



## EXAMINING THE RELATIONSHIP BETWEEN UNIVERSITY STUDENTS' KNOWLEDGE OF CARDIOVASCULAR DISEASE RISK FACTORS AND THEIR PERCEIVED ACCESS TO HEALTHCARE SERVICES

Ayşe Sarı<sup>1\*</sup>; Bahar Türkmenoğlu<sup>2</sup>; Döne Günay<sup>3</sup>

<sup>1\*</sup>Correspondence Author, Sivas Cumhuriyet University, Türkiye, asari@cumhuriyet.edu.tr; ORCID: 0000-0003-0621-4838

<sup>2</sup>Sivas Cumhuriyet University, Türkiye, baharturkmenoglu@cumhuriyet.edu.tr; ORCID: 0000-0001-5631-3215

<sup>3</sup>Sivas Numune Hospital, Türkiye, donegunay@gmail.com; ORCID: 0000-0002-8721-6028

**Abstract:** The aim of this study is to investigate the relationship between university students' knowledge levels of cardiovascular disease (CVD) risk factors and their perceptions of access to healthcare services. The study was conducted with a descriptive and cross-sectional design, involving 238 students from a vocational school at Sivas Cumhuriyet University. Data were collected online using the Personal Information Form, Cardiovascular Disease Risk Factors Knowledge Level Scale (CVD-RKLS), and the Perceived Access to Healthcare Services Scale (ACCESS). Descriptive statistics, correlation analysis, and multiple linear regression analysis were used for data analysis, and the statistical significance level was set at  $p < 0.05$ . The average score for students' knowledge level of CVD risk factors was found to be  $17.37 \pm 5.05$ , indicating a moderate level of knowledge. More than half of the students (51.3%) stated that they only seek healthcare services when they are ill, and the most frequently preferred healthcare institution was public hospitals affiliated with the Ministry of Health (78.6%). A positive and statistically significant relationship was found between knowledge level of CVD risk factors and perceived access to healthcare services ( $r = 0.247$ ;  $p < 0.001$ ). It was determined that age and class level significantly affected the knowledge level, while socioeconomic status and the presence of chronic disease significantly affected the perceptions of access to healthcare services. According to the regression analysis results, the perceived access to healthcare variables explained approximately 71% of the variance in knowledge level, with the acceptability subscale being the strongest predictor. In conclusion, although university students' knowledge level of CVD risk factors was moderate, this knowledge only had a limited impact on their healthcare utilization behaviors. The findings suggest that university-based preventive health programs should not only focus on providing information but also be supported by holistic approaches that increase access to healthcare services and acceptability.

**Keywords:** cardiovascular diseases, risk factors, access to health services, university students

**JEL Code:** I1, I23

## ÜNİVERSİTE ÖĞRENCİLERİNİN KARDİYOVASKÜLER HASTALIK RİSK FAKTÖRLERİNE İLİŞKİN BİLGİ DÜZEYLERİ İLE SAĞLIK HİZMETLERİNE ERİŞİM ALGILARI ARASINDAKİ İLİŞKİNİN İNCELENMESİ

**Özet:** Bu çalışmanın amacı, üniversite öğrencilerinin kardiyovasküler hastalık (KVH) risk faktörlerine ilişkin bilgi düzeyleri ile sağlık hizmetlerine erişim algıları arasındaki ilişkiyi incelemektir. Çalışma tanımlayıcı ve kesitsel desende yürütülmüş olup, Sivas Cumhuriyet Üniversitesi'nde bir meslek yüksekokulunda öğrenim gören 238 öğrenci ile gerçekleştirilmiştir. Veriler; Kişisel Bilgi Formu, Kardiyovasküler Hastalık Risk Faktörleri Bilgi Düzeyi Ölçeği (KARRİF-BD) ve Sağlık Hizmetlerine Algılanan Erişim Ölçeği (ACCESS) kullanılarak çevrim içi olarak toplanmıştır. Verilerin analizinde tanımlayıcı istatistikler, korelasyon analizi ve çoklu doğrusal regresyon analizi kullanılmış; istatistiksel anlamlılık düzeyi  $p < 0,05$  olarak kabul edilmiştir. Öğrencilerin KVH risk faktörlerine ilişkin bilgi düzeyi ortalama puanı  $17,37 \pm 5,05$  olarak saptanmış ve bu bulgu bilgi düzeyinin orta düzeyde olduğunu göstermiştir. Öğrencilerin yarısından fazlası (%51,3) sağlık hizmetlerine yalnızca hastalandıklarında başvurduklarını belirtmiş olup, en sık tercih edilen sağlık kuruluşunun Sağlık Bakanlığı'na bağlı kamu hastaneleri olduğu belirlenmiştir (%78,6). KVH risk faktörlerine ilişkin bilgi düzeyi ile sağlık hizmetlerine algılanan erişim arasında pozitif yönde ve istatistiksel olarak anlamlı bir ilişki saptanmıştır ( $r = 0,247$ ;  $p < 0,001$ ). Yaş ve sınıf düzeyinin bilgi düzeyini; sosyoekonomik durum ve kronik hastalık varlığının ise sağlık hizmetlerine erişime ilişkin algıyı anlamlı düzeyde etkilediği belirlenmiştir. Regresyon analizi sonuçlarına göre,

sağlık hizmetlerine algılanan erişim değişkenleri bilgi düzeyindeki varyansın yaklaşık %71'ini açıklamakta olup, kabul edilebilirlik alt boyutu en güçlü yordayıcı olarak belirlenmiştir. Sonuç olarak, üniversite öğrencilerinin KVH risk faktörlerine ilişkin bilgi düzeyleri orta düzeyde olmakla birlikte, bu bilginin sağlık hizmetlerinden yararlanma davranışlarına sınırlı ölçüde yansıdığı görülmektedir. Bulgular, üniversite temelli koruyucu sağlık programlarının yalnızca bilgilendirme odaklı değil, aynı zamanda sağlık hizmetlerine erişimi ve kabul edilebilirliği artıran bütüncül yaklaşımlarla desteklenmesi gerektiğini ortaya koymaktadır.

