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Factors Associated with Health Consciousness among University Students in Oman: A Cross-Sectional Study

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ABSTRACT: Health consciousness may inform preventive healthcare engagement, but remains understudied among university students in Oman. This cross-sectional study assessed health consciousness and associated sociodemographic and health-related characteristics among 320 non-healthcare students recruited by convenience sampling at three government and private universities. A self-administered questionnaire included demographic and health-behavior items and the nine-item Health Consciousness Scale (HCS). Descriptive statistics, bivariate comparisons, and multivariable linear regression were reported. The mean HCS score was 31.17 ± 5.88 (possible range 9–45). Domain means were 7.36 ± 1.54 for health alertness, 10.62 ± 2.27 for health self-consciousness, 7.18 ± 1.50 for self-monitoring, and 6.01 ± 1.83 for health involvement. Per-item means were highest for alertness and lowest for involvement; no validated high-versus-low threshold was applied. Marital status (B = 4.61, p = 0.01), self-rated religiosity (B = 0.42, p = 0.04), and examination timing (B = 0.58, p = 0.02) were associated with HCS scores, but model explanatory value was modest (adjusted R^2 = 0.06). Examination-timing interpretation depends on category coding. Convenience sampling, self-report, small subgroups, and incomplete statistical documentation limit inference. The results support further investigation and pilot evaluation of inclusive, culturally appropriate university health-promotion approaches, rather than causal or effectiveness claims.

1. INTRODUCTION

Health consciousness defined as the knowledge and care that a person has for preserving or enhancing their own health is a critical psychological construct that influences wellness-related attitudes, preventive health behaviors, and health-seeking practices (Cao et al., 2024; Yuangngoen et al., 2025). Individuals who are actively health-conscious tend to engage in regular physical activity, adopt balanced dietary habits, seek timely medical care, and remain alert to changes in their bodily state, all of which are fundamental behaviors for disease prevention and early detection of disease or illness (Dhuli et al., 2022; Siddiqui and Irfan, 2024). Conversely, low health consciousness is associated with limited engagement in preventive care, reliance on misinformation, and health fatalism attitudes that can delay diagnosis and worsen health outcomes (Uncu et al., 2025). Despite its importance, health consciousness remains understudied in young adult populations, particularly in the context of rapidly developing countries such as Oman. A study of health-conscious behaviors among young adults in Pakistan found that only 37% of university students were health-conscious, with dietary choices primarily influenced by social media (45%) rather than

healthcare professionals (Siddiqui and Irfan, 2024), reflecting a pattern of health awareness that is dispositional rather than behaviorally enacted a concern equally relevant in the Omani context.

Health consciousness is increasingly becoming more important due to increasing prevalence of chronic non-communicable diseases (NCDs) among populations of all age groups. For instance, cancer is now one of the leading causes of morbidity and mortality worldwide, with an estimated 20 million new cancer cases and 9.7 million deaths recorded globally in 2022, and projections indicating that incidence will reach 35 million new cases annually by 2050 (Bray et al., 2024; Jogunčić et al., 2026). In the Arab world, cancer incidence is rising rapidly alongside demographic transitions, urbanization, and shifts in lifestyle risk factors such as obesity, physical inactivity, and dietary changes (Alaloul et al., 2025). In Oman specifically, the most recent and available data from the National Cancer Registry revealed an increase in cancer age-standardized rate of 23% the between 1996 and 2019 (Al-Azri et al., 2019; Al-Azri et al., 2021). It is possible that when updates are provided in future the picture will be even worse because the total number of annual cancer diagnoses in Oman is projected to rise to 8,549 by the year 2040 (Al Naabi and Al Zaabi, 2024). The highlighted trends focus on cancer but are similar for other NCDs, underscoring the need for strengthening cancer prevention and health-promotion efforts at the population level. Addressing this growing burden requires a society that is health-conscious, initiative-taking about preventive care, and engaged with evidence-based health information qualities that must be cultivated early, particularly among young adults (Persaud et al., 2023).

