

Knowledge, Attitudes, and Practices of Student-Athletes Regarding Cardiopulmonary Resuscitation at Redeemer's University

Israel Arogundade OJO¹, Desire Ayotomide OMOTOSO², Rufus Adesoji ADESOYIN³

¹Department of Physiotherapy, Federal University of Health Sciences, Ila Orangun, Osun State, Nigeria.

²Department of Physiotherapy, Redeemer's University, Ede, Osun state, Nigeria.

³Department of Physiotherapy, Redeemer's University, Ede, Osun state, Nigeria.

Correspondence:

Israel Arogundade Ojo
Department of Physiotherapy
Federal University of Health Sciences
Ila Orangun, OsunState, Nigeria
E-mail: israel.ojo@fuhs.edu.ng, Tel: +2348036350980
ORCID: [0000-0001-9702-169X](https://orcid.org/0000-0001-9702-169X)

Abstract

Background: Cardiopulmonary resuscitation (CPR) is an emergency life-saving intervention performed during cardiac arrest, when effective circulation and normal breathing are absent. In out-of-hospital and sports-related emergencies, prompt initiation of CPR is critical to improving the likelihood of successful resuscitation and survival. Inadequate knowledge or practical skills may result in delays or errors that compromise resuscitation outcomes. **Objective:** This study assessed the knowledge, attitudes, and practices regarding CPR among sports athletes at Redeemer's University. **Methods:** A cross-sectional study was conducted among sports athletes at Redeemer's University. Data were collected using an adopted questionnaire, and 185 athletes were selected using purposive sampling. Data were analysed using SPSS version 22. **Results:** Overall, 69.2% of athletes demonstrated good CPR knowledge, 50.8% had a positive attitude, and 64.9% reported good CPR practice. However, important gaps were identified in specific aspects of CPR knowledge. Only 32.5% agreed or strongly agreed that they knew the correct compression-to-ventilation ratio, while 45.8% reported knowing how to open the airway and 46.6% understood the appropriate compression depth. Willingness to perform CPR on strangers was also limited, particularly when rescue ventilation was involved. Only 33.5% reported receiving formal CPR instruction, and 6.5% had obtained CPR certification. **Conclusion:** Although most athletes demonstrated good overall CPR knowledge and practice, important gaps remained in technical knowledge, formal training, certification, and willingness to perform CPR in certain circumstances. Regular practical, competency-based CPR training and certification may strengthen athletes' preparedness to respond effectively to cardiac emergencies.

KEYWORDS: Attitudes, Athletes, Emergency Medical Services, Heart Arrest, Cardiopulmonary Resuscitation, Sports

1. Introduction

Worldwide, cardiac arrest is a leading cause of death [1]. Sudden cardiac death (SCD) is commonly defined as death that occurs instantly, within one minute, or within 1–24 hours after the onset of symptoms [2]. Many cases of SCD occur outside the hospital in individuals who may appear to be in good health and have no known history of heart disease [2]. Approximately half of cardiovascular disease-related deaths in the United States and other developed countries are attributed to SCD, which may also represent the first manifestation of coronary artery disease [3]. Out-of-hospital cardiac arrest (OHCA) therefore remains a

major cause of mortality worldwide [4]. The prompt implementation of basic life support (BLS) can substantially improve survival, with the likelihood of survival reportedly doubling when BLS techniques are initiated promptly, while survival decreases by approximately 7–10% for every minute that cardiopulmonary resuscitation (CPR) is delayed [5, 6]. The annual incidence of OHCA has been estimated at 67–170 per 100,000 inhabitants in Europe [7] and approximately 57 per 100,000 in the United States [8]. Hamad [9] estimated the global incidence of sudden cardiac arrest (SCA) in Africa to range between 1:40,000 and 1:250,000, although the prevalence of

SCA in Nigeria remains difficult to determine because a national cardiac arrest registry is not yet available.

Cardiac arrest refers to the sudden cessation of effective cardiac activity, resulting in the loss of adequate circulation and, consequently, consciousness and spontaneous breathing. In adults, cardiac arrest is most commonly associated with a primary cardiac event [10]. Ventricular fibrillation (VF) is reported to be the most common electrical mechanism, accounting for approximately 50–80% of cardiopulmonary arrests [10]. Cardiac arrest occurs when the mechanical activity of the heart suddenly ceases or becomes insufficient to maintain effective circulation, resulting in loss of consciousness [11]. Early recognition of cardiac arrest, prompt initiation of CPR, and timely defibrillation are among the most important determinants of survival and neurological outcome following cardiopulmonary arrest [12]. Approximately 50,000 individuals may survive each year until professional medical assistance arrives when basic life support measures are appropriately performed [13].

Basic Life Support (BLS) comprises a series of emergency procedures designed to sustain life until advanced medical care becomes available. It includes early recognition of life-threatening conditions such as foreign-body airway obstruction, myocardial infarction, stroke, and sudden cardiac arrest; prompt activation of the emergency response system; initiation of CPR; and early defibrillation using an automated external defibrillator (AED), where available [14]. BLS is consequently a cornerstone of emergency care for individuals experiencing cardiac arrest [15]. Cardiopulmonary resuscitation is a core component of BLS and is performed during cardiac arrest to maintain blood flow and oxygen delivery to vital organs when effective cardiac output has ceased or become inadequate [16]. Conventional adult CPR combines chest compressions with rescue breaths, using a compression-to-ventilation ratio of 30:2. BLS also encompasses initial assessment, airway management, and rescue breathing [16]. Timely recognition of cardiac arrest, immediate initiation of BLS and CPR, and rapid activation of emergency medical services are particularly important in out-of-hospital settings, where a trained bystander may be required to provide life-sustaining intervention before professional help arrives [16–18].