**Anahtar Kelimeler:** kardiyovasküler hastalık, risk faktörleri, sağlık hizmetlerine erişim, üniversite öğrencileri

**JEL Kodu:** I1, I23

**Licence:**  This work is licensed under Creative Commons Attribution-NonCommercial 4.0 International License

## Introduction

Cardiovascular diseases (CVDs) are among the leading causes of death both worldwide and in Türkiye. According to the World Health Organization (WHO), CVDs are one of the primary causes of disability and mortality globally, accounting for approximately 18 million deaths each year (World Health Organization [WHO], 2023). Similarly, statistics from the Turkish Statistical Institute indicate that 33.4% of all deaths in Türkiye in 2023 were attributed to cardiovascular diseases (Turkish Statistical Institute [TurkStat], 2024).

Risk factors contributing to the development of CVDs are generally classified as modifiable and non-modifiable. Modifiable risk factors include smoking, physical inactivity, unhealthy diet, hypertension, type 2 diabetes mellitus, dyslipidemia, obesity, and stress, whereas non-modifiable risk factors comprise age, sex, and genetic predisposition (Kondo et al., 2019; Musinguzi et al., 2020). These risk factors frequently coexist and collectively increase an individual's overall cardiovascular risk.

University students represent a critical developmental period during which lifestyle habits are formed and health behaviors become established. Consequently, knowledge of CVD risk factors during this stage may directly influence future health-related behaviors. However, previous studies have shown that university students often have insufficient or moderate levels of knowledge regarding cardiovascular disease risk factors (Cin et al., 2018; Herlosky & Tran, 2019; Oğuz et al., 2019; Güneş et al., 2019; Türker & Tanrıkulu, 2022).

In Türkiye, studies conducted among university students have emphasized the need for interventions aimed at improving awareness of cardiovascular disease risk factors within this population (Türker & Tanrıkulu, 2022). Similarly, a multicenter study conducted in ASEAN countries reported a high prevalence of behavioral risk factors for CVDs among university students, while awareness levels remained relatively low (Peltzer & Pengpid, 2018).

Health-seeking behaviors of university students also play a significant role in shaping health outcomes during this period. Young adults tend to neglect their health needs and typically seek health care services only in acute situations (Limnili et al., 2024). Limited utilization of primary health care services among this age group leads to insufficient use of preventive health services. Nevertheless, young adulthood is a period characterized by frequent engagement in risky behaviors, and improving health literacy during this stage plays a crucial role in the prevention of chronic diseases, particularly cardiovascular diseases (WHO, 2023).

Knowledge of cardiovascular disease (CVD) risk factors is considered an important determinant influencing individuals' awareness of health risks, their perception of the seriousness of these risks, and the development of appropriate health-seeking behaviors. Within

the framework of health literacy, an increased capacity to obtain, understand, and use health-related information enhances the likelihood of utilizing preventive health services and accessing health care in a timely and appropriate manner (World Health Organization [WHO], 2022; Sørensen et al., 2021).

In the literature, utilization of health services is conceptualized as a multidimensional process encompassing individuals' access to health services, their health-seeking behavior in response to health problems, and their ability to use available services effectively. This concept involves not only the physical availability of services but also individuals' recognition of health needs, appropriate use of health care resources, and effective engagement with health services (Andersen & Newman, 2005; WHO, 2010). Moreover, the evaluation of access to health services includes key dimensions such as availability, geographical accessibility, affordability, accommodation, timeliness, acceptability, and awareness (Russell et al., 2013).

This study aims to examine the relationship between university students' knowledge levels regarding CVD risk factors and their utilization of health services. In the context of Türkiye, quantitative studies addressing the relationship between young adults' knowledge of CVD risk factors and their perceptions of access to health services remain limited. Identifying this relationship highlights the importance of university-based initiatives aimed at increasing knowledge levels and strengthening the utilization of preventive health services. Accordingly, this study seeks to contribute to the literature by addressing this gap.

In line with this general aim, the study seeks to answer the following research questions:

- What are the levels of knowledge regarding CVD risk factors among university students?
- What are the levels of health service utilization among university students?
- Is there a significant relationship between university students' knowledge of CVD risk factors and their utilization of health services?
- Do perceived levels of access to health services (accessibility, acceptability, accommodation, and affordability) have an effect on university students' knowledge levels regarding CVD risk factors?

## **Methods**

### ***Study Design and Participants***

This study was designed as a descriptive cross-sectional study and was conducted between May and June 2025. The study population consisted of 500 associate degree students enrolled in a vocational school at Sivas Cumhuriyet University. The required sample size was calculated using the G\*Power 3.1.9.7 software, based on a 95% confidence level, 95% statistical power, and a medium effect size (Cohen's  $d = 0.50$ ), resulting in a minimum sample size of 210 participants (Faul et al., 2009). A total of 238 students who met the inclusion criteria constituted the study sample.

### ***Inclusion Criteria***

Students who were enrolled in the spring semester of the 2024–2025 academic year, voluntarily agreed to participate, completed the online or printed questionnaire forms in full, had sufficient Turkish reading and writing skills, and were aged 18 years or older were included in the study. Written informed consent was obtained from all participants prior to data collection.

### **Data Collection Instruments**

Study data were collected both online and face-to-face between May and June 2025 using Google Forms. The data collection tools included a Personal Information Form developed by the researchers, the Cardiovascular Disease Risk Factors Knowledge Level Scale (KARRIF-BD), and the Perceived Access to Health Care Scale (ACCESS).

The Personal Information Form consisted of 10 items assessing students' demographic characteristics and health-related behaviors and was developed based on a review of the relevant literature (Cin et al., 2018; Yardımcı, 2023).

