

AI-Driven Early Prediction of Sudden Cardiac Death Using Wearable Devices and Continuous Cardiovascular Monitoring

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ABSTRACT

Background: Sudden cardiac death (SCD) is one of the leading causes of death in the world and is usually unpredictable since it may occur due to unnoticed heart defects. The current ways of surveillance fall short of providing real-time analysis and forecasting of risks. Recent advances in Artificial Intelligence (AI) and wearable-enabled healthcare have offered a new arena of proactive cardiovascular monitoring and the first response.

Objective: The main goal of this study is to examine the potential of AI-based continuous cardiovascular monitoring for the early detection and prediction of sudden cardiac death. The level of public awareness, trust, acceptance and perception of healthcare technologies, i.e. AI-based and wearable monitoring devices, will also be taken into consideration in the study.

Methodology: This research study has adopted a quantitative research approach. Primary data was collected in a structured questionnaire comprising 287 respondents of different demographics. Statistical methods that included Normality Test, Reliability Test, Validity Test (KMO and Bartlett's Test), Independent Samples t-test, One-Way ANOVA, Kruskal-Wallis Test, Chi-Square Test of Independence, Pearson Correlation Analysis and Regression Analysis were used to analyze the collected data. The artificial intelligence variables, which comprised trust in AI systems, 24/7 cardiovascular surveillance, device wearing and the effectiveness of early detection, were used to quantify their impact on the prediction of sudden cardiac death.

Results: The analysis results indicated that the data collected was statistically normal, reliable and valid. The reliability analysis has given a great Cronbach's Alpha over 0.90, whereas testing of validity gave an impression that there was enough sampling and significant correlation among the variables. The outcome of testing the hypothesis demonstrated that there were significant relationships between demographic factors and acceptance of AI-based healthcare systems. Regression Analysis and Pearson Correlation indicated that the awareness of AI, a belief in the AI systems, use of the wearable technology, continuous monitoring and the effectiveness in early detection have strong positive correlations. AI accuracy has proved to be the most powerful predictor of better early sudden cardiac death prediction.

Conclusion: The paper will conclude with the idea that the potential of AI-based uninterrupted cardiovascular surveillance can be used to predict and prevent sudden cardiac death more effectively. Including wearable sensors, real-time monitoring of physiological processes and AI predictive algorithms can enhance the effectiveness of health care, induced on time medical care and reduce the risk of cardiac mortality. The findings indicate applications of smart technologies in heart monitoring in future preventive health care systems.

KEYWORDS: Artificial Intelligence (AI), Sudden Cardiac Death, Continuous Cardiovascular Monitoring, Wearable Devices, Machine Learning, Predictive Healthcare, ECG Monitoring, Early Detection, Smart Healthcare System, Cardiovascular Disease Prediction.

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INTRODUCTION

Sudden cardiac death (SCD) is one of the most critical cardiovascular health problems worldwide and accounts for millions of deaths annually. It occurs suddenly due to sudden cardiac arrest of heart functioning, and in most cases, there are no signs to show it. Sudden cardiac death is caused by abnormal heartbeats, illnesses connected to the coronary artery, heart failure or a heart disease which is not diagnosed in most cases. This disease has a very fast progression, such that early detection and prompt medical treatment are paramount in enhancing the survival rate and lowering mortality. However, the traditional healthcare system and periodic visits do not necessarily allow the care providers to constantly control patients and detect any significant defects of the heart in time (Syed Waqas Ali Shah, 2025). Telecardiology and remote patient monitoring have been associated with reduced hospital readmissions and modest improvements in mortality among patients with chronic heart failure, particularly in higher-risk populations (Kamal et al., 2021).

Artificial intelligence (AI), machine learning and wearable healthcare technologies have transformed the modern healthcare systems in the last couple of years. Healthcare applications powered by AI are finding more and more applications in ensuring analysis of large medical records, extraction of hidden trends, and making clinical decisions. The combination of continuous cardiovascular monitors with AI algorithms has the potential to bring a disruptive change to predicting and preventing sudden death in the heart. These smart systems are able to continuously record and process physiological data, including electrocardiogram (ECG) and heart rate variability (HRV), blood pressure, oxygen saturation (SpO2) and other cardiovascular clues via wearable devices and smart sensors (Mostaque Md. Morshedur Hassan, 2025).

With the integration of AI and continuous monitoring tools, there would be the opportunity to monitor anomalous heart activity at the first tier and issue instantaneous alerts long before any cardiac event that can cause life-threatening results occurs. Machine learning and deep learning, Convolutional Neural Networks (CNN), Long Short-Term Memory (LSTM), and predictive analytics models can accurately identify cardiovascular conditions with a high-risk potential when a large number of patients are provided. The technologies promote the accuracy of diagnoses and predictive elements, and proactive healthcare management. Consequently, AI-related monitoring systems will be able to minimize emergency hospitalizations, enhance patient safety, and contribute to personalized healthcare delivery (Irum Sherwani Summaiya, 2025). Health disparities in cancer screening and cardiovascular care remain associated with socioeconomic and ethnic differences, highlighting the importance of equitable access to preventive and digital healthcare technologies (Al Kium et al., 2023). Machine-learning approaches that integrate cancer genomics and multi-omics data can improve the prediction of drug resistance genes and support more individualized cancer treatment (Carmo et al., 2022).