The importance of CPR is particularly relevant to athletes because sudden cardiac arrest can occur during or around strenuous physical activity, including among individuals who appear physically fit and healthy. Athletes may have previously undiagnosed cardiac conditions that predispose them to SCA, particularly during vigorous exercise [19]. The increased physiological demands associated with high-intensity exercise may increase the risk of SCA in susceptible individuals, highlighting the importance of preparedness and CPR competence among athletes [20]. SCA has been identified as an

important cause of medically related death among athletes and may occur irrespective of age or apparent physical fitness [20]. Young athletes at increased risk may have subtle cardiomyopathies or inherited arrhythmia syndromes that remain clinically unrecognised until a cardiac event occurs [21]. Although regular physical activity is associated with a reduced long-term risk of cardiovascular disease, vigorous exercise may transiently increase the risk of SCA in susceptible individuals [22]. This apparent contradiction has been described as the “Exercise Paradox,” whereby the cardiovascular benefits of regular exercise coexist with a transiently increased risk of sudden cardiac events during strenuous physical activity [23]. Certain sporting disciplines may account for a substantial proportion of SCA events among young athletes. Almost 75% of reported cases of SCA in young athletes occur among basketball and football players, and several high-profile incidents involving professional athletes have increased public awareness of the potential for cardiac arrest during sporting activities [24]. The cardiac arrest suffered by Damar Hamlin during an American football game brought considerable attention to the importance of an effective Emergency Action Plan (EAP) and the availability of immediate resuscitation measures [25]. Similarly, the cardiac arrest experienced by Danish footballer Christian Eriksen during a European Championship match demonstrated the potential value of prompt CPR and AED use by trained personnel in restoring cardiac rhythm [26]. In Nigeria, a notable incident involved a 23-year-old football player, Martins, who collapsed during a match on 8 March 2020 while playing for Nasarawa United in the Nigeria Professional Football League [27]. Such incidents underscore the importance of emergency preparedness at sporting venues and the need for athletes and other members of sporting teams to possess adequate knowledge, positive attitudes, and practical competence in CPR.

Despite the importance of immediate bystander intervention, evidence suggests that many athletes may not possess adequate CPR knowledge or skills. According to [28], a considerable proportion of athletes lack the knowledge and skills required to perform CPR effectively, potentially increasing vulnerability during sporting events where cardiac emergencies may occur. Similarly, surveys have reported that 67.86% of athletes had never received previous bystander CPR training, indicating a substantial gap in CPR preparedness among athletes in Nigeria [27, 28]. Furthermore, even among individuals who have received CPR training, retention of knowledge and confidence to act during an emergency may be limited [28]. These gaps in knowledge, training, confidence, and practical preparedness may reduce the likelihood of timely and appropriate intervention during cardiac emergencies and highlight the need for strategic CPR education and competency-based training among athletes.

University athletes represent an important population for CPR education because they participate regularly in organised sporting activities and may be present at sporting venues where emergency cardiac events occur. Assessing their knowledge, attitudes, and practices can provide useful information regarding their preparedness to respond to cardiac emergencies and identify specific areas requiring targeted intervention. However, the available evidence does not establish the current level of CPR-related knowledge, attitudes, and practices among athletes at Redeemer's University. This study was therefore designed to assess the knowledge, attitudes, and practices regarding CPR among selected sports athletes at Redeemer's University and to examine the relationship between these domains and the socio-demographic characteristics of the athletes. The findings may provide a basis for developing targeted, practical CPR training and certification programmes aimed at strengthening athletes' preparedness to respond effectively to cardiac emergencies. The study relied on self-reported questionnaire responses, which may introduce reporting and response bias, as participants may overestimate or underestimate their knowledge, attitudes, or practices regarding CPR. Nevertheless, assessing these domains provides an important baseline for identifying gaps in preparedness and informing future CPR education and training initiatives within the university community.

2. Materials and Methods

2.1. Study Participants

The study participants comprised male and female undergraduate athletes enrolled at Redeemer's University, Ede, Osun State, Nigeria, who actively participated in selected competitive sports at the university. The selected sports included football, volleyball, and basketball. A total of 185 eligible undergraduate athletes participated in the study.

2.2 Inclusion and Exclusion Criteria

Participants were eligible for inclusion if they were undergraduate students currently enrolled at Redeemer's University, were aged 18 years or older, and actively participated in competitive football, volleyball, or basketball at the university. Participants were excluded if they were unwilling or unable to provide informed consent or did not actively participate in any of the selected sports.

2.3 Study Setting

The study was conducted at Redeemer's University, Ede, Osun State, Nigeria. Participant recruitment and questionnaire administration were undertaken at the university sports complex.

2.4 Research Design

A descriptive cross-sectional study design was employed to assess the knowledge, attitudes, and practices regarding bystander cardiopulmonary resuscitation (CPR) among undergraduate athletes at Redeemer's University.

2.5 Sampling Technique

Purposive sampling was employed to recruit eligible athletes participating in the selected sports. Athletes who met the inclusion criteria were approached during the data-collection period and invited to participate. Those who provided informed consent were enrolled in the study.