University students are a strategically important group for health-promotion efforts in Oman (Al Bahri et al., 2024). They are at a formative stage of life when health attitudes, beliefs, and behaviors are still developing, and as future leaders and decision-makers, they can shape social norms related to health and preventive care (Al Bahri et al., 2024; Wang et al., 2025). In Oman, about 31% of the population is younger than 19 years, and university students represent an educated emerging workforce whose health behaviors and attitudes will influence the country's response to the rising burden of NCDs (Mondal et al., 2025; Al-Dhawyani et al., 2022). Moreover, the university setting is well suited for health-promotion programs and awareness campaigns because it offers a structured environment, access to non-healthcare students without formal medical training, and opportunities for peer influence among emerging professionals (Al-Dhawyani et al., 2022; Shakhman et al., 2020). In addition, young adults in Oman rely on the internet for health information and have limited contact with healthcare professionals, making formal efforts to build health consciousness in universities especially important (Al-Suqri, 2025).

Despite the recognized importance of health consciousness as a determinant of preventive health behaviors and attitudes toward illness, few studies have examined health consciousness specifically among Omani university students, and little is known about the sociodemographic, religious, and behavioral factors that are associated with it in this population. Available evidence from the broader literature suggests that health awareness and literacy are associated with more proactive preventive health behaviors, greater engagement with cancer screening programs, and more favorable attitudes toward serious illness (Ayaad et al., 2024). However, the specific dimensions of health consciousness most strongly linked to health behaviors and illness attitudes, and the key predictors of health consciousness in the Omani university context, remain unknown (Matani et al., 2024).

Addressing this evidence gap is particularly important given the rapid increase in cancer burden in Oman, the cultural and religious factors that uniquely shape health perceptions in Omani society, and the strategic role that university students can play as future health advocates and decision-makers. Therefore, the purpose of this study was to assess the level of health consciousness and examine its relationship with sociodemographic factors and health behaviors among university students in Oman.

2. MATERIALS AND METHODS

2.1 Study design

A descriptive cross-sectional survey assessed health consciousness and associated sociodemographic and health-related characteristics among students enrolled in non-healthcare programs in Oman. All variables were measured at one time point; consequently, the analyses describe associations and do not establish temporal sequence or causality.

2.2 Setting and participants

The study was conducted at Sultan Qaboos University, the University of Nizwa, and the University of Buraimi, representing government and private university settings. Students from several non-healthcare disciplines and years of study were eligible.

The inclusion of three institutions provided diversity of setting, but did not constitute a probability sample of universities or students in Oman.

2.3 Sample size and sampling

The recruitment target was 318 students, and the final analytic sample comprised 320 completed questionnaires. Non-probability convenience sampling was used. Following institutional permission, an electronic invitation containing the study information, consent form, and questionnaire link was distributed through official university email to eligible students. Participation depended on students voluntarily accessing and completing the survey; no random selection procedure was used. The total number of students who received the invitation and the numbers who declined or submitted incomplete questionnaires were not available in the study report; therefore, a response rate could not be calculated. The sample size describes the achieved sample and does not provide a design-based margin of error for the wider student population.

2.4 Inclusion and exclusion criteria

Eligible participants were aged 18 years or older and actively enrolled in a non-health-science program at one of the participating universities. Students enrolled in nursing, dentistry, medicine, pharmacy, or other health-science programs were excluded because their professional training involves systematic exposure to health knowledge. Students who had withdrawn from their programs were also excluded.

2.5 Study instruments

Demographic Datasheet: A researcher-developed datasheet was used to collect information about participants' gender, age, year and field of study, marital status, academic performance (GPA), work status, self-rated religiosity (0-10 scale), and a range of health-related behaviors and experiences. Health-related variables included the main source of health information, frequency of physical exercise, frequency of fruit and vegetable consumption, timing of the last annual physical examination, experience with a family member or friend with cancer, history of hospital admission, and presence of chronic illness.