The KARRIF-BD Scale was developed by Arıkan et al. (2009) to assess individuals' knowledge levels regarding cardiovascular diseases. The scale consists of 28 items and includes three subdimensions: basic characteristics of cardiovascular diseases (4 items), risk factors related to cardiovascular diseases (15 items), and knowledge regarding the modifiability of risky behaviors (9 items). Items are answered as "Yes," "No," or "I do not know." Correct responses are scored as 1 point, while incorrect and "I do not know" responses are scored as 0. Total scores range from 0 to 28, with higher scores indicating higher levels of knowledge regarding cardiovascular diseases. The original Cronbach's alpha coefficient of the scale was reported as 0.76; in the present study, the Cronbach's alpha coefficient for the total scale was 0.89.

The ACCESS Scale is a 23-item, five-point Likert-type instrument comprising four subdimensions: accessibility, acceptability, accommodation, and affordability. Subscale scores are calculated by summing the relevant items and computing mean scores. Scores for the accessibility subdimension are divided by 4, acceptability and accommodation by 8, and affordability by 3. Higher scores indicate more positive perceptions of access to and utilization of health care services. The Cronbach's alpha coefficient of the scale was reported as 0.94 (Yılmaz et al., 2025). In the present study, the Cronbach's alpha coefficient was calculated as 0.94 for the total scale, 0.82 for the accessibility subdimension, 0.91 for acceptability, 0.92 for accommodation, and 0.78 for affordability.

### **Statistical Analysis**

Data analysis was performed using IBM SPSS Statistics Version 25 software. Descriptive statistics included frequencies, percentages, means, standard deviations, medians, minimum, and maximum values. The normality of data distribution was assessed using the Shapiro–Wilk test and by examining skewness and kurtosis values ( $\pm 1.5$ ).

For data with a parametric distribution, the independent samples *t*-test was used for comparisons between two groups, and One-Way Analysis of Variance (ANOVA) was applied for comparisons among three or more groups. For non-parametric data, the Mann–Whitney U test was used for comparisons between two groups, and the Kruskal–Wallis test was applied for comparisons among three or more groups.

Pearson correlation analysis was conducted to determine the relationships between variables, and multiple linear regression analysis was performed to examine the predictors of knowledge levels regarding cardiovascular disease risk factors. Prior to the regression analysis, outliers were evaluated using the casewise diagnostics table; case number 74, which had a standardized residual greater than  $\pm 3$ , was excluded from the analysis due to violation of model assumptions and excessive influence. Variables that were found to be significant in the preliminary Pearson correlation analysis were included in the regression model, and the

backward elimination method was used to identify the most appropriate predictors. In all analyses, the level of statistical significance was set at  $p < 0.05$ .

## Results

Of the students, 79.8% were female, 64.7% were aged 18–20 years, 68.8% were first-year students, and 98.3% were single; 84.5% rated their family’s economic status as moderate. In addition, 13.9% reported having a chronic disease, 21.0% reported smoking, 49.2% were enrolled in the Child Development program, and 26.5% in the Health Institutions Management program. Accordingly, 75.7% of the students were studying in health-related fields, while 24.3% were enrolled in non–health-related fields (Rail Systems and Banking/Insurance).

**Table 1.** Scores of university students regarding knowledge level on cardiovascular disease risk factors

Scale / Sub-dimension	Mean	SD	Median	Min.	Max.
*KARRİF-BD Scale	17.37	5.05	19.00	5.00	27.00
**ACCESS Scale	3.38	0.65	3.35	1.00	5.00
Accessibility	0.44	0.25	0.50	0.00	1.00
Acceptability	0.71	0.21	0.75	0.25	1.00
Accommodation	0.69	0.23	0.75	0.13	1.00
Affordability	3.28	0.78	3.17	1.00	5.00

\* Cardiovascular Disease Risk Factors Knowledge Level Scale, \*\*Perceived Access to Health Services Scale

According to the study findings, the mean score of the KARRIF-BD scale was  $17.37 \pm 5.05$ , with a median value of 19.00 (min: 5.00; max: 27.00). The median value being higher than the mean indicates a left-skewed distribution, suggesting that some students obtained relatively high scores. The mean total score of the Perceived Access to Health Care Scale was  $3.38 \pm 0.65$ , with a median value of 3.35. Examination of the subdimensions revealed that the highest mean scores were observed in the acceptability and accommodation subdimensions, while the lowest mean score was found in the accessibility subdimension (Table 1).

**Table 2.** Utilization status of university students regarding health care services

Variable	Groups	n (238)	%
Frequency of applying to health care institutions	Every 2–3 months	46	19.3
	Once a month or more often	28	11.8
	Only when ill	122	51.3
	A few times a year	42	17.6
The most frequently visited health institution	Family Health Center	51	21.4
	Ministry of Health Public Hospital	187	78.6
	Private Hospital	-	-
	University Hospital	-	-

More than half of the students (51.3%) reported that they sought health care services only when they became ill. The most frequently utilized health care institutions were public

hospitals affiliated with the Ministry of Health (78.6%), followed by Family Health Centers (21.4%). None of the students reported utilizing private hospitals or university hospitals (Table 2).

KARRIF-BD scores differed significantly according to age ( $p = 0.003$ ) and year of study ( $p = 0.004$ ), with knowledge levels increasing as age and year of study increased. The accessibility ( $p = 0.022$ ) and acceptability ( $p < 0.001$ ) subdimensions were found to be significantly associated with age, while the accommodation subdimension showed a significant association with year of study ( $p = 0.039$ ). A significant difference according to marital status was observed only for overall access scores ( $p = 0.027$ ), with married students reporting more positive perceptions of access. Students with good economic status had significantly higher access ( $p < 0.001$ ) and accessibility ( $p = 0.001$ ) scores. In addition, students with chronic diseases had significantly higher accessibility scores ( $p = 0.047$ ). No statistically significant differences were found for the other variables ( $p > 0.05$ ) (Table 3).