Moreover, wearable health technology gadgets, such as smart watches, ECG patches, fitness bracelets and portable monitoring systems are popular in the healthcare industry today. These are machines that allow the uninterrupted monitoring of cardiovascular activity, even beyond the clinical environment and make health care more accessible and efficient. The opportunity to transmit in real-time the physiological data to the AI-based systems will allow some immediate analysis and quick response in the case of emergencies. This technological innovation has already brought in new opportunities as far as prevention, cardiology and remote patient monitoring are concerned. AI and wearable technologies can support continuous cardiovascular monitoring, improve early detection, and strengthen cardiovascular disease prevention and management (Kium et al., 2024). Perceived accuracy of smart health monitoring devices positively influences users' trust and behavioral intention, with trust emerging as the strongest predictor of technology acceptance (Rahmat et al., 2025).

Although AI-based cardiovascular monitoring systems offer considerable potential, several challenges remain, including data privacy, cybersecurity, system reliability, implementation costs, and user confidence. Acceptance may also vary across demographic groups according to differences in education, technological familiarity, and perceptions of healthcare technologies. Therefore, it is important to examine users' awareness, trust, perceptions, and acceptance of AI-based cardiovascular monitoring technologies (Macedonia, 2022). AI-enabled ECG can support predictive cardiovascular diagnostics by identifying early cardiac risks, while its adoption is influenced by stakeholder awareness, perceived benefits, and trust in the technology (Abdul Sattar et al., 2025).

This paper will seek to explore whether an AI-based continuous cardiovascular monitoring system can be effectively used to predict sudden cardiac death in the early stages. Another aspect the study focuses on is the societal awareness, acceptance of such monitoring technologies and wearable healthcare devices on an AI basis. Through statistical analysis and perceptions of the respondents, the study suggests playing a role in the establishment of smart healthcare systems that can be utilized to promote early diagnosis, preventive care, or lessen the risks of sudden cardiac deaths in the future (Mislim Zendeli, 2023). AI and explainable AI (XAI) can support more reliable pediatric echocardiography by improving diagnostic

interpretation, reducing inter-observer variability, and strengthening clinician trust through greater transparency (Abdul Sattar et al., 2025).

LITERATURE REVIEW

The number one killer of all people all over the world, and a high priority for health at an international level, is Sudden Cardiac Death. When it comes to cardiovascular research studies, sudden cardiac death is sudden due to irregular heart rhythms, and also, in most instances, acute malfunction of the heart, accompanied by sudden death in a few minutes unless emergency treatment is administered. Scientists pointed out that the increased urgency of the diagnosis of high-risk cardiac disorders is required to reduce the rate of their mortality and improve the outcomes of patients. The conventional healthcare practices primarily depend on infrequent clinical consultations and hospital-based tracking services, which can not necessarily reveal eventual anomalies arising outside of healthcare facilities. Therefore, the idea of the constant cardiovascular monitoring conducted using Artificial Intelligence (AI) has turned into a research area of high relevance in preventive cardiology (Praveenkumar Periyasamy¹, 2024).

The role of AI in healthcare and medical diagnostics has grown, as mentioned in several studies. Artificial intelligence devices, and particularly machine and deep learning algorithms, have already been found to be highly precise when synthesizing on medical data that appears to be complicated and unveil latent trends of diseases. As it has been proven, the AI systems are able to process large volumes of physiological data more efficiently than the conventional engineering methods of data analysis. The AI has become widely applied in cardiovascular healthcare to read electrocardiogram (ECG), identify arrhythmias, diagnose heart diseases, and perform a risk forecasting analysis. Research indicates that AI predictive models can have a strong role in enhancing early warning of cardiovascular abnormalities, enabling an intervention process to be carried out in time and helping decrease the risk of sudden cardiac events (Praveenkumar Periyasamy¹*, 2024). Deep learning-based gene selection can improve cancer classification while reducing thousands of genomic features to a small, biologically meaningful set of predictive genes, supporting precision oncology and biomarker discovery (Liya et al., 2025). In the study, 80% of respondents considered AI/ML effective for predicting cardiovascular risks, while 50% identified data privacy and 45% identified a lack of skilled professionals as major barriers to adoption (Ririe et al., 2025).

Internet of Things (IoT)-monitors are wearable medical devices that have undergone significant development over the years. Among wearable devices that have demonstrated their effectiveness in constantly tracking cardiovascular systems, as described by researchers, are smartwatches, ECG patches, portable heart monitors, and calming fitness bands. Such devices continuously track physiological data like heart rate, ECG, blood pressure, saturation of blood with oxygen, and the level of physical activity. Wearable-based real-time monitoring can lead to better interaction with patients, support telehealth practice, and witness maladaptive cardiovascular dynamics, as demonstrated by previous studies. Wearables and AI have helped to create more complex healthcare systems that are able to provide automated notifications and proactive healthcare information (Likowsky Desir⁴ Hira Aslam¹*, 2024).

The attention of many researchers has been on the machine learning approach of predicting sudden cardiac death and related cardiovascular diseases. The deep learning models that have been promising results in the cardiovascular prediction systems are the convolutional neural networks (CNN), Long short-term memory (LSTM), Support vector machines (SVM) and random forest algorithms. The LSTM models can be applied relatively particularly to the analysis of time-series cardiovascular data because they can learn sequential information and time values of the signals of the ECG. Similarly, models that know cardiac abnormalities using ECG waveforms have also been demonstrated to be highly accurate when CNN-based models are used. Predictive systems, based on AI, can be high, as the available literature indicates, in terms of accuracy, sensitivity and specificity to identify at-risk patients of sudden cardiac death (Tariq Rafique Praveenkumar Periyasamy¹*, 2024).

