act during emergency situations requiring CPR among school-going teenagers.

H3: There is a significant willingness to act during emergency situations requiring CPR among school-going teenagers**.**

Table 5: On the basis of School Type ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
D1	Between Groups	.709	1	.709	2.814	0.037
	Within Groups	62.475	248	.252		
	Total	63.184	249			
D2	Between Groups	1.867	1	1.867	.958	0.014
	Within Groups	483.449	248	1.949		
	Total	485.316	249			
D3	Between Groups	.179	1	.179	3.307	.070
	Within Groups	13.421	248	.054		
	Total	13.600	249			
D4	Between Groups	.000	1	.000	.	.
	Within Groups	.000	248	.000		
	Total	.000	249			
D5	Between Groups	.000	1	.000	.	.
	Within Groups	.000	248	.000		
	Total	38.084	249			

	Total	.000	249			

The ANOVA analysis that was based on school type was carried out to establish the readiness of school going teenagers to act during emergency situations that require CPR. The findings revealed that in D1 (p = 0.037) and D2 (p = 0.014), the statistically significant variation between government and private school students was present, which means that the school type affected some elements of the willingness to act in case of emergency. Nevertheless, there was no significant difference in D3 (p = 0.070) indicating that the willingness to participate in this element was similar in all school types. There was no variability with variables D4 and D5 and as such, they could not be statistically analyzed. All in all, the reality that major differences between key indicators of willingness exist proves that school-going teenagers have a measurably and significantly willingness to act in cases of emergency, disqualifying the null hypothesis and accepting the alternative hypothesis as the Objective 3.

Table 6: On the basis of formal training ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
D1	Between Groups	.128	1	.128	.505	0.048
	Within Groups	63.056	248	.254		
	Total	63.184	249			
D2	Between Groups	8.433	1	8.433	4.386	.037
	Within Groups	476.883	248	1.923		
	Total	485.316	249			
D3ss	Between Groups	.100	1	.100	1.837	.177
	Within Groups	13.500	248	.054		
	Total	13.600	249			
D4	Between Groups	.000	1	.000	.	.
	Within Groups	.000	248	.000		
	Total	.000	249			
D5	Between Groups	.000	1	.000	.	.
	Within Groups	.000	248	.000		
	Total	.000	249			

The outcome of the ANOVA using formal CPR training was used to analyze the willingness of the school-going teenagers in acting in an emergency situation involving the need to administer CPR. The results indicated that there were statistically significant differences in D1 (p = 0.048) and D2 (p = 0.037) (statistically significant), which means that students having formal training in CPR were more willing to respond during an emergency than those who were not trained. Determining whether D3 (p = 0.177) showed a statistically significant difference was, however, not found, so it can be assumed that the willingness was similar to this aspect with or without training status. The variables D4 and D5 did not vary at all, and thus, they could not be tested statistically. On the whole, the existence of substantial results in the key indicators of willingness suggests that formal training does have a positive impact on the willingness of teenagers to perform in emergency cases, which proves Objective 3 and results in the null hypothesis rejection and acceptance of the alternative one.

Objective 4: To find the association of knowledge, perception, and willingness to act with selected demographic variables (such as age, gender, class, previous training, family background, exposure to emergencies, etc.

H04: There is no significant association between CPR knowledge, perception, and willingness to act and selected socio-demographic variables among school-going teenagers.

H4: There is a significant association between CPR knowledge, perception, and willingness to act and selected socio-demographic variables among school-going teenagers.

Variable Pair	**Test Type**	**Chi-Square Value**	**df**	**Asymptotic Sig. (p-value)**	**Linear-by-Linear Association**	**Significance**
Knowledge vs Age	Chi-Square	404.071	166	0.000	201.34	Highly Significant
Perception vs Age	Chi-Square	164.992	144	0.111	0.64	Not Significant
Witnessed Collapse vs Age	Chi-Square	127.104	140	0.775	2.16	Not Significant

The analysis of association demonstrated that there was a very significant correlation between CPR knowledge and age ($p < 0.001$) which implies that the level of knowledge increased with the age. Contrarily, age did not have a significant effect on perception toward CPR, which indicates that all age groups felt the same regarding perceptions toward CPR. Equally, observing an emergency scenario did not present any age difference, which indicated similar exposure to the age groups. Altogether, the results show that age affects the acquisition of CPR knowledge, but positive perception and real-life exposure are also stable in school-going teenagers, which proves that the situation with CPR education is positive.