**Table 3.** Comparison of university students' sociodemographic characteristics with cardiovascular disease risk factors knowledge level and utilization of health services

Variable / Group		KARRİF-BD Scale Mean±SD	ACCESS Scale Mean±SD	Accessibility Mean±SD	Acceptability Mean±SD	Accommodation Mean±SD	Affordability Mean±SD
Age	18–20	16.57±5.27	3.36±0.64	0.41±0.27	0.68±0.21	0.66±0.24	3.29±0.78
	21–23	18.57±4.38	3.37±0.64	0.49±0.23	0.78±0.19	0.73±0.21	3.22±0.76
	24 and above	20.8±3.16	3.7±0.86	0.53±0.18	0.78±0.16	0.8±0.09	3.57±1.01
Test value <sup>b</sup>		11.893	3.332	7.596	15.671	5.768	3.006
p value		0.003*	0.189	0.022*	0.000*	0.056	0.222
Grade level	1st year	16.77±5.18	3.33±0.66	0.42±0.26	0.69±0.22	0.66±0.24	3.25±0.78
	2nd year	18.62±4.56	3.48±0.61	0.45±0.24	0.75±0.18	0.74±0.2	3.37±0.8
Test value <sup>a</sup>		4510.0	5006.5	5575.5	5000.0	4902.5	5259.0
p value		0.004*	0.069	0.506	0.061	0.039*	0.189
Marital status	Single	17.31±5.05	3.37±0.65	0.43±0.25	0.71±0.21	0.69±0.23	3.27±0.78
	Married	20.75±4.43	3.96±0.17	0.56±0.24	0.75±0.1	0.78±0.12	3.92±0.17
Test value <sup>a</sup>		298.5	166.0	327.0	462.0	374.0	213.0
p value		0.213	0.027*	0.275	0.964	0.483	0.056
Family financial status	Poor	16.5±4.22	2.91±0.45	0.43±0.29	0.68±0.17	0.7±0.2	2.73±0.68
	Moderate	17.33±5.18	3.35±0.62	0.45±0.26	0.71±0.22	0.68±0.24	3.25±0.75
	Good	18±4.42	3.75±0.75	0.36±0.21	0.74±0.18	0.73±0.2	3.72±0.91
Test value <sup>b</sup>		1.045	16.649	3.047	0.936	0.900	14.203
p value		0.593	0.000*	0.218	0.626	0.638	0.001*
Chronic disease status	Yes	18.09±5.67	3.34±0.56	0.52±0.28	0.75±0.22	0.69±0.24	3.14±0.7
	No	17.25±4.95	3.38±0.66	0.42±0.25	0.71±0.21	0.69±0.23	3.31±0.79
Test value <sup>a</sup>		2944.5	3095.5	2694.5	2832.5	3273.5	2870.0
p value		0.231	0.433	0.047*	0.124	0.762	0.154

<sup>a</sup>Mann Whitney U test, <sup>b</sup> Kruskal Wallis test, Mean: Average, SD: Standard Deviation, \*p<0.05

**Table 4.** Relationship between university students' knowledge level of cardiovascular disease risk factors and their utilization of health services and subscale scores

Variable	Group	KARRİF-BD Scale Mean±SD	ACCESS Scale Mean±SD	Accessibility Mean±SD	Acceptability Mean±SD	Accommodation Mean±SD	Affordability Mean±SD
Frequency of applying health institutions to care	Every 2–3 months	17.65±5.48	3.26±0.77	0.47±0.26	0.71±0.19	0.70±0.27	3.29±0.82
	Once a month or more often	18.43±4.57	3.36±0.60	0.50±0.25	0.74±0.21	0.72±0.18	3.10±0.79
	Only when ill	16.81±5.04	3.42±0.61	0.42±0.26	0.70±0.22	0.66±0.23	3.30±0.76
	A few times a year	17.98±4.89	3.38±0.65	0.39±0.24	0.72±0.21	0.74±0.21	3.34±0.81
	Test value <sup>b</sup>	4.281	2.055	4.025	0.761	6.422	2.588
	p value	0.233	0.561	0.259	0.859	0.093	0.460
Type of most frequently visited health institution	Family Health Center	16.25±5.25	3.49±0.72	0.35±0.25	0.64±0.20	0.69±0.22	3.48±0.88
	Ministry of Health Public Hospitals	17.67±4.97	3.35±0.63	0.46±0.25	0.73±0.21	0.69±0.23	3.23±0.75
	Test value <sup>a</sup>	3927.0	4143.5	3648.0	3408.0	4627.5	3832.0

<sup>a</sup> Mann Whitney U test, <sup>b</sup> Kruskal Wallis test

When subdimension scores were examined according to the type of health care institution most frequently utilized by students, those who sought care at public hospitals affiliated with the Ministry of Health had significantly higher scores in the accessibility ( $p = 0.007$ ), acceptability ( $p = 0.001$ ), and affordability ( $p = 0.028$ ) subdimensions (Table 4).

**Table 5.** The relationship between university students' knowledge level of cardiovascular disease risk factors and their utilization of healthcare services  
**\*\*ACCESS Scale    Accessibility    Acceptability    Accommodation    Affordability**

*KARRIF-BD Scale	r	0.247	0.190	0.834	0.264	0.207
	p	<0.001	0.003	<0.001	<0.001	<0.001

\*Cardiovascular Disease Risk Factors Knowledge Level Scale, \*\*Perceived Access to Health Services Scale, Pearson correlation analysis was conducted to examine the relationships between variables.

A positive and statistically significant relationship was found between students' knowledge levels regarding cardiovascular disease risk factors and perceived access to health services ( $r = 0.247$ ,  $p < 0.001$ ). This relationship was also significant across all subdimensions of the ACCESS scale ( $p < 0.01$ ) (Table 5).

**Table 6.** Assessing the predictors of KARRIF scores

Model	Unstandardized Coefficients		Standardized Coefficients	t	p	95.0% CI for B		Collinearity Statistics	
	B	Std. Error				Lower Bound	Upper Bound	Tolarence	VIF
Constant	0.685	1.027		0.667	0.506	-1.339	2.708		
Affordability	0.586	0.286	0.073	2.046	0.04	0.022	1.150	0.974	1.027
Acceptability	20.127	0.864	0.829	23.283	<0.001	18.424	21.830	0.974	1.027
Model Summary		R <sup>2</sup> =0.713	Adjusted R <sup>2</sup> =0.706		F=288.276		p= <0.001	DW=2.183	

The regression model was found to be statistically significant ( $F = 288.276$ ,  $p < 0.001$ ) and explained a substantial proportion of the variance in KARRIF scores. Acceptability emerged as the strongest predictor of KARRIF scores, while affordability contributed more modestly to the model (Table 6).