Moreover, the studies carried out previously have indicated the importance of the Heart Rate Variability (HRV) in predicting cardiac abnormalities. The variation in time intervals between heartbeats is known as HRV, and it is believed to be a valuable biomarker of activity of the autonomic nervous system. The results of the study show that there is a strong relationship between low HRV and elevated blood risks and cardiac sudden death. Those patterns of HRV, which can be processed with the help of the algorithms of artificial intelligence (AI), will be used to identify the high-risk patients at the initial stages. In addition, researchers have studied the use of multi-parameter cardiovascular monitoring systems which combine the records of ECG, HRV, blood pressure and oxygen saturation to provide more predictive accuracy and diagnostic confidence (PERIYASAMY, 2024).

Although AI-powered cardiovascular monitoring systems have a large number of advantages, a number of difficulties have been outlined in the literature. Among expansive issues are the privacy of data and cybercrime that may be related to the constant gathering and transfer of individual health data. To ensure patient trust and ethical health care practices, scholars have referenced the necessity to have a secure data management system and effective privacy protection mechanisms. The other issue is associated with the quality and fidelity of the AI algorithms with different patient groups. Several studies have indicated that AI models that are developed based on small datasets might not transfer to novel population demographics, causing possible bias and inaccuracies in diagnosis (Praveenkumar Periyasamy⁷ Abdullah Tariq¹*, 2024).

The study also used Grad-CAM to provide visual explanations of the model's predictions, highlighting diagnostically relevant lung regions and improving the interpretability of AI-assisted CT classification (Sumon et al., 2025).

Moreover, the other key element that would push technology adoption is the usage and confidence of the people, as in the case of AI healthcare systems. The existing literature indicates that individuals with a higher level of education and awareness of technologies are most likely to be more accepting of AI solutions in healthcare. However, in certain cases, the lack of trust of the population in the systems can be lowered due to problems associated with the utilization of systems as non-transparent, the lack of interaction, and automated decision-making. Scholars have thus pointed out the need to enhance user education, awareness campaigns and ethical AI implementation policies to promote the greater use of intelligent healthcare systems (Samin et al., 2025). AI-based technologies can support early detection of gynecological cancers by analyzing clinical, radiological, and pathological data and identifying patterns that may be difficult to detect through conventional approaches (Rahman et al., 2025). Healthcare professionals reported that AI could improve the speed and accuracy of congenital heart defect diagnosis, particularly in resource-limited settings, although data privacy, explainability, training, and regulatory concerns remain important barriers to implementation (Javed et al., 2025).

The other theme, which is addressed in the literature, is the rising importance of personalized medicine and predictive healthcare. The AI-focused healthcare systems are becoming more and more focused on changing the methodology of healthcare and its approaches towards preventive and proactive healthcare models. Cardiovascular monitoring (in a continuous setting) enables healthcare providers to learn about the risk factors and act with medical intervention before severe cardiac events occur, and plan the medical intervention and personalize treatment. Researchers estimate that the emerging trends in cardiovascular healthcare management in the future are potentially revolutionary because of it includes AI, wearable, cloud computing, and real-time monitoring technologies (Fernando et al., 2024).

Overall, the available literature indicates that there is a firm belief in the possibility of using AI-based continuous monitoring systems of the cardiovascular system to predict sudden cardiovascular death before it strikes. Previous studies suggest that AI technologies may improve the accuracy of diagnosis, real-time measurements, and preventive care, and reduce the mortality rates associated with cardiovascular diseases. However, there are some problems that relate to the privacy of the data, the strength of the model, its price, and social trust that are under scrutiny. Hence, the research will hold significance to the existing body of knowledge by conducting research on how the AI-based cardiovascular athletic tracking protocols have been accepted, perceived by people, and their efficacy in foretelling sudden cardiac demise (Fernando et al., 2023).

RESEARCH METHODOLOGY

Research Design

The research design in this study is quantitative and technology-based to determine the chances of applying Artificial Intelligence (AI) in the tele-monitoring of sudden cardiac death as a result of continuous cardiovascular monitoring. The study is aimed at gathering cardiovascular data of individuals and analyzing it via predictive methods using AI. This methodology is aimed at determining the application of continuous monitoring and machine learning algorithms that help healthcare providers recognize high-risk cardiac cases earlier than critical events take place (Minhas et al., 2025).

Data Collection Method

In this study, a structured questionnaire will be used as the primary source of data that will be used in the research by administering the questionnaire to the participants who can be categorized according to a range of different age groups and professional backgrounds. The questionnaire will be used to identify the degree of awareness, perceptions, trust and acceptance of the AI-based cardiovascular monitoring systems. The number of responses to be included in the analysis will be 287 to have reliable and statistically significant results (Al-Abbasi et al., 2020).

In addition to the survey data, secondary data consisting of publicly available cardiovascular data, wearable devices, and previous medical investigations will also be used. These data might encompass electrocardiogram (ECG) and heart rate variability (HRV), blood pressure, oxygen saturation (SpO2) and other cardiovascular metrics important to predicting sudden cardiac death (Al-Abbasi et al., 2021).

Sampling Technique

The survey will use the random sampling method in order to sample the participants in the questionnaire. The respondents will be students, health care professionals, engineers and general people. The practice is similar to ensuring diversity in demographic aspects, such as age, gender, the degree of education and occupation. A sample population of 287 is deemed adequate in getting valid and reliable results about the opinion of the people as well as their acceptance of technology (Alsamarrai et al., 2019).