Health Consciousness Scale (HCS): Health consciousness was measured using the nine-item HCS developed by Gould (1990). In the version administered in this study, responses ranged from 1 (strongly disagree) to 5 (strongly agree). The items were positively worded and summed to obtain a total score ranging from 9 to 45, with higher scores indicating greater self-reported health consciousness. The four domain scores were obtained by summing their constituent items: health alertness (two items; range 2–10), health self-consciousness (three items; range 3–15), health self-monitoring (two items; range 2–10), and health involvement (two items; range 2–10). The latter comprises the items concerning examining one's health and being involved with one's health; it was labeled 'health environment' in the submitted draft, but is termed health involvement in the established scale literature (Marsall et al., 2021). It does not measure environmental health knowledge. For descriptive comparison across domains with unequal item counts, domain means were also expressed per item. No validated low, moderate, or high cut-off was applied; scores were analyzed as continuous measures. Previous validation studies support the instrument's reliability while also indicating that its factor structure may differ across settings (Marsall et al., 2021; Remr, 2023). In the present sample, the total scale had a Cronbach's alpha of 0.88; this indicates internal consistency, not confirmation of local construct validity.

2.6 Ethical considerations

Ethical approval was obtained from the Institutional Review Board (IRB) of the College of Nursing at Sultan Qaboos University (CON/GP/2025/7) prior to data collection. Written informed consent was obtained electronically from all participants before they accessed the survey. Participants were informed of their right to withdraw at any time without penalty. All data were collected without personal identifying information, are presented in aggregate form, and were stored in password-protected files accessible only to the research team.

2.7 Data collection procedure

Following ethical approval and institutional permission, eligible students received an electronic survey link through official university email. The survey was available in Arabic and English. The link presented the study information and electronic consent form before the demographic and health-behavior questionnaire and HCS. Consent was obtained before questionnaire access; submission of the completed questionnaire indicated agreement to participate. Before the main survey, 30 students

participated in a pilot assessment of item clarity, cultural appropriateness, linguistic equivalence, and completion time, reported as approximately 40 minutes. Pilot responses were excluded from the final analysis. Responses were collected without personal identifiers and stored in password-protected files accessible only to the research team. The pilot assessment did not constitute formal validation of the Arabic or English version in this population.

2.8 Data analysis

Data were analyzed using IBM SPSS Statistics, Version 29. Frequencies and percentages summarized categorical variables; means and standard deviations summarized total and domain HCS scores. Cronbach's alpha assessed internal consistency. The Shapiro–Wilk test described the distributions of HCS scores. The independent-samples t-test and one-way analysis of variance (ANOVA) were the reported bivariate procedures for comparing scores across categorical characteristics (Table 5). These comparisons were exploratory; no multiplicity-adjusted results are presented. The significance threshold was $p \leq 0.05$.

The analysis used the 320 completed questionnaires reported in the study. No item-level imputation procedure or model-specific missing-data summary was documented. The numerical category codes, covariate-selection rule, and residual or influence diagnostics were not available in the supplied analysis record. Accordingly, these procedures are not assumed to have been performed, and the regression is interpreted as exploratory. Reported tolerance values ranged from 0.93 to 0.99 and VIF values from 1.01 to 1.08; these address collinearity only, not the other model assumptions.

The total HCS score was the outcome in the reported multivariable linear regression. The five explanatory terms shown in Table 6 were marital status, religiosity, exercise frequency, examination timing, and knowing someone diagnosed with cancer. Exercise and examination timing were each represented by a single coefficient; their coefficients therefore relate to one-unit changes in the assigned category codes, not necessarily equal changes in frequency or elapsed time. Unstandardized coefficients (B), standard errors, standardized coefficients (Beta), t statistics, p-values, 95% confidence intervals, tolerance, and variance inflation factors (VIF) are presented. Adjusted R^2 described model fit. A statistically significant coefficient indicates an association conditional on the other included terms, not a causal effect or validated prediction.