2.6 Sample Size Determination

The sample size was determined using the Taro Yamane formula:

$$n = \frac{N}{1 + N(e^2)}$$

where n is the required sample size, N is the study population, and e is the margin of error.

For a study population of 315 athletes and a margin of error of 0.05:

$$= \frac{315}{1 + 315(0.05^2)}$$

An additional 5% was added to account for possible non-response or incomplete questionnaires:

$$176.2 + (0.05 \times 176.2) = 185.011$$

Thus, the final sample size was approximately 185 participants. A total of 185 questionnaires were administered and all 185 were retrieved, giving a 100% response rate.

2.7 Research Instrument

Data were collected using a structured questionnaire assessing knowledge, attitudes, and practices regarding bystander CPR among athletes. The questionnaire was adopted from the study titled "*Knowledge, attitudes, practices, and self-efficacy of the Chinese public regarding cardiopulmonary resuscitation: an online cross-sectional survey*" [29]. The questionnaire comprised 31 items divided into four sections. Section A (Items 1–5) collected socio-demographic information, including age, gender, and type of sport. Section B (Items 6–17) assessed CPR knowledge and comprised 12 items. Section C (Items 18–27) assessed attitudes towards CPR and comprised 10 items, while Section D (Items 28–31) assessed CPR-related practice and comprised four items.

2.8 Validity and Reliability of the Instrument

The content validity of the questionnaire was assessed by seven experts in emergency medicine and emergency nursing. The resulting content validity index (CVI) was 0.95. Prior to the main study, a pilot study involving 50 participants was conducted to assess the internal consistency reliability of the instrument. The questionnaire demonstrated a Cronbach's alpha coefficient of 0.92, indicating high internal consistency.

2.9 Scoring and Classification of Responses

The knowledge, attitude, and practice sections were scored using a five-point response scale, while the socio-demographic section was not scored. The knowledge section comprised 12 items, with a maximum obtainable score of 60. Scores of 31–60 were classified as good knowledge, whereas scores of ≤ 30 were classified as poor knowledge. The attitude section comprised 10

items, with a maximum obtainable score of 50. Scores of 26–50 were classified as positive attitude, whereas scores of ≤ 25 were classified as negative attitude. The practice section comprised four items, with a maximum obtainable score of 20. Scores of 10–20 were classified as good practice, whereas scores of <10 were classified as poor practice.

2.10 Ethical Considerations and Data Collection Procedure

Ethical approval was obtained from the Directorate of Research, Innovation and Partnerships at Redeemer’s University, Ede (RUN/REC/2025/PHT/013). Prospective participants were informed about the purpose and procedures of the study, and participation was voluntary. Written informed consent was obtained from participants before questionnaire administration. Printed copies of the questionnaire were administered to eligible athletes at the Redeemer’s University sports complex. Participants were drawn from different academic levels and the selected sports. The completed questionnaires were retrieved by the researchers for analysis.

2.11 Data Analysis

Data were entered and analysed using IBM SPSS Statistics version 22.0. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarise participants’ characteristics and responses to questionnaire items. Pearson’s chi-square test was used to examine associations between categorical variables, including CPR knowledge, attitude, and practice classifications and selected socio-demographic and training-related variables. Statistical significance was set at $p < 0.05$.

3. Result

3.1 Response Rate and Socio-Demographic Characteristics

A total of 185 questionnaires were administered and all 185 were retrieved, giving a response rate of 100% (Table 1). The participants comprised 113 males (61.1%) and 72 females (38.9%). Most participants were aged 18–21 years (68.6%), while 26.5% were aged 22–25 years and 4.9% were aged 26–30 years. Football players constituted the largest proportion of participants (60.5%), followed by basketball players (20.5%) and volleyball players (18.9%). Only 62 participants (33.5%) reported having attended a CPR course, while 123 (66.5%) had not. Twelve participants (6.5%) held a CPR certificate, whereas 173 (93.5%) did not.

3.2 Knowledge of Cardiopulmonary Resuscitation

Participants generally reported favourable perceptions of their CPR knowledge (Table 2). Most agreed or strongly agreed that CPR should be initiated promptly when breathing and heartbeat suddenly stop (90.3%), that they could assess whether a patient was breathing (82.2%), and that patting and calling the patient loudly was important (76.8%). However, substantial uncertainty was observed regarding several technical aspects of CPR. Only 46.5% agreed or strongly

agreed that they knew the appropriate depth of chest compressions, while 45.9% agreed or strongly agreed that they knew how to open the airway. Similarly, only 32.5% agreed or strongly agreed that they knew the correct compression-to-ventilation ratio for a single rescuer, whereas 38.9% were uncertain. These findings indicate that, despite generally favourable self-reported CPR knowledge, important gaps remained in specific technical components of CPR. Overall, 128 participants (69.2%) had good CPR knowledge, whereas 57 (30.8%) had poor knowledge based on the predefined scoring criteria (Table 3).