## Discussion and Conclusion

This study contributes to understanding the dynamics between health knowledge and access to health services among young adults by evaluating the relationship between university students' knowledge levels regarding cardiovascular disease (CVD) risk factors and their perceptions of access to health services. In the present study, the mean KARRIF-BD score of students was found to be  $17.37 \pm 5.05$ . In studies conducted with students from different academic programs, reported KARRIF-BD scores were  $19.64 \pm 4.36$  among paramedic students (Cin et al., 2018),  $20.93 \pm 4.31$  among nursing students (Yardımcı, 2023),  $18.68 \pm 4.82$  among elderly care students,  $19.37 \pm 4.26$  among pharmacy services students (Erkal & Demir, 2020),  $22.7 \pm 3.9$  among medical students,  $22.5 \pm 2.7$  among nursing students,  $14.6 \pm 5.3$  among education faculty students, and  $16.3 \pm 4.5$  among law students (Öz & Koç, 2020). Among sports sciences students, the mean score was reported as  $16.70 \pm 4.71$  (Şimşek & Ökmen, 2020). Overall, these findings indicate that students studying in health-related fields have higher levels

of knowledge regarding CVD risk factors compared to those in non-health-related fields. The fact that the majority of the sample in the present study consisted of students enrolled in health-related programs suggests consistency with the existing literature. However, the lower mean score compared to students in disciplines such as nursing, medicine, or paramedicine may be explained by the inclusion of students from non-health-related fields in the sample.

In this study, gender was not found to have a significant effect on knowledge levels regarding CVD risk factors or on perceived access to health services. Although some studies have reported higher CVD risk perception among male students, this difference has often been associated with personal experience, family history, and perceived risk, while gender differences in knowledge levels have not been consistently observed (Mosca et al., 2011; Najman et al., 2024; Alqahtani et al., 2025). A study conducted among medical students in 2025 reported that while students had adequate knowledge of basic CVD risk factors, awareness levels differed by gender and were higher among male students (Alqahtani et al., 2025). In contrast, a study conducted with non-medical undergraduate students found that female students more accurately identified CVD risk factors and basic information than male students, although overall knowledge levels were moderate and awareness of high cholesterol, diabetes, and insufficient sleep was low (Juraev et al., 2025). Similarly, another study conducted among general university students reported higher awareness levels among women (Kızılaslan & Samancı Tekin, 2024). The lack of a significant gender effect in the present study may indicate that health behaviors in this age group are more strongly shaped by cognitive and environmental factors. In addition, the relatively small proportion of male students in the sample may have limited the statistical power. It is also possible that university-level curricula and shared educational content play a balancing role in the acquisition of knowledge regarding CVD risk factors, independent of gender.

The study findings showed that students primarily utilized health services only when needed and predominantly preferred public hospitals affiliated with the Ministry of Health. This indicates that health service utilization among students is largely need-based. The tendency to seek health care only when ill may be explained by several factors, including low health literacy, insufficient awareness of the importance of preventive health services, and perceived barriers to accessing health care. A recent study reported that high levels of CVD-related knowledge among university students may reduce personal risk perception rather than increase it, which was associated with students' tendency to attribute health risks to others rather than themselves; however, students were found to be highly ready to adopt behavioral changes related to exercise and healthy nutrition (Coker et al., 2025). Another study identified time constraints, cost, privacy concerns, and fear of stigma as major barriers influencing university students' health service utilization behaviors (Tran & Silvestri-Elmore, 2021). These findings suggest that the theoretical chain linking knowledge, awareness, and health-seeking behavior does not always operate linearly among young adults; even when knowledge levels increase, perceived access, time, cost, and acceptability of services may determine utilization behavior. Although students tend to seek health services primarily in emergency situations or when a problem arises, their high readiness for behavior change regarding exercise and healthy nutrition indicates important opportunities for preventive health behaviors when appropriately guided. The preference for public hospitals may also be explained by the location of the vocational school in a district center and the limited availability of alternative health care facilities such as university or private hospitals in the region. Geographic accessibility is frequently emphasized in the literature as a key determinant of health service utilization, with distance, travel time, and limited alternatives significantly influencing health care choices. In district centers and rural areas, reduced utilization with increasing distance—known as the

distance decay effect—has been identified as a structural barrier to access (Guagliardo, 2004; McGrail & Humphreys, 2009; Delamater et al., 2019). The lack of preference for private health care institutions may also be related to the financial burden these services pose for students.

In the present study, statistically significant relationships were identified between age and the accessibility and acceptability subdimensions of perceived access to health services. The findings indicate that as age increases, both knowledge levels regarding CVD risk factors and positive evaluations of access to health services increase. This suggests that perceptions and evaluations of access to health care evolve with age, and that older students perceive existing health services more positively in terms of accessibility and acceptability. In a study conducted by Gallè et al. (2020), older university students demonstrated higher knowledge levels regarding CVD risk factors and more positive attitudes toward the health system. Similarly, other research has shown that increasing age is associated with higher health knowledge levels and greater satisfaction with health services (Aydm et al., 2021).

Parallel to age, the present study found that KARRIF-BD scores and knowledge levels regarding CVD risk factors increased as year of study increased. The association between year of study and the accommodation subdimension of access to health services may largely reflect increased experience with age, suggesting that upper-year students are better able to adapt to health service utilization processes.