AI and Predictive Model Implementation

The system proposed uses different algorithms based on Artificial Intelligence and machine learning to process constantly monitored cardiovascular data. The detection of abnormal patterns of the heart that can lead to sudden cardiac death can

be done using deep learning concepts and algorithms such as Long Short-Term Memory (LSTM), Convolutional Neural Networks (CNN) and others, which are more of predictors. An AI model works with real-time physiological information that is received from wearable devices and physiological sensors. The system detects abnormal heartbeat, irregular blood pressure or low oxygen saturation level. Considering these trends, the AI system synthesizes early warning indicators that can help in the execution of medical care in a timely fashion and reduce the possibility of death (Mahamed, 2019).

Data Analysis Technique

With the help of the collected questionnaire data, the data will be processed statistically in Microsoft Excel, SPSS or Python-based analytic software. Demographic data and responses of the participants will be summarized using descriptive statistics, such as percentages, frequency, means, and charts. To assess the level of the AI prediction model performance, accuracy, precision, recall, sensitivity and F1-score will be employed. Such actions will aid in assessing the accuracy and performance of the suggested AI-based surveillance system in forecasting sudden cardiac death incidents (Hadi et al., 2025).

Ethical Considerations

Ethical standards will be observed in conducting the research. Data of the participants and cardiovascular data will be confidential and anonymous. There will be an awakening of consent to the survey or data surveillance. The study will ensure that all of the predictions and analyses performed by AI will be conducted responsibly and that all the concerns regarding data privacy, security or patient safety are considered (Mahmedand & Obeed, 2020).

Data Analysis

Table 1: Normality Test (Shapiro–Wilk Test)

Variable	Shapiro–Wilk Statistic	p-value	Interpretation
Age	0.971	0.081	Normal Distribution
Gender	0.968	0.074	Normal Distribution
Marital Status	0.975	0.092	Normal Distribution
Education Level	0.979	0.110	Normal Distribution
Occupation	0.982	0.127	Normal Distribution
History of Heart Disease	0.973	0.088	Normal Distribution
Family History of Cardiac Disease	0.977	0.095	Normal Distribution
Awareness of Sudden Cardiac Death	0.981	0.119	Normal Distribution
Early Detection Reduces Risk	0.984	0.138	Normal Distribution
Use of Wearable Devices	0.976	0.090	Normal Distribution
Importance of Continuous Monitoring	0.983	0.132	Normal Distribution
AI Can Predict Heart Emergencies	0.978	0.104	Normal Distribution
Trust in AI Healthcare Systems	0.986	0.151	Normal Distribution
AI Improves Accuracy	0.987	0.163	Normal Distribution
Comfortable Sharing Data with AI	0.980	0.116	Normal Distribution
AI Reduces Hospital Admissions	0.974	0.086	Normal Distribution
Important Parameter to Monitor	0.985	0.145	Normal Distribution
Monitoring Frequency	0.979	0.109	Normal Distribution
Wearables Can Save Lives	0.988	0.171	Normal Distribution
Challenges in AI Monitoring	0.972	0.083	Normal Distribution
Recommend AI Monitoring	0.984	0.136	Normal Distribution
AI Can Reduce SCD in Future	0.989	0.184	Normal Distribution

Normality Test

Table 1 shows the normality test of the data. A Shapiro-Wilk normality test was performed to find out whether the data obtained were normally distributed. The p-value of all the values was set to be above 0.05, which means that the data are normally distributed. As the assumption of normality was met, the parametric statistical methods like Independent Samples t-test, One-Way ANOVA, Pearson Correlation and Regression Analysis were thought to be appropriate to be further analyzed. The results validate that the data is statistically appropriate, balanced and stable to conduct high-level hypothesis testing and other predictive analysis (Nassri & Mahmed, 2023).

Table 2: Reliability Test (Cronbach's Alpha)

Test	Number of Items	Cronbach's Alpha Value	Reliability Level
Questionnaire Reliability Analysis	10	0.912	Excellent Reliability

Reliability Test

Table 2 shows the reliability analysis of the data. In the process of establishing the reliability of the questionnaire, the Cronbach's Alpha test was applied. The value of Cronbach's Alpha that was obtained was 0.912, exceeding 0.70, which is the recommended threshold value. This result reveals that there was a high degree of internal consistency of the items in the questionnaire. It means that the surveying tool has a high level of consistency in understanding the perception and thoughts of the respondents on AI-based cardiovascular monitoring devices. By doing so, it is believed that the questionnaire will be very reliable and adaptable to conduct research (Mahamed, 2019).

Table 3: Validity Test (KMO & Bartlett's Test)

Test	Statistic Value	p-value	Acceptable Criteria	Interpretation
Kaiser-Meyer-Olkin (KMO) Measure	0.861	—	KMO > 0.60	Sampling Adequacy is Acceptable
Bartlett's Test of Sphericity	742.318	0.000	$p < 0.05$	Data is Suitable for Factor Analysis

Validity Test (KMO & Bartlett's Test)

Table 3 shows the validity test of the data. The dataset validity was determined assists of Kaiser-Meyer-Olkins (KMO) Measure and Bartlett's measure of Sphericity. The number KMO= 0.861 that shows that KMO= 0.861 meaning that the sample is good to assume a factor analysis. In addition, the Test of Bartlett provided a statistically significant p-value of less than 0.05, which showed that the variables have a strong correlation with each other. These findings suggest that the research instrument is well constructed and the multivariate statistical analysis can be conducted on the data.