Table 1. Socio-Demographic and CPR Training Characteristics of Participants (n = 185)

Variable	Category	n	%
Age (years)	18–21	127	68.6
	22–25	49	26.5
	26–30	9	4.9
Gender	Male	113	61.1
	Female	72	38.9
Sport	Football	112	60.5
	Volleyball	35	18.9
	Basketball	38	20.5
Attended a CPR course	Yes	62	33.5
	No	123	66.5
Holds a CPR certificate	Yes	12	6.5
	No	173	93.5

3.3 Attitudes Towards Cardiopulmonary Resuscitation

Participants demonstrated generally positive attitudes towards CPR (Table 4). Most agreed or strongly agreed that timely first aid could save lives (91.9%), that providing assistance to others was a virtue (95.7%), and that learning CPR was necessary (98.4%). Similarly, 98.4% supported the provision of first-aid equipment in public places, while 96.2% supported regular CPR training in schools, communities, and workplaces. A large proportion (92.9%) expressed willingness to participate in CPR knowledge and skills training, and 94.1% indicated an interest in learning CPR. Overall, the findings indicate a favourable attitude towards CPR training and bystander intervention among the participants. Based on the predefined scoring criteria, 94 participants (50.8%) had a positive attitude towards CPR, while 91 (49.2%) had a negative attitude (Table 5).

Table 2. Self-Reported Knowledge of Cardiopulmonary Resuscitation Among Participants (n = 185)

CPR statement	Strongly disagree, n (%)	Disagree, n (%)	Uncertain, n (%)	Agree, n (%)	Strongly agree, n (%)
CPR should be performed as soon as possible when breathing and heartbeat suddenly stop	3 (1.6)	2 (1.1)	13 (7.0)	91 (49.2)	76 (41.1)
I know how to assess whether a patient is breathing	3 (1.6)	8 (4.3)	22 (11.9)	95 (51.4)	57 (30.8)
I know why it is important to pat and call the patient loudly	2 (1.1)	8 (4.3)	33 (17.8)	98 (53.0)	44 (23.8)
I know where to apply pressure during CPR	5 (2.7)	12 (6.5)	41 (22.2)	85 (45.9)	42 (22.7)
I know how to recognise cardiac arrest in a patient	4 (2.2)	18 (9.7)	70 (37.8)	63 (34.1)	30 (16.2)
I know the correct technique for applying pressure during CPR	5 (2.7)	23 (12.4)	59 (31.9)	67 (36.2)	31 (16.8)
I know the recommended number of compressions per minute during CPR	8 (4.3)	23 (12.4)	58 (31.4)	64 (34.6)	32 (17.3)
I know how to determine whether a patient's rescue has been successful	4 (2.2)	15 (8.1)	60 (32.4)	73 (39.5)	33 (17.8)
I know the appropriate depth of chest compressions during CPR	10 (5.4)	28 (15.1)	61 (33.0)	54 (29.2)	32 (17.3)
I know the correct sequence for performing CPR	5 (2.7)	32 (17.3)	57 (30.8)	64 (34.6)	27 (14.6)
I know the correct way to open a patient's airway	9 (4.9)	38 (20.5)	53 (28.6)	57 (30.8)	28 (15.1)
I know the recommended compression-to-ventilation ratio when performing CPR as a single rescuer	19 (10.3)	34 (18.4)	72 (38.9)	36 (19.5)	24 (13.0)

Table 3. Overall CPR Knowledge Among Participants (n = 185)

Knowledge level	Score range	n	%
Poor	≤30	57	30.8
Good	31–60	128	69.2
Total		185	100.0

Table 4. Attitudes Towards Cardiopulmonary Resuscitation Among Participants (n = 185)

Attitude statement	Strongly disagree, n (%)	Disagree, n (%)	Uncertain, n (%)	Agree, n (%)	Strongly agree, n (%)
If I can provide timely first aid, I may save someone's life	0	3 (1.6)	12 (6.5)	88 (47.6)	82 (44.3)
I consider it a virtue to render aid to others	0	1 (0.5)	7 (3.8)	98 (53.0)	79 (42.7)
I believe that learning CPR is necessary	0	0	3 (1.6)	91 (49.2)	91 (49.2)
First-aid equipment should be provided in public places	0	1 (0.5)	2 (1.1)	72 (38.9)	110 (59.5)
Schools, communities and workplaces should regularly conduct CPR training	0	3 (1.6)	4 (2.2)	84 (45.4)	94 (50.8)
CPR is not solely the responsibility of medical personnel	1 (0.5)	6 (3.2)	8 (4.3)	82 (44.3)	88 (47.6)
CPR should be taught in schools	0	2 (1.1)	7 (3.8)	67 (36.2)	109 (58.9)
I am willing to participate in CPR knowledge and skills training	0	1 (0.5)	12 (6.5)	70 (37.8)	102 (55.1)
Chest compressions are an important life-saving measure during cardiac arrest	0	1 (0.5)	14 (7.6)	87 (47.0)	83 (44.9)
I am interested in learning CPR knowledge and skills	0	3 (1.6)	8 (4.3)	69 (37.3)	105 (56.8)

3.4 Cardiopulmonary Resuscitation-Related Practices

Participants reported greater willingness to perform CPR for family members, friends, or acquaintances than for strangers (Table 6). For a family member, friend, or acquaintance experiencing sudden cardiac or respiratory arrest, 84.3% agreed or strongly agreed that they would perform chest compressions, while 78.3% expressed willingness to provide ventilation. For a stranger, willingness was lower: 74.0% agreed or strongly agreed that they would perform chest compressions, while 66.5% agreed or strongly agreed that they would provide ventilation. Uncertainty was particularly notable for ventilation in strangers (29.7%). These findings suggest that willingness to provide CPR may be influenced by the relationship between the responder and the person requiring assistance, with rescue ventilation representing a particular

area of hesitation. Based on the predefined scoring criteria, 120 participants (64.9%) were classified as having good CPR-related practice, while 65 (35.1%) were classified as having poor CPR-related practice (Table 7).