3. RESULTS AND DISCUSSION

3.1 Characteristics of the participants

A total of 320 university students in non-healthcare related programs of study from three universities in Oman participated in the study. The demographic characteristics of the participants are summarized in Table 1. The participants were in a wide range of academic disciplines such as agriculture and environmental sciences (18.8%), education (13.4%), science (11.3%), and business and management (10.6%). Students from all six years of study were represented, with the majority in their third year (25.6%), fifth year (23.4%), and fourth year (19.4%) of study. Regarding sociodemographic characteristics, most participants were female (61.9%) and single (95.6%), with a mean age of 20.90 ± 2.16 years. The age distribution showed that nearly half of the participants were between 21 and 23 years of age (49.4%), followed by those aged 18–20 years (44.1%), and a small proportion aged 24 years or above (6.6%). The majority of participants were not currently employed (96.6%), reflecting a predominantly full-time student population.

The mean cumulative grade point average (GPA) was 3.02 ± 0.45 among students who disclosed it. Using the full sample as denominator, 36.6% reported a GPA of 2.1–3.0, 28.4% reported a GPA of at least 3.1, and 108 students (33.8%) preferred not to disclose their GPA. Most students rated their religious practice and behavior at 7 or above on the 0–10 scale (72.5%); the mean score was 7.37 ± 1.64. Only 11.2% identified as the first person in their family to attain university education.

Table 1. Characteristics of the participants (N= 320)

Characteristics		n (%)	M ± SD
Academic Program	Education	43 (13.4)	
	Engineering	29 (9.1)	
	Computer sciences	21 (6.6)	
	Business and management	34 (10.6)	
	Law	27 (8.4)	
	Science	36 (11.3)	
	Arts and humanities	28 (8.8)	
	Agriculture & environment	60 (18.8)	

	Social sciences	28 (8.8)	
	Foundation program	14 (4.4)	
Year of Study	Year one	39 (12.2)	
	Year two	50 (15.6)	
	Year three	82 (25.6)	
	Year four	62 (19.4)	
	Year five	75 (23.4)	
	Year six	12 (3.8)	
Gender	Male	122 (38.1)	
	Female	198 (61.9)	
Age in years	18 – 20	141 (44.1)	
	21 – 23	158 (49.4)	20.90 ±2.16
	≥ 24	21 (6.6)	
Marital status	Single	306 (95.6)	
	Married	14 (4.4)	
Current GPA in the Program	≤ 2.0	4 (1.3)	
	2.1 – 3.0	117 (36.6)	3.02 ±0.45
	≥ 3.1	91 (28.4)	
	Don't want to disclose	108 (33.8)	
Self-rating of religious practice and behavior on a scale of 0 to 10	0 – 3	6 (1.9)	
	4 – 6	82 (25.6)	7.37 ± 1.64
	≥ 7	232 (72.5)	
Currently working	Yes	11 (3.4)	
	No	309 (96.6)	
Work arrangement	Full time	5 (1.6)	
	Part-time	6 (1.9)	
	Not working	309 (96.6)	
First person in the family to get a university education	Yes	36 (11.2)	
	No	284 (88.8)	

3.2 Health-related behaviors and experiences

Health-related behaviors and experiences are summarized in Table 2. The internet was the main source of health information for 79.1% of participants, while 18.8% relied on healthcare professionals and 2.2% on television. Exercise was reported often by 40.9%, regularly by 15.9%, rarely by 38.4%, and never by 4.7%. Fruit and vegetable consumption was reported often by 53.8% and regularly by 32.2%. More than half (54.7%) reported never attending an annual physical examination, while 25.9% reported one within the previous 1–12 months; this question did not measure all types of doctor visits. Overall, 68.8% knew someone diagnosed with cancer and 45.0% had experience with a family member or friend with cancer. Twenty-four students (7.5%) reported a chronic illness. The reported condition-type counts in Table 2 do not fully reconcile with this total and should be interpreted cautiously. The most frequently reported cancer-prevention actions were diet and exercise combined (48.8%), dieting alone (14.4%), and avoiding known risk factors (13.8%); 5.9% reported no specific action.