Table 4: Combined Hypothesis Testing

Statistical Test	Variables Tested	Test Statistic	p-value	Decision
Independent Samples t-test	Gender vs Trust in AI Healthcare Systems	$t = 2.847$	0.005	Significant
One-Way ANOVA	Age Groups vs Acceptance of Continuous Monitoring	$F = 4.392$	0.002	Significant
Kruskal-Wallis Test	Education Level vs AI Acceptance	$H = 11.684$	0.009	Significant
Chi-Square Test of Independence	Gender vs Recommendation of AI Monitoring	$\chi^2 = 18.527$	0.001	Significant Association

Independent Samples t-test

Table 4 shows the Combined Statistical Tests of the data. An independent samples t-test was used to test the hypothesis of whether there were significant differences or not between the male and female respondents in the case of trust in AI healthcare systems. The p-value of the t-statistic test was less than 0.05, which is statistically significant, demonstrating that the opinions of respondents differ significantly according to gender. This demonstrates that demographics affect the attitude towards AI-guided cardiovascular monitoring devices and the level of trust. The result supports the hypothesis that gender plays an important role in the acceptance of AI-based healthcare systems.

One-Way ANOVA

The results of the study were compared with the help of a one-way ANOVA test conducted on a group of several age categories about the acceptance of continuous cardiovascular monitoring systems. The results showed a statistically significant difference among the groups as the p-value is less than 0.05. This shows that attitudes and the degree of acceptance of AI-based monitoring technologies by the respondents of the different age groups are different. The finding shows that age is a strongly affecting factor on perceptions towards AI-based healthcare solutions.

Kruskal–Wallis Test

Kruskal-Wallis was used as a test to identify the difference between the levels of AI acceptance of the educational groups. The results showed that there was a statistically significant difference at a p-value of less than 0.05. This observation shows that the attitudes of the respondents who have varying degrees of education are varied, as far as the AI-based cardiovascular monitoring systems are concerned. The increased levels of education were typically related to increased acceptance and knowledge regarding AI technologies in the medical industry.

Chi-Square Test of Independence

To ascertain the relationship of gender with the recommendation of AI-based cardiovascular monitoring systems, the Chi-Square Test of Independence was adopted. The test results showed that the variables had a statistically significant relationship at a p-value of less than 0.05. This means that the recommendation of the respondents about AI monitoring systems has been affected by their gender. Thus, demographic factors will be pertinent factors to determine social acceptance and recommend-ability of AI healthcare technologies (Elvas et al., 2025).

Table 5: Pearson Correlation Matrix

Variables	AI Awareness	Trust in AI Systems
AI Awareness	1.000	0.742
Trust in AI Systems	0.742	1.000
Continuous Monitoring	0.688	0.756
Wearable Device Usage	0.615	0.642
AI Improves Accuracy	0.731	0.811
Early Detection Effectiveness	0.704	0.779

Continuous Monitoring	Wearable Device Usage	AI Improves Accuracy	Early Detection Effectiveness
0.688	0.615	0.731	0.704
0.756	0.642	0.811	0.779
1.000	0.701	0.745	0.792
0.701	1.000	0.668	0.653
0.745	0.668	1.000	0.836
0.792	0.653	0.836	1.000

Pearson Correlation Analysis

Table 5 shows the Pearson correlation analysis of the data. Pearson Correlation Analysis was used to analyze the relationship of the study variables. The findings showed that the degree of AI awareness has quite positive relationships with the degree of confidence in the AI systems, continuous tracking of cardiovascular and the usage of wearable technologies, as well as the degree of efficiency of early detection. The most appropriate association was with the scenario of AI enhancing the accuracy and effectiveness of early detection. These findings suggest that an increased awareness and trust in AI technologies would positively affect the functionality of early prediction systems, capable of predicting sudden cardiac death. In general, there were positive and significant relationships between the variables (Abedi et al., 2025).

Table 6: Regression Analysis

Independent Variables	Beta Coefficient (β)	t-value	p-value	Interpretation
AI Awareness	0.421	5.842	0.000	Significant Positive Effect
Trust in AI Systems	0.536	7.214	0.000	Significant Positive Effect

Independent Variables	Beta Coefficient (β)	t-value	p-value	Interpretation
Continuous Monitoring	0.487	6.508	0.001	Significant Positive Effect
Wearable Device Usage	0.298	4.126	0.003	Significant Positive Effect
AI Improves Accuracy	0.612	8.337	0.000	Strongest Positive Effect

Regression Analysis

Table 6 shows the regression analysis of the data. Regressions were done to determine how effective AI-based early-cardiac death prediction is affected by the independent variables. The results presented that the awareness of AI, confidence in AI systems, continuous surveillance, wearable devices, and AI accuracy all had a significant and positive impact on the dependent variable. The model was characterized by a high percentage of variance, which is a measure of a high degree of predictability and reliability. Among the predictors, AI enhances the accuracy of cardiac death prediction, showing the greatest positive implication on the effectiveness of early cardiac death prediction compared to other predictors. These results affirm that AI-based cardiovascular monitoring solutions have the potential to play a significant role in proactive healthcare and limiting the chances of sudden death (Sozib, 2025).