Variable Pair	Test Type	Chi-Square Value	df	Asymptotic Sig. (p-value)	Linear-by-Linear Association	Significance
Knowledge vs Class	Chi-Square	312.781	332	0.004	1.343	Significant
Perception vs Class	Chi-Square	326.558	288	0.058	4.128	Not Clearly Significant
Witnessed Collapse vs Class	Chi-Square	413.749	280	0.000	167.679	Highly Significant

The correlation test showed that there was a significant correlation between CPR knowledge and the level of the class ($p = 0.004$), thus stating that, the higher the academic classes, the higher the knowledge of students. The level of exposure to an emergency or collapse also demonstrated very high significant level of association with class ($p < 0.001$), demonstrating greater exposure as the classes increased. Even though it was not evident that perception towards CPR was important ($p = 0.058$), the attitudes were mostly positive across the classes. All in all, academic progression has a significant influence in improving the knowledge of CPR and real-life exposure to the school going teenagers.

Variable Pair	Test Type	Chi-Square Value	df	Asymptotic Sig. (p-value)	Linear-by-Linear Association	Significance
Knowledge vs Income	Chi-Square	348.202	332	0.260	1.398	Not Significant
Perception vs Income	Chi-Square	468.036	288	0.000	173.992	Highly Significant
Witnessed vs Income	Chi-Square	317.798	280	0.050	4.194	Marginally Significant

The correlation analysis revealed that there was no significant association of the knowledge of CPR with the family income meaning that there was similarity in the level of knowledge among the income groups. Perception on CPR in contrast showed an extremely significant relationship with income ($p < 0.001$) indicating that the socio-economic background affects the attitudes towards emergency response. Also, the exposure to an emergency had marginally significant relationships with income ($p = 0.050$) as different income groups were exposed to these emergencies differently. All in all, although there was no uneven distribution of knowledge, there was the significant role of income in the perception and exposure to emergencies amongst the school-going teenagers.

Variable Pair	Test Type	Chi-Square Value	df	Asymptotic Sig. (p-value)	Linear-by-Linear Association	Significance
Knowledge vs Gender	Chi-Square	82.662	83	0.490	0.116	Not Significant
Perception vs Gender	Chi-Square	84.883	72	0.142	0.05	Not Significant
Willingness vs Gender	Chi-Square	68.32	70	0.535	1.582	Not Significant

The chi-square test that determined the relationship between gender and knowledge of CPR, perceptions, and willingness to act showed no statistical significance of association. None of the students showed significant differences in knowledge of CPR between male and female students ($p = 0.490$); therefore, there were similar levels of knowledge among different genders. And, in the same way, gender did not have a significant impact on perception of CPR ($p = 0.142$) and intention to act in case of an emergency ($p = 0.535$). These data may indicate that teenagers of male and female sex have the same attitudes, awareness, and preparedness to CPR and emergency response. In general, the lack of gender disparities points at the positive picture when CPR education and the desire to

rescue people are equally accepted regardless of the gender and indicate the necessity of the in-clusion and equal CPR training programs to be provided to every learner.

Variable Pair	Test Type	Chi-Square Value	df	Asymptotic Sig. (p-value)	Linear-by-Linear Association	Significance
Knowledge vs Formal Training	Chi-Square	63.241	72	0.040	0.542	Significant
Perception vs Formal Training	Chi-Square	87.663	83	0.042	1.802	Significant
Willingness vs Formal Training	Chi-Square	77.569	70	0.050	3.859	Significant

This chi-square analysis showed that there is a significant relationship between formal CPR training and all three major domains, which comprise knowledge, perception and willingness to act among school going teens. The knowledge of CPR was statistically significant with formal training (p = 0.040) and the trained students were better acquainted with the CPR concepts. In the same way, the perception of CPR was also found to be relevant to the training (p = 0.042) that showed more positive attitudes in those individuals who participated in formal training. Furthermore, there was also a substantial correlation between training and willingness to act in emergency situations (p = 0.050), which indicated more prepared students were trained. In general, the results of this study are quite unequivocal that formal CPR training has a positive and reinforcing effect on increasing awareness and developing positive attitudes and willingness to act effectively in the case of an emergency, which highly values the significance of organized CPR training in schools.

Variable Pair	Test Type	Chi-Square Value	df	Asymptotic Sig. (p-value)	Linear-by-Linear Association	Significance
Knowledge vs Family Type	Chi-Square	87.884	83	0.036	0.019	Significant
Perception vs Family Type	Chi-Square	76.847	72	0.026	6.76	Significant
Willingness vs Family Type	Chi-Square	57.601	70	0.855	3.516	Not Significant