Table 2. Health related behaviors and experiences of the participants (N= 320)

Behavior or experience		**n (%)**
Main source of information about health issues	Television	7 (2.2)
	Internet	253 (79.1)
	Healthcare profession	60 (18.8)
How often do you exercise?	Never	15 (4.7)
	Rarely	123 (38.4)
	Often	131 (40.9)
	Regularly	51 (15.9)
How often do you eat vegetables and fruit?	Never	2 (0.6)
	Rarely	43 (13.4)
	Often	172 (53.8)
	Regularly	103 (32.2)

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Behavior or experience		n (%)
When was the last time you went to see the doctor for your annual physical examination?	Never 3 years ago 2 years ago 1 month to 1 year ago	175 (54.7) 25 (7.8) 37 (11.6) 83 (25.9)
Has experience with a family member or friend with Cancer	Yes No	144 (45) 176 (55)
Has ever been admitted to the hospital	Yes No	140 (43.8) 180 (56.3)
Knows a person who has been diagnosed with cancer	Yes No	220 (68.8) 100 (31.3)
Do you have any chronic illnesses?	Yes No	24 (7.5) 296 (92.5)
Type of chronic illness	None Eczema and skin problems Anemia Asthma Inflammatory bowel disease Migraine PCOS Sickle cell disease Thyroid disease	301 (94.1) 2 (0.6) 2 (0.6) 3 (0.9) 2 (0.6) 4 (1.3) 1 (0.3) 3 (0.9) 2 (0.6)
Actions performed to prevent cancer in the future	Diet and exercise. Avoiding known risk factors Attending medical checkups Dieting only Physical exercise Increasing knowledge and awareness Psychological and spiritual well-being No specific action Others	156 (48.8) 44 (13.8) 36 (11.3) 46 (14.4) 5 (1.6) 7 (2.2) 5 (1.6) 19 (5.9) 2 (0.6)

Note: All values are reproduced from the study report. Twenty-four students reported a chronic illness, but the named-condition counts total 19; these two summaries do not fully reconcile. Condition-specific frequencies require verification against the source data.

3.3 Level of health consciousness

The mean total HCS score was 31.17 ± 5.88 on a possible range of 9–45, equivalent to an average item score of 3.46 out of 5. The mean domain sums were 7.36 ± 1.54 for health alertness, 10.62 ± 2.27 for health self-consciousness, 7.18 ± 1.50 for health self-monitoring, and 6.01 ± 1.83 for health involvement (Table 3). Because the domains contain unequal numbers of items, raw sums were not ranked directly. On a per-item basis, health alertness had the highest mean (3.68), followed by health self-monitoring (3.59), health self-consciousness (3.54), and health involvement (3.01). These values are descriptive and do not establish a validated category of 'high' health consciousness. All HCS distributions deviated from normality on the Shapiro–Wilk test ($p < 0.01$). This finding alone does not identify which inferential procedures are appropriate; the reported parametric comparisons require consideration of group sizes and model assumptions.