According to the study findings, married students evaluated access to health services more positively than single students. The literature indicates that married individuals tend to utilize health services more frequently and report higher satisfaction with health care institutions (Özceylan & Toprak, 2019). These findings suggest that experience- and life-condition-related variables such as age, year of study, and marital status may influence how students perceive and evaluate health services. Such experience-related factors may exert indirect effects on knowledge of CVD risk factors through perceived access to health services, and the predictive role of perceived access on knowledge levels may strengthen with age.

The study also identified a significant relationship between students' family socioeconomic status and their perceptions of access to health services. Students with better economic conditions perceived health services—particularly in economic terms—as more accessible. This finding supports the view that socioeconomic status is a facilitating factor in health service utilization (Marmot, 2008; Yousefi et al., 2025). The higher accessibility perceptions among students with chronic diseases may be attributed to more frequent interaction with health services. Individuals with chronic conditions are known to use health services more frequently and to engage more intensively with the health system (Poudel et al., 2025). This suggests that chronic disease status is an important determinant of access to and utilization of health services and that continuity of interaction with the health system enables individuals to develop more informed and positive perceptions of access.

Within the scope of this study, it is expected that knowledge levels regarding CVD risk factors influence students' access to health services and their utilization behaviors. Consistent with this expectation, previous research has demonstrated that knowledge and awareness of CVD are important determinants in the adoption of healthy lifestyle behaviors (Aslan & Bozkur, 2025). However, the literature also indicates that although university students are knowledgeable about CVD risk factors such as high cholesterol, stress, hypertension, smoking, obesity, and diabetes, they often fail to adopt healthy lifestyle behaviors (Güneş et al., 2019; Cammalleri et al., 2023). These findings highlight a universal gap between knowledge and behavior and underscore that healthy lifestyle behaviors are shaped not solely through

information transfer but through comprehensive approaches that support risk awareness and behavior change.

The regression model established in this study explained approximately 71% of the variance in knowledge levels regarding CVD risk factors, indicating that perceived access to health services plays a strong and determining role in students' knowledge levels. In the social sciences, explained variance values above 50% are considered indicative of strong explanatory power and robust relationships (Cohen, 1988; Hair et al., 2019), suggesting that the model has a meaningful and strong structure for explaining knowledge levels related to CVD risk factors. The significant positive relationship identified between knowledge of CVD risk factors and perceived access to health services further demonstrates that perceiving health services as accessible, acceptable, and compatible with individual needs supports knowledge acquisition. The finding that acceptability was the strongest predictor of knowledge levels suggests that the knowledge-behavior relationship does not necessarily follow a linear pattern. While knowledge is often assumed to influence health service utilization, this result indicates that positive and acceptable experiences with health services may also foster learning and health-related awareness. Andersen's Behavioral Model of Health Services Use emphasizes that access to and experiences with the health system shape not only utilization behaviors but also health-related cognitive outcomes (Andersen, 1995). Similarly, theoretical frameworks of health literacy highlight interaction with health services as an important learning context that enhances knowledge production and risk awareness (Nutbeam, 2000). In this context, the regression findings suggest that in young adults, access to CVD risk information is shaped not only by individual learning processes but also by the accessibility and acceptability of the health care system.

In conclusion, this study demonstrated that university students have moderate levels of knowledge regarding CVD risk factors and that this knowledge is significantly and strongly associated with perceived access to health services. The findings indicate that the acceptability and accommodation dimensions of perceived access play a supportive role in students' knowledge levels regarding CVD risk factors. However, students' tendency to use health services primarily when a need arises and predominantly through public health institutions suggests limited awareness of preventive health services. Individual and environmental factors such as age, year of study, marital status, and socioeconomic status jointly shape perceptions of access to health services and knowledge levels. The high explanatory power of the regression analysis indicates that perceived access to health services is not merely an outcome but also an active determinant in the development of health knowledge and awareness.

In this context, initiatives aimed at preventing CVD among university youth should not focus solely on information provision but should be supported by comprehensive approaches that ensure health services are accessible, acceptable, and responsive to young people's needs, alongside educational and policy interventions. Such approaches play a critical role in strengthening early risk awareness and improving long-term population health outcomes. In this respect, the study contributes to the development of preventive health services and policy-making processes aimed at CVD prevention among university students.

## **Limitations**

This study has several limitations that should be acknowledged. The cross-sectional design of the study limits the causal interpretation of the relationships between variables. Conducting the study at a single center, specifically at a vocational school located in a district center, suggests that students' health care preferences may have been shaped by geographical

accessibility and the availability of health services, thereby limiting the generalizability of the findings. In addition, the fact that the majority of the sample consisted of students enrolled in health-related programs restricts the direct generalization of the observed knowledge levels to the broader population of university students. Furthermore, although the regression model established in the study demonstrated the explanatory role of perceived access to health services on knowledge levels, the effect of knowledge levels on health service utilization behaviors was not examined using a separate model. Therefore, the findings reflect relational associations between variables rather than causal pathways.

### Author Contributions

All processes of this study (design, data collection, analysis, writing, and editing) were carried out by Author.

### Ethical Approval

This study was conducted with the approval of the Ethics Committee at Sivas Cumhuriyet University (No. E-99711239-050.04-565651).

### Conflict of Interest Statement

This study contains no conflicts of interest with any individual or organization.