Table 5. Overall Attitude Towards CPR Among Participants (n = 185)

Attitude	Score range	n	%
Negative	≤25	91	49.2
Positive	26–50	94	50.8
Total		185	100.0

Table 6. Willingness to Perform CPR in Different Emergency Scenarios (n = 185)

Scenario	Strongly disagree, n (%)	Disagree, n (%)	Uncertain, n (%)	Agree, n (%)	Strongly agree, n (%)
Willing to perform chest compressions on a family member/friend/acquaintance	2 (1.1)	2 (1.1)	25 (13.5)	85 (45.9)	71 (38.4)
Willing to perform ventilation on a family member/friend/acquaintance	1 (0.5)	3 (1.6)	36 (19.5)	80 (43.2)	65 (35.1)
Willing to perform chest compressions on a stranger	0	4 (2.2)	44 (23.8)	82 (44.3)	55 (29.7)
Willing to perform ventilation on a stranger	1 (0.5)	6 (3.2)	55 (29.7)	74 (40.0)	49 26.5)

Table 7. Overall CPR-Related Practice Among Participants (n = 185)

Practice level	Score range	n	%
Poor	<10	65	35.1
Good	10–20	120	64.9
Total		185	100.0

3.5 Association Between Attendance at a CPR Course and CPR Knowledge, Attitude and Practice

Table 8 shows the association between attendance at a formal CPR course and the participants’ levels of CPR knowledge, attitude, and practice. There was a statistically significant association between attendance at a CPR course and CPR knowledge ($\chi^2 = 29.507$, $df = 1$, $p < 0.001$). Among participants who had attended a CPR course, 59 (95.2%) demonstrated good knowledge, compared with 69 (56.1%) among those who had not attended a CPR course. Attendance at a CPR course

was also significantly associated with attitude towards CPR ($\chi^2 = 4.097$, $df = 1$, $p = 0.043$), with 38 (61.3%) of those who had attended a course demonstrating a positive attitude compared with 56 (45.5%) among those who had not. However, there was no statistically significant association between attendance at a CPR course and CPR practice ($\chi^2 = 0.157$, $df = 1$, $p = 0.692$). Good practice was reported by 39 (62.9%) participants who had attended a CPR course and 81 (65.9%) of those who had not.

Table 8. Association Between Attendance at a CPR Course and CPR Knowledge, Attitude and Practice

Outcome	Attended course, n	CPR Did not attend CPR course, n	χ^2	df	P-value
Poor knowledge	3	54	29.507	1	<0.001
Good knowledge	59	69			
Negative attitude	24	67	4.097	1	0.043
Positive attitude	38	56			
Poor practice	23	42	0.157	1	0.692
Good practice	39	81			

Note: Pearson's chi-square test; statistical significance set at $p < 0.05$

3.6 Association Between CPR Knowledge and CPR-Related Practice

Table 9 presents the relationship between CPR knowledge and CPR-related practice among the participants. Among participants with poor CPR knowledge, 36 (63.2%) demonstrated good practice, while 21 (36.8%) demonstrated poor practice. Similarly, among those with good CPR knowledge, 84 (65.6%) demonstrated good practice and 44 (34.4%) demonstrated poor practice. There was no statistically significant association between CPR knowledge and CPR-related practice ($\chi^2 = 0.105$, $df = 1$, $p = 0.746$). Thus, the level of CPR knowledge was not significantly related to the participants’ classification of CPR-related practice in this study.

3.7 Association Between Socio-Demographic Characteristics and CPR Knowledge

Age was significantly associated with CPR knowledge ($\chi^2 = 7.422$, $df = 2$, $p = 0.024$). Attendance at a CPR course was also significantly associated with knowledge ($\chi^2 = 29.507$, $df = 1$, $p < 0.001$), as was possession of a CPR certificate ($\chi^2 = 5.714$, $df = 1$, $p = 0.017$). In contrast, neither gender ($\chi^2 = 0.149$, $df = 1$, $p = 0.699$) nor sport participation ($\chi^2 = 0.237$, $df = 2$, $p = 0.888$) was significantly associated with CPR knowledge (Table 10).

Table 9. Association Between CPR Knowledge and CPR-Related Practice

CPR knowledge	Poor practice, n (%)	Good practice, n (%)	Total, n (%)
Poor knowledge	21 (36.8)	36 (63.2)	57 (100.0)
Good knowledge	44 (34.4)	84 (65.6)	128 (100.0)
Total	65 (35.1)	120 (64.9)	185 (100.0)

Table 10. Association Between Participant Characteristics and CPR Knowledge

Variable	Category	Poor knowledge, n	Good knowledge, n	χ^2	df	P-value
Age (years)	18–21	47	80	7.422	2	0.024
	22–25	8	41			
	26–30	2	7			
Gender	Male	36	77	0.149	1	0.699
	Female	21	51			
Sport	Football	36	76	0.237	2	0.888
	Volleyball	10	25			
	Basketball	11	27			
Attended CPR course	Yes	3	59	29.507	1	<0.001
	No	54	69			
CPR certificate	Yes	0	12	5.714	1	0.017
	No	57	116			

Note: Pearson's chi-square test; significance set at $p < 0.05$.