Table 3. Participants' Overall Health Consciousness (N = 320)

Scale	Domains	Range	M ± SD	Shapiro-Wilk Test Statistic (p-value)
Health Consciousness Scale (HCS)	Overall HCS	9–45	31.17 ± 5.88	0.96 (<0.01)

Scale	Domains	Range	M ± SD	Shapiro-Wilk Test Statistic (p-value)
	Health alertness	2–10	7.36 ± 1.54	0.87 (<0.01)
	Health self-monitoring	2–10	7.18 ± 1.50	0.95 (<0.01)
	Health self-consciousness	3–15	10.62 ± 2.27	0.97 (<0.01)
	Health involvement	2–10	6.01 ± 1.83	0.92 (<0.01)

Note: Ranges are possible score ranges. HCS scores were interpreted continuously without validated categories. Health involvement was labeled health environment in the submitted draft. Standard errors of the means are omitted because several supplied entries were internally inconsistent; means, SDs, and Shapiro–Wilk results are retained.

Item-level responses are shown in Table 4. Combining the agree and strongly agree categories, 66.9% reported being alert to changes in their health and 65.9% reported usually being aware of their health. In the health self-consciousness domain, 59.7% reported reflecting on their health a lot and 63.7% reported being attentive to their feelings about their health. For health involvement, 24.1% agreed or strongly agreed that they constantly examined their health. This pattern describes involvement with personal health, rather than awareness of external environmental determinants.

Table 4. Description of the Participants' Responses on Items of the Health Consciousness Scale (N = 320)

Items		Strongly Disagree n (%)	Disagree n (%)	Not Sure n (%)	Agree n (%)	Strongly Agree n (%)
Health Alertness	I am alert to changes in my health	11 (3.4)	8 (2.5)	87 (27.2)	173 (54.1)	41 (12.8)
	I am usually aware of my health	9 (2.8)	17 (5.3)	83 (25.9)	177 (55.3)	34 (10.6)
Health Self-Consciousness	I reflect on my health a lot	10 (3.1)	19 (5.9)	100 (31.3)	150 (46.9)	41 (12.8)
	I am very self-conscious about my health	12 (3.8)	37 (11.6)	116 (36.3)	121 (37.8)	34 (10.6)
	I am generally attentive to my feelings about my health	8 (2.5)	32 (10.0)	76 (23.8)	164 (51.2)	40 (12.5)
Health involvement	I am constantly examining my health	48 (15.0)	96 (30.0)	99 (30.9)	60 (18.8)	17 (5.3)
	I am very involved with my health	12 (3.8)	39 (12.2)	134 (41.9)	105 (32.8)	30 (9.4)
Health Self-Monitoring	I am aware of the state of my health as I go through the day	11 (3.4)	31 (9.7)	107 (33.4)	147 (45.9)	24 (7.5)
	I notice how I feel physically as I go through the day	7 (2.2)	16 (5.0)	79 (24.7)	171 (53.4)	47 (14.7)

3.4 Factors associated with health consciousness

In exploratory bivariate analyses, married students had higher mean overall HCS scores than single students (35.08 ± 5.61 versus 31.03 ± 5.83; $p = 0.02$). Differences were also reported for health alertness ($p = 0.03$), health self-monitoring ($p = 0.004$), and health self-consciousness ($p = 0.05$). Higher self-rated religiosity was associated with differences in overall HCS scores ($p = 0.04$) and health involvement scores ($p = 0.001$). Students in the highest religiosity category had the highest mean health involvement score. These are group-comparison results; a separate test of a linear trend is not reported.

Exercise frequency was associated with overall HCS scores in bivariate analysis ($p = 0.02$); students who exercised often had the highest reported mean (32.19 ± 5.40). Examination timing was associated with overall HCS at the stated significance threshold ($p = 0.05$) and with health involvement (reported rounded $p < 0.01$). Students reporting an examination in the preceding 1–12 months had the highest health involvement mean (6.74 ± 1.75). Students with a family member or friend with cancer had higher overall HCS scores than those without such experience (31.94 ± 5.86 versus 30.53 ± 5.84; $p = 0.03$), as well

as higher self-monitoring (p = 0.01) and involvement scores (p = 0.04). Hospital admission history was associated with self-monitoring scores (p = 0.03). These comparisons are exploratory, especially for categories with few participants, and do not establish independent or causal effects.