### Article Process History

Article Submission Date: 27.10.2025

Article Acceptance Date: 03.03.2026

### References

- Alqahtani, N. G., Benmelouka, A. Y., Aldosari, R. H. S., Asiri, L. G., AlKasi, L. Y., Almasswary, S. A., Alassim, A., Al Hunaif, A. M., Alqahtani, S. A. M., Abu Mughaedh, M. A., & El-Qushayri, A. E. (2025). *Knowledge of risk factors of heart disease among medical students and interns: A cross-sectional study from King Khalid University, Saudi Arabia. Journal of Family Medicine and Primary Care, 14(6), 2514–2519.* [https://doi.org/10.4103/jfmpe.jfmpe\\_744\\_24](https://doi.org/10.4103/jfmpe.jfmpe_744_24)
- Andersen, R. M. (1995). Revisiting the behavioral model and access to medical care: Does it matter? *Journal of Health and Social Behavior, 36(1), 1–10.*
- Andersen, R., & Newman, J. F. (2005). Societal and Individual Determinants of Medical Care Utilization in the United States. *The Milbank Quarterly, 83(4), 10.1111/j.1468-0009.2005.00428.x.* <https://doi.org/10.1111/j.1468-0009.2005.00428.x>
- Arıkan, İ., Metintaş, S., Kalyoncu, C., & Yıldız, Z. (2009). Validity and reliability of the cardiovascular disease risk factors knowledge level scale (KARRIF-BD). *Archives of the Turkish Society of Cardiology, 37(1), 35–40.*
- Aslan, T. V., & Bozkur, B. (2025). *The relationship of cardiovascular disease knowledge, health history and lifestyle factors with healthy lifestyle behaviors: A study in the context of university youth.* *International Journal of Eurasia Social Sciences, 16(62), 2178–2193.* <https://doi.org/10.70736/ijoess.2031>
- Aydın, V., Vizdiklar, C., Akici, A., Akman, M., Gogas Yavuz, D., Altikardes, Z. A., et al. (2021). Evaluation of health-related knowledge, attitudes, and behaviors of undergraduate

- students by cardiovascular risk factors. *Primary Health Care Research & Development*, 22, e49. <https://doi.org/10.1017/S1463423621000499>
- Cammalleri, V., Zanni, S., Gallè, F., Marotta, D., Valeriani, F., Liguori, G., et al. (2023). Cardiovascular risk knowledge and related behaviors among youths: A cross-sectional study in a sample of Italian undergraduates. *Journal of Public Health (Berlin)*, 31, 1–9. <https://doi.org/10.1007/s10389-023-02133-7>
- Cin, A., Doğan, E. S., & Demirağ, H. (2018). Determination of paramedic students' knowledge levels about cardiovascular disease risk factors. *İnönü University Journal of Health Services Vocational School*, 6(2), 36–43. <https://doi.org/10.33715/inonusaglik.469872>
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Lawrence Erlbaum Associates.
- Coker, O. S., Akyala, A. I., & Coker, R. B. (2025). Cardiovascular disease knowledge, risk perception, and lifestyle behaviors among university students in North-Central Nigeria: A cross-sectional study. *BMC Public Health*. <https://doi.org/10.1186/s12889-025-26071-z>
- Delamater, P. L., Shortridge, A. M., & Kilcoyne, R. C. (2019). Using floating catchment area (FCA) metrics to predict health care utilization patterns. *BMC Health Services Research*, 19, 144. <https://doi.org/10.1186/s12913-019-3969-5>
- Erkal, E., & Demir, S. (2020). Determination of Health Services Vocational School Students' knowledge levels regarding cardiovascular disease risk factors: Example of Artvin Çoruh University. *İnönü University Journal of Health Services Vocational School*, 8(2), 293–301. <https://doi.org/10.33715/inonusaglik.712383>
- Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2009). Statistical power analyses using G\*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, 41(4), 1149–1156. <https://doi.org/10.3758/BRM.41.4.1149>
- Gallè, F., Sabella, E. A., Ferracuti, S., De Giglio, O., Caggiano, G., Protano, C., et al. (2020). Sedentary behaviors and physical activity of Italian undergraduate students during lockdown at the time of COVID-19 pandemic. *International Journal of Environmental Research and Public Health*, 17, 6171. <https://doi.org/10.3390/ijerph17176171>
- Guagliardo, M. F. (2004). *Spatial accessibility of primary care: Concepts, methods and challenges*. *International Journal of Health Geographics*, 3, Article 3. <https://doi.org/10.1186/1476-072X-3-3>
- Güneş, F. E., Bekiroğlu, N., Imeryuz, N., & Agirbaslı, M. (2019). Awareness of cardiovascular risk factors among university students in Turkey. *Primary Health Care Research & Development*, 20, e127. <https://doi.org/10.1017/S1463423619000531>
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). *Multivariate data analysis* (8th ed.). Cengage Learning.
- Herlosky, K. N., & Tran, D.-M. T. (2019). Differences in cardiovascular risk factors in college students: Midwest versus Southwest. *Biological Research for Nursing*, 21(5), 571–577. <https://doi.org/10.1177/1099800419856109>
- Juraev, J., Odilov, K., Mirzaev, U., Baynazarov, M., Tun, T., Rakhimov, A., Tuychiev, S., Makhamatkulova, M., Toshpulatov, A., Mutalov, B., Davlatov, K., & Rasulov, Ş. (2025). *Knowledge of cardiovascular disease and its risk factors among non-medical undergraduate students in Uzbekistan: A cross-sectional study*. Research Square.