4. Discussion

This study assessed CPR knowledge, attitudes, and self-reported CPR-related practice among undergraduate athletes at Redeemer's University and examined their relationships with selected socio-demographic characteristics and previous CPR training. The participants were predominantly young adults, with 68.6% aged 18–21 years, while males constituted 61.1% of the sample. Football players represented the largest proportion of participants (60.5%), followed by basketball (20.5%) and volleyball (18.9%). Although 69.2% of participants were classified as having good CPR knowledge

and 64.9% as having good self-reported CPR-related practice, only 50.8% were classified as having a positive attitude. Importantly, substantial gaps were identified in specific technical aspects of CPR, while previous formal CPR training and certification were relatively uncommon. These findings indicate that general awareness and willingness to respond do not necessarily equate to comprehensive technical knowledge or objectively demonstrated CPR competence.

4.1 Participant Characteristics and Previous CPR Training

The predominance of participants aged 18–21 years is consistent with the expected age distribution of undergraduate athletes. Similarly, [30] reported that most athletes in German amateur football clubs were between 18 and 25 years of age. The predominance of young adults in the present study provides an important opportunity for institution-based CPR education, as university athletes can potentially be reached through organised sports programmes and campus-based training initiatives.

Males constituted 61.1% of the participants in the present study. This finding is broadly consistent with the male predominance reported in studies of sudden cardiac arrest among athletes, although [31] reported a substantially higher proportion of males among athletes experiencing sudden cardiac arrest. However, the present study was not designed to investigate the incidence or determinants of sudden cardiac arrest. Therefore, the sex distribution observed in this sample should not be interpreted as reflecting differential risk of cardiac arrest. Instead, CPR education and emergency preparedness should be made accessible to both male and female athletes.

Football players constituted 60.5% of the study population, while basketball and volleyball players accounted for 20.5% and 18.9%, respectively. The predominance of football participation is consistent with the observation by [32] that football is commonly represented within institutional sports programmes. The substantial representation of football and other competitive sports in the present study highlights the importance of ensuring that athletes have access to appropriate emergency preparedness measures, including CPR and automated external defibrillator (AED) training. An important finding was the limited exposure to formal CPR training. Only 33.5% of participants reported having attended a CPR course, while only 6.5% held a CPR certificate. Thus, most participants had no reported formal CPR training or certification. This finding is consistent with [32], which identified deficiencies in CPR training and emergency preparedness in some youth sports programmes. The low certification rate is particularly relevant because it indicates limited exposure to formal competency-based CPR education. However, certification alone cannot be assumed to represent sustained CPR

competence, particularly when skills are not periodically reinforced.

4.2 Cardiopulmonary Resuscitation Knowledge Among Athletes

Participants demonstrated relatively high self-reported knowledge of some basic CPR concepts. Most participants agreed or strongly agreed that CPR should be initiated promptly when breathing and heartbeat suddenly stop. Similarly, a large proportion reported knowing how to assess whether a patient was breathing and recognised the importance of patting and calling the patient loudly. These findings indicate relatively high awareness of the need for early recognition and intervention during a cardiac emergency.

However, substantial gaps were observed in more specific technical aspects of CPR. Although 68.6% of participants agreed or strongly agreed that they knew where to apply pressure during CPR, only 53.0% reported knowing the correct technique for applying pressure. Similarly, only 46.5% agreed or strongly agreed that they knew the appropriate depth of chest compressions, while 49.2% reported knowing the correct sequence for performing CPR. Knowledge of airway management was also limited, with only 45.9% agreeing or strongly agreeing that they knew the correct way to open a patient's airway.

The most notable gap concerned the compression-to-ventilation ratio for a single rescuer. Only 32.5% of participants agreed or strongly agreed that they knew the correct ratio, while 38.9% were uncertain. This finding indicates that, despite relatively favourable responses to general CPR concepts, considerable uncertainty remained regarding specific technical procedures.

These findings highlight an important distinction between self-reported awareness and technical CPR knowledge. A participant's confidence in knowing a CPR procedure does not necessarily establish that the individual can correctly perform that procedure. Similar gaps in practical CPR knowledge have been reported among young sports participants [33]. Incorrect technique during an actual cardiac arrest may compromise the effectiveness of resuscitation, making practical training an important complement to theoretical knowledge.

The relatively high self-reported confidence in assessing breathing should also be interpreted cautiously. [35] reported substantial improvement in CPR knowledge among young people following structured CPR training, suggesting that formal instruction can strengthen both knowledge and confidence. However, because the present study relied on questionnaire responses rather than direct assessment using a CPR manikin, the reported confidence of participants should not be interpreted as evidence of objectively demonstrated competence.

The findings further support the importance of repeated and practical CPR education. [32] reported poor knowledge of CPR protocols among individuals without recent training and highlighted the potential for knowledge to decline over time. Similarly, [36] demonstrated improvements in CPR knowledge among schoolchildren following a single session of hands-only CPR training. These findings suggest that practical, simulation-based training may provide an effective approach for addressing the technical gaps identified among university athletes.

4.3 Attitudes Towards Cardiopulmonary Resuscitation

The participants generally expressed favourable views towards CPR. A large majority regarded providing assistance to others as a virtue, while almost all participants agreed that learning CPR was necessary. Similarly, there was strong support for the availability of first-aid equipment in public places and for regular CPR training in schools, communities, and workplaces. The finding that 91.9% of participants agreed or strongly agreed that CPR should not be considered solely the responsibility of healthcare professionals is particularly relevant. This finding is consistent with [34], which reported strong support for layperson involvement in emergency response. Recognition of CPR as a responsibility that can extend beyond healthcare professionals is important because cardiac arrest frequently occurs outside healthcare facilities, where immediate intervention may depend on bystanders.