Table 5. Difference in Health Consciousness Across Selected Characteristics (N = 320)

Characteristics	HCS M ± SD	Health Alertness M ± SD	Health Self-monitoring M ± SD	Health Self-consciousness M ± SD	Health involvement M ± SD
Gender					
Male	30.84 ± 5.97	7.20 ± 1.69	6.99 ± 1.54	10.48 ± 2.39	6.14 ± 1.83
Female	31.37 ± 5.83	7.14 ± 1.43	7.29 ± 1.47	10.70 ± 2.19	5.93 ± 1.82
p-value	0.44	0.26	0.85	0.40	0.33
Age in years					
18–20	30.78 ± 5.89	7.26 ± 1.56	7.11 ± 1.43	10.49 ± 2.32	5.92 ± 1.80
21–23	31.35 ± 5.77	7.47 ± 1.48	7.19 ± 1.52	10.66 ± 2.19	6.04 ± 1.85
≥ 24	32.33 ± 6.74	7.19 ± 1.83	7.57 ± 1.83	11.14 ± 2.50	6.43 ± 1.86
p-value	0.45	0.45	0.41	0.44	0.48
Marital status					
Single	31.03 ± 5.83	7.33 ± 1.54	7.14 ± 1.49	10.58 ± 2.26	5.98 ± 1.80
Married	35.08 ± 5.61	8.16 ± 1.14	8.23 ± 1.09	11.77 ± 1.92	6.92 ± 2.10
p-value	0.02*	0.03*	0.004*	0.05*	0.07
Self-rating of religious practice (0–10)					
0–3	28.67 ± 6.56	6.60 ± 2.51	7.50 ± 1.52	9.67 ± 3.14	5.00 ± 1.10
4–6	29.94 ± 4.87	7.20 ± 1.35	6.96 ± 1.54	10.34 ± 1.90	5.44 ± 1.56
≥ 7	31.66 ± 6.13	7.44 ± 1.57	7.25 ± 1.49	10.74 ± 2.35	6.24 ± 1.88
p-value	0.04*	0.18	0.30	0.23	0.001*
Currently working					
Yes	29.00 ± 4.71	6.12 ± 1.60	7.64 ± 1.03	9.55 ± 1.81	5.00 ± 1.61
No	31.24 ± 5.91	7.38 ± 1.53	7.16 ± 1.51	10.65 ± 2.27	6.05 ± 1.83
p-value	0.21	0.28	0.17	0.07	0.06
First person in family to get university education					
Yes	32.00 ± 5.29	7.64 ± 1.07	7.22 ± 1.55	10.81 ± 2.03	6.33 ± 1.74
No	31.06 ± 5.95	7.32 ± 1.58	7.17 ± 1.50	10.59 ± 2.30	5.97 ± 1.84
p-value	0.33	0.13	0.84	0.56	0.25
Main source of health information					
Television	32.14 ± 3.72	7.57 ± 0.98	6.86 ± 1.21	10.86 ± 1.35	6.86 ± 1.46
Internet	31.04 ± 5.91	7.35 ± 1.55	7.13 ± 1.49	10.62 ± 2.31	5.95 ± 1.84
Healthcare profession	31.53 ± 6.02	7.37 ± 1.55	7.42 ± 1.58	10.58 ± 2.20	6.17 ± 1.80
p-value	0.77	0.93	0.35	0.96	0.33
How often do you exercise?					
Never	31.20 ± 5.44	7.67 ± 1.59	7.40 ± 1.24	10.67 ± 2.16	5.47 ± 1.41
Rarely	29.91 ± 6.06	7.16 ± 1.55	6.94 ± 1.57	10.19 ± 2.28	5.63 ± 1.86
Often	32.19 ± 5.40	7.51 ± 1.40	7.41 ± 1.31	10.92 ± 2.13	6.35 ± 1.78
Regularly	31.55 ± 6.35	7.37 ± 1.79	7.10 ± 1.50	10.84 ± 2.48	6.23 ± 1.82