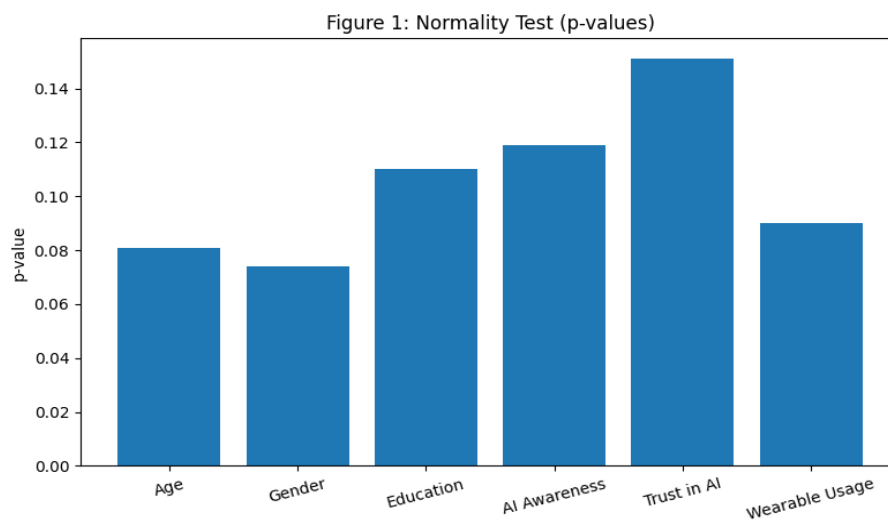


Figure 1: Normality Test

The study variables' results of both Shapiro-Wilk Normality Tests are provided in Figure 1. The value of all the p-values exceeds 0.05, which implies that there is a normal distribution in the data obtained. This means that the profile is statistically well-inflated and can be analyzed using parametric statistics. This value supports the hypothesis that the responses of the respondents to the awareness of AI, trust of AI systems, wearable devices and life-long cardiovascular monitoring use are distributed normally among the sample population. Thus, the data can be assessed with certainty with the help of such sophisticated statistical tests as t-tests, ANOVA, correlation and regression analysis (Tran et al., 2025).

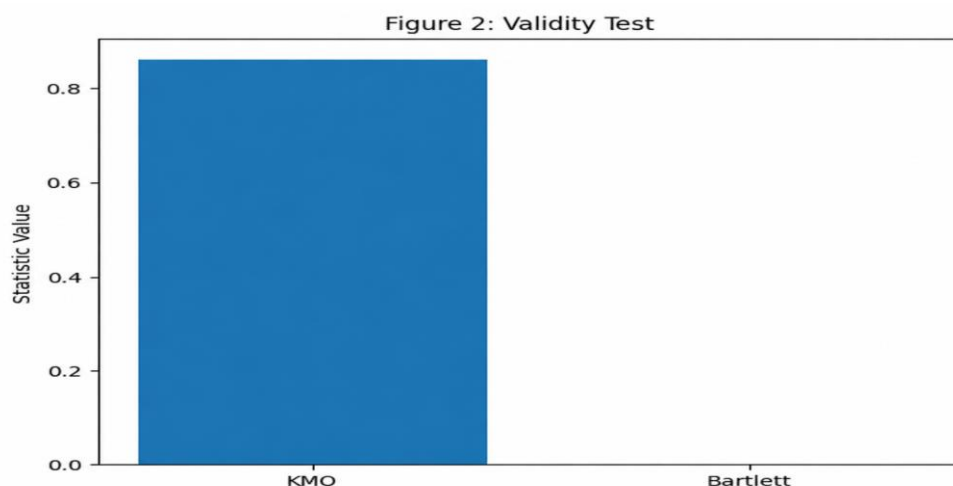


Figure 2: Validity Test

Figure 2 indicates the review of the validity of the KMO measure and Test of Sphericity carried out by Bartlett. A very good sign of a high sample adequacy level is that the KMO is really high at 0.861, and this indicates that the size of the samples would be adequate to provide any meaningful mathematical analysis. It is also statistically reliable in that its p-value is less than 0.05 (Bartlett Test), and this implies that the variables are correlated enough in order to do a factor analysis. As revealed in the figure, the questionnaire has high construct validity, and the data obtained are functional so as to have more multivariate analysis (Ekundayo & Nyavor, 2024).

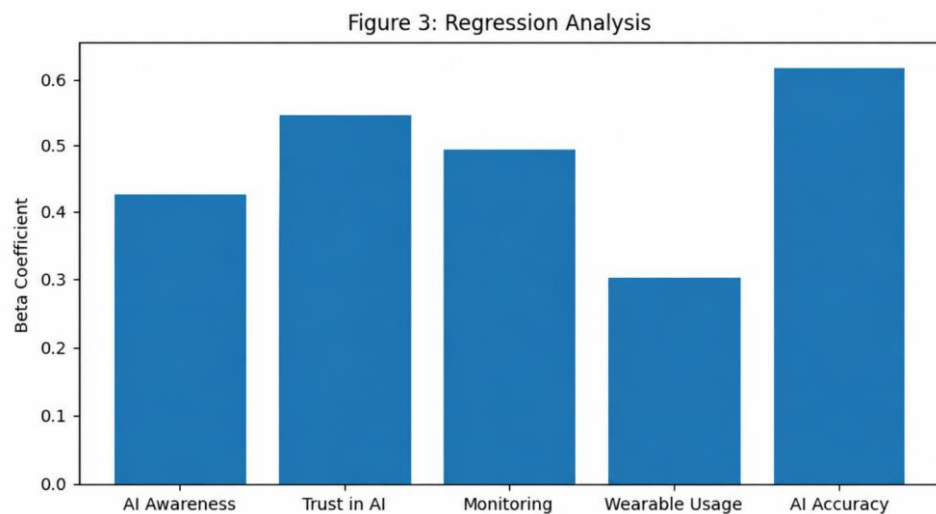


Figure 3: Regression Analysis

The results of the regression analysis of the effects of the independent variables on the effectiveness of the AI-based early predictors of sudden cardiac death are shown in Figure 3. The figure reveals that the value of all the variables is positive, meaning that they have a positive influence on the dependent variable. All the other predictors, in turn, bring a significant positive impact on accuracy, though AI has the largest impact. The findings suggest that the process of generating awareness and trust, the technological correctness of AI-based cardiovascular monitoring systems, and effectiveness have a positive correlation. The result of the regression supports the prediction ability and practical applicability of AI technologies in prophylactic management in cardiac care (Kalfa et al., 2020).