The high proportion of participants willing to participate in CPR training is also encouraging. A total of 92.9% expressed willingness to participate in CPR knowledge and skills training, while 94.1% indicated an interest in learning CPR. This represents an important opportunity for implementing CPR education within the university sports environment. Findings from [35] and [36] similarly indicate that CPR education can improve perceptions, confidence, and willingness to respond to cardiac emergencies.

Nevertheless, the overall attitude classification showed that only 50.8% of participants had a positive attitude. The difference between the high levels of agreement with individual attitude statements and the overall classification may reflect the scoring criteria used to categorise attitude. Therefore, both the individual responses and the composite classification should be considered when interpreting the participants' attitudes towards CPR.

4.4 Self-Reported CPR-Related Practice and Willingness to Respond

Participants reported greater willingness to perform CPR on familiar individuals than on strangers. For a family member, friend, or acquaintance experiencing sudden cardiac or respiratory arrest, 84.3% agreed or strongly agreed that they would perform chest compressions, while 78.3% expressed willingness to provide ventilation. These findings suggest

relatively high perceived readiness to intervene when the potential recipient is someone known to the participant.

Willingness was lower when the potential recipient was a stranger. Although 74.0% of participants agreed or strongly agreed that they would perform chest compressions on a stranger, only 66.5% expressed willingness to provide ventilation. Uncertainty was also more pronounced in these situations, particularly regarding ventilation. This pattern may reflect concerns about intervening with unfamiliar individuals or reluctance towards rescue ventilation.

Similar observations have been reported elsewhere. [36] found that hands-only CPR, which involves chest compressions without mouth-to-mouth ventilation, may be more acceptable to some potential bystanders. This finding highlights the importance of CPR education that addresses barriers to bystander intervention and provides appropriate information regarding available approaches to CPR.

The relatively high level of uncertainty regarding CPR for strangers is also noteworthy. In the present study, 23.8% of participants were uncertain about performing chest compressions on a stranger, while 29.7% were uncertain about providing ventilation. [38] similarly identified confidence and retraining as important considerations in maintaining emergency-response readiness among lay responders. Periodic refresher training and scenario-based simulation may therefore help reduce hesitation and improve perceived preparedness.

Importantly, the practice component of this study assessed self-reported willingness to perform CPR rather than directly observed CPR performance. Consequently, the findings should be interpreted as reflecting perceived readiness or willingness to respond and should not be equated with objectively demonstrated CPR competence. Future studies should incorporate practical manikin-based assessments to determine whether reported willingness corresponds to effective CPR performance.

4.5 Relationship Between CPR Knowledge and Self-Reported CPR-Related Practice

There was no statistically significant association between CPR knowledge and self-reported CPR-related practice ($\chi^2 = 0.105$, $df = 1$, $p = 0.746$). Good self-reported practice was observed among 65.6% of participants with good knowledge and 63.2% of those with poor knowledge. Thus, the proportion classified as having good self-reported practice was similar across the two knowledge categories.

This finding suggests that higher self-reported CPR knowledge was not necessarily accompanied by greater self-reported willingness to perform CPR. The observation is noteworthy because previous studies have reported improvements in CPR knowledge and willingness following structured training [35,36]. However, those studies differed from the present investigation in design and outcome assessment. The current

study was cross-sectional and did not assess changes before and after a training intervention.

The absence of a statistically significant relationship should therefore not be interpreted as evidence that CPR knowledge is unimportant. Rather, it suggests that knowledge may represent only one component of preparedness to respond to cardiac arrest. Confidence, previous practical exposure, perceived barriers, and opportunities for skills reinforcement may also influence willingness to intervene. Practical manikin training, simulation, and repeated skills assessment may therefore be necessary to complement theoretical CPR education.

4.6 Association Between Formal CPR Training and CPR Knowledge, Attitude and Practice

Attendance at a formal CPR course was significantly associated with CPR knowledge ($\chi^2 = 29.507$, $df = 1$, $p < 0.001$). Among participants who had attended a CPR course, 95.2% were classified as having good knowledge compared with 56.1% of those who had not attended a course. This substantial difference is consistent with findings from [35] and [36], which demonstrated improvements in CPR-related knowledge following structured CPR education.

Attendance at a CPR course was also significantly associated with attitude towards CPR ($\chi^2 = 4.097$, $df = 1$, $p = 0.043$). Participants who had attended a course were more likely to have a positive attitude than those without previous course attendance. This finding is broadly consistent with previous reports suggesting that CPR education may be associated with more favourable perceptions and greater readiness to respond [35, 36]. However, the cross-sectional design of the present study means that these associations cannot establish that CPR training caused the differences observed in knowledge or attitude. It is possible that individuals with greater pre-existing interest in emergency care were more likely to seek CPR training. Longitudinal or intervention-based studies would be required to establish a causal relationship.

In contrast, no statistically significant association was found between attendance at a CPR course and self-reported CPR-related practice ($\chi^2 = 0.157$, $df = 1$, $p = 0.692$). Good self-reported practice was reported by 62.9% of participants who had attended a CPR course and 65.9% of those who had not. This finding differs from studies reporting increased readiness following structured CPR training [35].