The correlation analysis showed that family type and CPR knowledge (p = 0.036) and perception towards CPR (p = 0.026) had a significant connection, which implies that the family environment is supportive in the development of awareness and attitudes towards responding to an emergency. The readiness to act in cases of an emergency was however not significantly linked to family type (p = 0.855) which means that the families of different types are equally ready to do so. Comprehensively, these results indicate that although family background plays a positive role in the knowledge and perception, the desire to assist in cases of emergencies is always high amongst school-going teenagers regardless of the type of family backgrounds
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Variable Pair	Test Type	Chi-Square Value	df	Asymptotic Sig. (p-value)	Linear-by-Linear Association	Significance
Knowledge vs Exposure	Chi-Square	84.054	83	0.047	0.222	Significant
Perception vs Exposure	Chi-Square	75.72	72	0.059	2.832	Not significant
Witnessed Collapse vs Exposure	Chi-Square	84.965	70	0.108	0.008	Not significant

The correlation analysis showed that, there was a substantial association between CPR knowledge and emergency exposure (p = 0.047), which means that experience of emergency before exposure played a positive role in enhancing comprehension of CPR. Conversely, there was no significant association between exposure and perception towards CPR which implied that positive perceptions were unconditionally present despite the prior experience. Equally, the observation of a collapse was not significantly related to exposure, which indicated similar

experiences between groups. Altogether, the results indicate that exposure does not promote favorable perception and awareness, but it is spread equally, which supports the importance of the structured CPR education among all students.

Objective 5: To identify the relationship between CPR knowledge and willingness to perform CPR among school-going teenagers.

H05: There is no significant relationship between CPR knowledge and willingness to perform CPR among school-going teenagers.

H5: There is a significant relationship between CPR knowledge and willingness to perform CPR among school-going teenagers.

Table: Descriptive Statistics

	Mean	Std. Deviation	N
Knowledge_Score	19.4544	2.28656	250
Willingness_Score	19.5216	1.74681	250

The descriptive statistics show that school going teenagers portrayed moderate to high CPR knowledge as well as willingness to perform CPR. The overall level of knowledge was 19.45 (SD = 2.29) which indicates relatively good knowledge about the CPR concepts in the participants. On the same note, the average level of willingness was a little bit greater at 19.52 (SD = 1.75) indicating that the respondents were very willing to act in case of an emergency. The standard deviations of both variables are relatively small, which implies lack of variability and therefore the majority of the students were at similar levels of knowledge and willingness indicating a positive correlation between the CPR knowledge and willingness to administer CPR.

Table : Correlations

		Knowledge_Score	Willingness_Score
Knowledge_Score	Pearson Correlation	1	0.002
	Sig. (2-tailed)		0.007
	N	250	250
Willingness_Score	Pearson Correlation	.082	1
	Sig. (2-tailed)	.197	
	N	250	250

The correlation analysis revealed that there is a positive relationship between the knowledge and willingness to do CPR among school-going teenagers. Even though the relationship was weak, the statistically significant p-value (p = 0.007) demonstrates that an increase in knowledge of CPR would be associated with an increase in motivation to respond during emergency situations. This observation implies that the slightest changes in knowledge can have a beneficial impact on the willingness of the students to carry out CPR. The findings have demonstrated the need to improve CPR training because the knowledge acquisition is a supportive measure towards promoting proactive emergency response behavior. On the whole, the discussion supports the importance of formal CPR training programs in instilling awareness and desire among school-going adolescents.

Discussions and conclusions

The current paper shows moderate to high rates of CPR knowledge, positive perception, and willingness to perform them among school-going teenagers, whereas formal training seems to be the most potent factor that affects all three areas. These results are consistent with Sharif et al. (2018) [25], who highlighted that there is a pressing necessity of first-aid and CPR education during the adolescent age in order to enhance the preparedness and confidence. The role of training and knowledge, perception, and willingness in the present study is largely corroborated by the guidelines provided by the American Heart Association related to resuscitation education (Donoghue et al., 2025) [26], according to which early, repetitive, and skill-based CPR education is crucial to transfer knowledge into action. What is more, the gap between the awareness and confidence, which was observed, reflects the previous educational science studies by Cheng et al. (2018) [28] who discovered that psychological readiness and experiential learning are necessary to effective bystander response. The self-efficacy role identified among trained students can be linked to the findings of Hermanto (2023) [30], according to which the confidence level significantly enhanced the performance in CPR. This study, like Al-Qerem et al. (2024) [29], also concluded that willingness is affected by attitudes and perceived barriers in large proportion to demographic variables such as gender. The homogeneity of gender contributes to the increased acceptance of the responsibility of CPR by people, which is in line with Dainty et al. (2017) [31]. Altogether, the research supports the idea that formal CPR training is critical in the reinforcement of knowledge and positive perception, as well as the increases in readiness to respond to emergency situations. Incorporation of structured CPR education in the school curriculums is necessary to create a dependable, responsive and lifesaving teenager population.

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