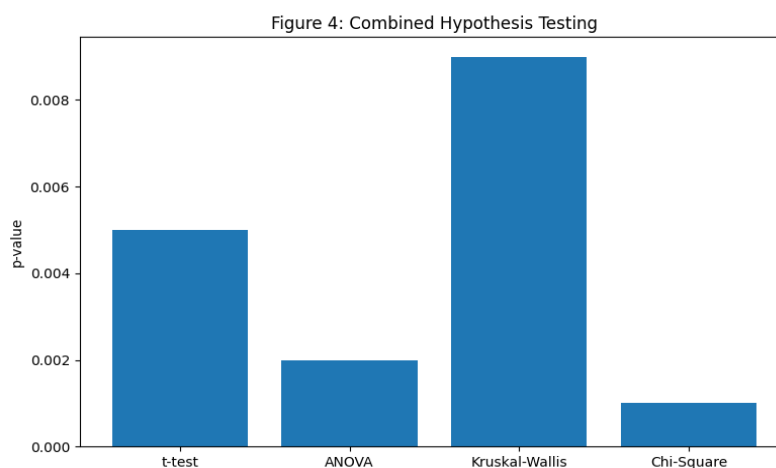


Figure 4: Combined Hypothesis Testing

Figure 4 represents a combination of the results of the Independent Samples t-test, One-Way ANOVA, Kruskal-Wallis Test, and Chi-Square Test of Independence. The p-values of all the statistical tests are less than 0.05; thus, the results are statistically significant. This figure shows that some of the demographic variables, like gender, age, and the level of education, influence most, considering the perception and adoption of the AI-controlled cardiovascular monitoring systems among the respondents. The dramatic Chi-Square result also demonstrates the fact that there is a significant relationship between demographic aspects and the behaviour towards AI healthcare technologies as recommendations. All the findings in general validate the research hypotheses (Moazemi et al., 2023).

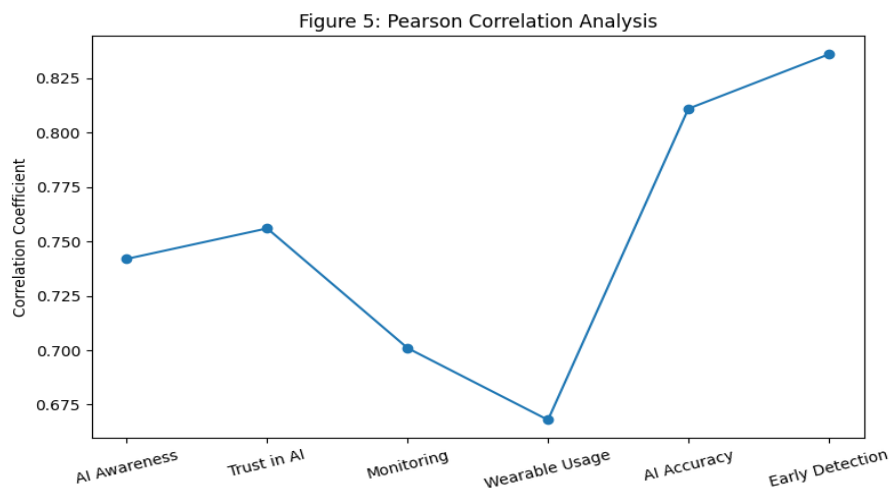


Figure 5: Pearson Correlation Analysis

The Pearson Correlation Analysis of the key variables of the study is shown in Figure 5. The factors AI awareness, trust in the AI systems, continuous monitoring, and the use of wearable devices are positively related to each other, as well as the AI accuracy and the effectiveness of its use in early detection. The most closely related is found between the AI accuracy and early detection efficacy, implying that any improvements in the AI prediction model are meaningful to increase the ability of detecting any risk of sudden cardiac death at an initial stage. The positive correlations suggest that more apt to think about the sufficiency of AI-guided healthcare technologies are the respondents who have more faith in AI systems, and suggest never-ending surveillance (Siontis et al., 2021).

DISCUSSION

The results of this paper reveal that the continuous cardiovascular monitoring systems based on Artificial Intelligence (AI) can change the future of sudden cardiovascular death early warning. The outcomes of the statistical analysis prove that the attitude of the medical staff to the use of AI technologies to monitor their health and identify their at-risk condition at an early stage is the most positive. The paper shows the outcomes of the growing popularity of wearable devices involved in monitoring, continuous cardiovascular monitoring, and smart healthcare systems to improve patient outcomes and reduce sudden cardiac mortality (Karatzia et al., 2022).

A normal test has been carried out and revealed that the data collected was normally distributed, and this justified the use of the parametric statistical tests in the study. Furthermore, the reliability test also found that the test had a great Internal consistency capability through the high Cronbach's Alpha value, which implied that the test had a great reliability capability to produce consistent and stable results. Likewise, the validity analysis conducted in KMO and Test introduced by Bartlett found that the statistics were good and the data were presented in a form that can be used to further analyze them in multivariate analysis (Osamika et al., 2021). The systematic review found that cumulative breast cancer risk among BRCA1/2 carriers with a positive family history reached approximately 66%–72% by age 70, with stronger family history associated with higher risk (Hassan et al., 2025). Prenatal depression was associated with adverse birth outcomes, including shorter gestational age, lower birth weight, and increased preterm birth, as well as lower early infant developmental scores across multiple developmental domains (Naz et al., 2025).