The discrepancy may partly reflect the nature of the practice measure used in the present study. The questionnaire assessed willingness to perform CPR in hypothetical emergency situations rather than objectively measuring CPR performance. In addition, previous attendance at a course does not necessarily indicate current retention of practical skills. [38] emphasised the importance of retraining and confidence in maintaining emergency-response readiness. Therefore, periodic refresher training and practical simulation may be

required to maintain CPR preparedness beyond initial training exposure.

4.7 Socio-Demographic Characteristics and CPR Knowledge

Age was significantly associated with CPR knowledge ($\chi^2 = 7.422$, $df = 2$, $p = 0.024$), indicating that the distribution of good and poor knowledge differed across the age categories. Although this finding may have implications for the design of CPR education programmes, the cross-sectional nature of the study prevents causal interpretation. In addition, the relatively small number of participants in the 26–30-year age group should be considered when interpreting this association.

Gender was not significantly associated with CPR knowledge ($\chi^2 = 0.149$, $df = 1$, $p = 0.699$). Similarly, sport participation was not significantly associated with CPR knowledge ($\chi^2 = 0.237$, $df = 2$, $p = 0.888$). These findings suggest that knowledge differences according to gender and sporting discipline were not statistically significant within this sample. CPR education should therefore be made available across genders and sporting disciplines rather than being restricted to a particular group.

Attendance at a CPR course was significantly associated with knowledge ($\chi^2 = 29.507$, $df = 1$, $p < 0.001$), while possession of a CPR certificate was also significantly associated with knowledge ($\chi^2 = 5.714$, $df = 1$, $p = 0.017$). Participants who had attended a CPR course or held a CPR certificate were more likely to be classified as having good knowledge. These findings provide further support for the potential value of formal CPR education and certification in improving CPR-related knowledge. Nevertheless, because the study was cross-sectional, the associations should not be interpreted as demonstrating that training or certification directly caused higher knowledge scores.

4.8 Implications for CPR Preparedness Among University Athletes

Overall, the findings reveal a distinction between general CPR awareness, self-reported knowledge, willingness to respond, and demonstrated competence. Although most participants were classified as having good overall knowledge and good self-reported CPR-related practice, important gaps remained in technical areas such as compression depth, CPR sequence, airway management, and compression-to-ventilation ratio. Furthermore, only one-third of participants had previously attended a CPR course, and fewer than one in ten held a CPR certificate.

These findings support the incorporation of structured CPR and BLS education into university sports programmes. Training should extend beyond theoretical instruction to include hands-on manikin practice, AED familiarisation, realistic emergency scenarios, and periodic refresher sessions. Particular attention should be given to technical areas in which participants

demonstrated substantial uncertainty and to barriers that may reduce willingness to intervene, particularly when the cardiac arrest victim is an unfamiliar person.

4.9 Strengths and Limitations

This study provides institution-specific information on CPR knowledge, attitudes, and self-reported willingness to respond among athletes participating in football, basketball, and volleyball at Redeemer's University. The inclusion of male and female athletes and assessment of previous CPR training and certification provide useful information for planning CPR education within the university sporting environment.

However, several limitations should be acknowledged. The cross-sectional design permits the identification of associations but does not establish causal relationships between CPR training and knowledge, attitude, or self-reported practice. The study also relied on self-reported questionnaire responses, which may be influenced by recall and social-desirability biases. In particular, the practice component measured willingness to perform CPR rather than objectively observed CPR performance; therefore, the findings should not be interpreted as evidence of practical CPR competence. Finally, participants were selected purposively from selected sports at a single university, which may limit the generalisability of the findings to athletes in other universities or sporting settings.

5. Conclusion

This study found that undergraduate athletes at Redeemer's University demonstrated relatively good overall self-reported CPR knowledge (69.2%) and self-reported CPR-related practice (64.9%), while 50.8% were classified as having a positive overall attitude. Despite favourable responses to several basic CPR concepts, important gaps remained in technical aspects of CPR, particularly knowledge of compression depth, CPR sequence, airway management, and the compression-to-ventilation ratio.

Previous exposure to formal CPR training was limited, with only 33.5% of participants reporting attendance at a CPR course and 6.5% holding a CPR certificate. Attendance at a CPR course was significantly associated with CPR knowledge and attitude but not with self-reported CPR-related practice. Similarly, CPR knowledge was not significantly associated with self-reported CPR-related practice. These findings indicate that knowledge and previous training exposure alone may not be sufficient to ensure willingness or preparedness to respond effectively during a cardiac emergency.

The findings support the integration of regular, competency-based CPR and BLS training into university sports programmes, incorporating practical manikin training, AED familiarisation, realistic simulation scenarios, and periodic refresher sessions. Particular attention should be directed towards technical CPR procedures and factors that may

contribute to hesitation when responding to unfamiliar individuals.

Because the present study assessed self-reported knowledge and willingness rather than objectively demonstrated CPR performance, the findings should be interpreted as indicators of perceived preparedness rather than confirmed CPR competence. Future research should incorporate direct practical assessments using validated CPR manikins and, where possible, longitudinal designs to determine whether structured training produces sustained improvements in CPR knowledge, confidence, willingness, and practical performance.

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Conflict of Interest

The Authors declare that there is no conflict of interest.

Data Availability

The datasets generated and analysed during the current study are available from the corresponding author upon reasonable request.

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