- Kızılaslan, S., & Samancı Tekin, Ç. (2024). *Risk factors of ischemic heart disease and risk-related awareness in university students*. *STED / Sürekli Tıp Eğitimi Dergisi*, 33(1), 57–72. <https://doi.org/10.17942/sted.1430834>
- Kondo, T., Nakano, Y., Adachi, S., & Murohara, T. (2019). Effects of tobacco smoking on cardiovascular disease. *Circulation Journal*, 83(10), 1980–1985. <https://doi.org/10.1253/circj.CJ-19-0323>
- Limnili, G., Günvar, T., Mevsim, V., & Özçakar, N. (2024). Primary health care utilization and determination of health care needs among university students: A cross-sectional study. *Turkish Journal of Family Medicine and Primary Care*, 18(4), 397–405.
- Marmot, M., Friel, S., Bell, R., Houweling, T. A. J., & Taylor, S. (2008). Closing the gap in a generation: Health equity through action on the social determinants of health. *The Lancet*, 372(9650), 1661–1669. [https://doi.org/10.1016/S0140-6736\(08\)61690-6](https://doi.org/10.1016/S0140-6736(08)61690-6)
- McGrail, M. R., & Humphreys, J. S. (2009). Measuring spatial accessibility to primary care in rural areas: Improving the effectiveness of the two-step floating catchment area method. *Applied Geography*, 29(4), 533–541. <https://doi.org/10.1016/j.apgeog.2008.12.003>
- Mosca, L., Hammond, G., Mochari-Greenberger, H., Towfighi, A., & Albert, M. A. (2011). Fifteen-year trends in awareness of heart disease in women. *Circulation*, 124(11), 1254–1263. <https://doi.org/10.1161/CIRCULATIONAHA.110.009845>
- Musinguzi, G., Ndejjo, R., Ssinabulya, I., Bastiaens, H., van Marwijk, H., & Wanyenze, R. K. (2020). Cardiovascular risk factor mapping and distribution among adults in Mukono and Buikwe districts in Uganda: Small area analysis. *BMC Cardiovascular Disorders*, 20, 284. <https://doi.org/10.1186/s12872-020-01573-3>
- Najman, J. M., Kisely, S., Scott, J. G., Ushula, T. W., Williams, G. M., Clavarino, A. M., McGee, T. R., Mamun, A. A., & Wang, W. Y. S. (2024). Gender differences in cardiovascular disease risk: Adolescence to young adulthood. *Nutrition, metabolism, and cardiovascular diseases: NMCD*, 34(1), 98–106. <https://doi.org/10.1016/j.numecd.2023.09.024>
- Nutbeam, D. (2000). Health literacy as a public health goal: A challenge for contemporary health education and communication strategies. *Health Promotion International*, 15(3), 259–267. <https://doi.org/10.1093/heapro/15.3.259>
- Oğuz, S., Erguvan, B., Ünal, G., Bayrak, B., & Çamcı, G. (2019). Determination of knowledge level about cardiovascular disease risk factors among university students. *MN Cardiology*, 26(3), 184–191.
- Öz, Ş., & Koç, A. (2020). Determination of university students' healthy lifestyle behaviors and knowledge levels about cardiovascular risk factors. *Journal of Turkish Health Sciences and Research*, 3(2), 16–30.
- Özceylan, G., & Toprak, D. (2019). Factors affecting health service utilization among married individuals according to Turkey Demographic and Health Survey data. *Journal of Health Academicians*, 6(3), 306–312. <https://doi.org/10.5455/sad.13-1568713172>
- Peltzer, K., & Pengpid, S. (2018). Prevalence, risk awareness and health beliefs of behavioural risk factors for cardiovascular disease among university students in nine ASEAN countries. *BMC Public Health*, 18, 237. <https://doi.org/10.1186/s12889-018-5142-1>
- Poudel, S., Parajuli, A., Duwadi, N., Bhatta, B. K., Paudel, S., Khatri, D., Paneru, D. P., & Sharma, Y. P. (2025). Social health insurance, family support, and chronic diseases as

- determinants of health service utilization among senior citizens in rural Nepal. *BMC public health*, 25(1), 1512. <https://doi.org/10.1186/s12889-025-22693-5>
- Russell, D. J., Humphreys, J. S., Ward, B., Chisholm, M., Buykx, P., McGrail, M., & Wakerman, J. (2013). Helping policy-makers address rural health access problems. *The Australian journal of rural health*, 21(2), 61–71. <https://doi.org/10.1111/ajr.12023>
- Sørensen, K., Pelikan, J. M., Röthlin, F., Ganahl, K., Slonska, Z., Doyle, G., ... Brand, H. (2021). Health literacy in Europe: Comparative results of the European health literacy survey (HLS-EU). *European Journal of Public Health*, 31(Suppl. 3), ckab164. <https://doi.org/10.1093/eurpub/ckab164>
- Şimşek, E., & Ökmen, M. (2020). Examination of sports sciences faculty students' knowledge levels about cardiovascular disease risk factors. *Journal of Physical Education and Sport Sciences*, 22(3), 1–11.
- Tran, D.-M. T., & Silvestri-Elmore, A. (2021). Healthcare-seeking behaviours in college students and young adults: A review. *Journal of Nurse Practitioners*, 17(1), 39–44.
- Türker, E., & Tanrıku, G. (2022). Examination of the relationship between knowledge level of risk factors for cardiovascular diseases and lifestyle among students studying at a foundation university. *Journal of Paramedic and Emergency Health Services*, 3(1), 16–26. <https://doi.org/10.54862/pashid.956002>
- Turkish Statistical Institute. (2024). *Death and cause of death statistics, 2023*. TurkStat. <https://data.tuik.gov.tr/Bulten/Index?p=Olum-ve-Olum-Nedeni-Istatistikleri-2023-53709> (Accessed October 11, 2025)
- World Health Organization [WHO]. (2023). *Adolescent and young adult health*. Geneva: WHO. Retrieved February 20, 2024, from <https://www.who.int/news-room/fact-sheets/detail/adolescents-health-risks-and-solutions>
- World Health Organization. (2010). *Monitoring the building blocks of health systems: A handbook of indicators and their measurement strategies*. World Health Organization.
- World Health Organization. (2022). *Health literacy development for the prevention and control of noncommunicable diseases: Volume I*. World Health Organization.
- World Health Organization. (2023). *Cardiovascular diseases (CVDs)*. Geneva: WHO. Retrieved April 25, 2025, from [https://www.who.int/health-topics/cardiovascular-diseases#tab=tab\\_1](https://www.who.int/health-topics/cardiovascular-diseases#tab=tab_1)
- Yardımcı, G. T. (2023). Determination of nursing students' knowledge levels about cardiovascular disease risk factors. *Journal of Samsun Health Sciences*, 8(1), 103–112. <https://doi.org/10.47115/jshs.1102010>
- Yılmaz, S., Ateş, M., & Abay, P. (2025). Adaptation and psychometric assessment of the Turkish version of the Perceived Access to Health Care Questionnaire: Validity and reliability analysis. *Healthcare (Basel)*, 13(4), 370. <https://doi.org/10.3390/healthcare13040370>
- Yousefi, et al. (2025). *The equity of health service utilization in less developed areas of China: evidence from Gansu Province*. *BMC Public Health*, 25, 3081. <https://doi.org/10.1186/s12889-025-24218-6>