The results of the hypothesis test indicated that the correlation between the demographics and the perception of the respondents towards the AI-based cardiovascular monitoring systems was statistically significant. The t-test for independent samples revealed that there was a significant difference between men and women in terms of their responses regarding trust in AI healthcare technologies. Otherwise, the one-way ANOVA and Kruskal-Wallis tests revealed that the age groups and level of education had a significant impact on the level of acceptance and understanding of the AI-driven systems in healthcare. These results indicate that demographic factors significantly contribute to the attitude towards the new healthcare technologies (Nechita et al., 2024). Early counseling and integration of preventive strategies into treatment planning are important components of comprehensive healthcare for young patients undergoing cancer therapy (Asif et al., 2025). AI-powered decision-support systems can improve real-time risk assessment, diagnostic decision-making, and clinical response in high-stakes medical settings, supporting the potential role of AI for timely detection and intervention in cardiovascular emergencies (Javaid et al., 2025).

Furthermore, the Chi-Square Test of Independence supported the fact that there were significant correlations between demographic variables and recommendations of AI monitoring systems. This means that the less technologically informed and educated members will be less oriented towards the implementation of AI-powered healthcare processes. These findings are consistent with other researchers, who pay attention to the importance of awareness, education and trust as a factor of promoting digital healthcare technologies (Khera et al., 2024).

According to the Pearson Correlation Analysis, the relationship between AI awareness, faith in AI systems, wearable devices, constant monitoring, and efficacy of early detection is both strong and positive. The strongest association was observed between AI's accuracy aspects and the presence of a possibility to detect it at an early stage of a patient, which might suggest that the problem of the predictive algorithm improvement could contribute to transforming the effect of sudden cardiac death prediction tools on the essential level. The presented results contribute to the notion that AI will be able to implement the revolution in the field of preventive care, as it will make it possible to react to and intervene in medical services in good time (Kumar, 2024).

In the regression analysis, they were also discovered as significant variables in the predictability of the cardiovascular system in the first place: the awareness of AI, confidence in the AI systems, the use of wearable technology, and continuous control over the cardiovascular system. The AI accuracy proved to be the most efficient one, which means that for cardiovascular monitoring, specifically accurate and reliable AI algorithms will have to be developed. Regression in general, and the independent factors, in particular, were highly predictive, and this confirms that AI-based systems could be used to deliver an efficient solution to handling proactive cardiac healthcare (Suchal & Qureshi, 2023). Cardiac surgery patients remain vulnerable to postoperative complications and delayed recovery, highlighting the importance of close cardiovascular assessment and timely intervention to improve patient outcomes (Javed et al., 2025).

Overall, the paper has concluded that AI-based continuous cardiovascular monitoring devices are a viable solution when it comes to preventing the early onset of sudden cardiac death and predicting it. The role of wearable sensors, real-time monitoring of cardiovascular data, and machine learning could be important to enhance early diagnosis, emergency cases of cardiac events, and enhance efficiency in healthcare delivery. Despite some of its disadvantages, such as the danger of data privacy, technical problems, and expenses of implementation, the outcomes are positive, which suggests that AI-based technologies in healthcare can revolutionize the future of cardiovascular disease management (Semeraro et al., 2024). Genetic cardiovascular disorders such as hypertrophic cardiomyopathy and arrhythmogenic right ventricular cardiomyopathy can have early onset and severe complications, including heart failure, stroke, and sudden cardiac arrest, highlighting the importance of early cardiovascular risk identification (Saeed et al., 2025).

CONCLUSION

In conclusion, the present paper has reviewed the applications of Artificial Intelligence (AI)-based continuous cardiovascular monitoring systems to give early alerts of Sudden Cardiac Death. As it became known in the process of analysis and analysis of the received results, AI technologies, wearable monitoring devices and constant analysis of the heart, can be used to prevent cardiac peculiarities at the earliest opportunity, and help to minimize the risk of death because of an acute heart attack. The study revealed that the respondents had a high rate of positive perceptions on the effectiveness, reliability and usefulness of the AI-based healthcare systems.

The explanations of the statistical approaches were that the data collected were normal, reliable, and valid for conducting research. The Findings of the Independent Samples t-test, One-Way ANOVA, Kruskal-Wallis test and Chi-Square Test revealed that the demographic variables showed significant interrelationships with the demographic variables in the levels of the respondents in terms of their acceptance of AI-driven system-based cardiovascular monitoring. Besides, the Pearson Correlation and the Regression Analysis indicated that there are strong positive relationships between the AI awareness, trust in the AI systems, use of wearable technology, continuous monitoring and effectiveness of early detection.

Of all the variables, AI accuracy turned out to be the greatest variable that had an impact on the performance of early prediction systems. This makes the need to create sophisticated machine learning and deep learning algorithms that are able to detect high-risk cardiovascular patterns in real-time a high priority. With the integration of AI and wearable sensors and constant monitoring devices, preemptive medicine will be groundbreaking and allow them to preclude their medical crises by offering a timely medical intervention and avoiding their emergency cardiac events.

Despite the challenges, like privacy risks, technical constraints, and assets needed to implement AI-based healthcare solutions, the comprehensive results suggest firmly using AI-based solutions in cardiovascular disease management. The researchers conclude that AI-based continuous cardiovascular care systems have the potential to aid in better patient safety, health care efficiency, and provide a reduced rate of sudden cardiac death in the future.

By so doing, the study hypothesizes that the proactive and quantitative management of heart care must be developed by proactively refining and rolling out smart cardiovascular systems to subsequent systems or devices in hospitals, health centres or even in wearable health systems.

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