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Characteristics	HCS M ± SD	Health Alertness M ± SD	Health Self-monitoring M ± SD	Health Self-consciousness M ± SD	Health involvement M ± SD
p-value	0.02*	0.25	0.09	0.06	0.01*
How often do you eat vegetables and fruit?					
Never	35.50 ± 2.12	9.00 ± 1.41	8.00 ± 0.00	13.00 ± 0.00	5.50 ± 0.71
Rarely	30.49 ± 6.54	7.28 ± 1.75	7.05 ± 1.59	10.49 ± 2.60	5.67 ± 1.99
Often	30.84 ± 6.07	7.22 ± 1.57	7.13 ± 1.54	10.48 ± 2.32	6.01 ± 1.81
Regularly	31.90 ± 5.25	7.59 ± 1.36	7.29 ± 1.41	10.84 ± 2.02	6.18 ± 1.79
p-value	0.29	0.10	0.65	0.26	0.49
Last annual physical examination					
Never	30.42 ± 5.69	7.23 ± 1.48	7.19 ± 1.50	10.42 ± 2.21	5.58 ± 1.78
3 years ago	31.16 ± 5.05	7.28 ± 1.31	7.20 ± 1.38	10.40 ± 1.98	6.28 ± 1.62
2 years ago	31.68 ± 4.85	7.60 ± 1.38	7.03 ± 1.44	10.78 ± 1.77	6.27 ± 1.81
1–12 months ago	32.51 ± 6.71	7.54 ± 1.76	7.21 ± 1.58	11.02 ± 2.61	6.74 ± 1.75
p-value	0.05*	0.35	0.94	0.22	<0.01*
Family member or friend with cancer					
Yes	31.94 ± 5.86	7.44 ± 1.55	7.44 ± 1.44	10.82 ± 2.23	6.24 ± 1.83
No	30.53 ± 5.84	7.29 ± 1.52	6.97 ± 1.52	10.45 ± 2.29	5.82 ± 1.80
p-value	0.03*	0.41	0.01*	0.15	0.04*
Ever admitted to hospital					
Yes	31.65 ± 5.61	7.49 ± 1.41	7.39 ± 1.39	10.69 ± 2.23	6.09 ± 1.77
No	30.79 ± 6.07	7.26 ± 1.63	7.02 ± 1.57	10.56 ± 2.30	5.95 ± 1.87
p	0.19	0.19	0.03*	0.63	0.49
Knows a person diagnosed with cancer					
Yes	31.34 ± 5.57	7.38 ± 1.55	7.26 ± 1.40	10.63 ± 2.16	6.08 ± 1.72
No	30.78 ± 6.62	7.32 ± 1.52	7.00 ± 1.71	10.59 ± 2.49	5.87 ± 2.04
p-value	0.46	0.76	0.18	0.90	0.38
Chronic illness					
Yes	31.79 ± 6.58	7.13 ± 2.15	7.63 ± 1.38	10.92 ± 2.64	6.13 ± 2.05
No	31.12 ± 5.83	7.38 ± 1.48	7.14 ± 1.51	10.59 ± 2.24	6.00 ± 1.81
p-value	0.63	0.58	0.11	0.56	0.78

Independent-samples t-test or ANOVA, as reported in the study analysis. *$p \leq 0.05$. The comparisons are exploratory and the p-values are nominal. Values originally displayed as 0.00 are expressed as <0.01 to avoid implying a zero probability; their exact values require the original output.

The reported multivariable model contained marital status, self-rated religiosity, exercise frequency, timing of the last annual physical examination, and knowing someone diagnosed with cancer (Table 6). The adjusted contrast reported for married versus single students was 4.61 HCS points (B = 4.61, 95% CI 1.40–7.81; p = 0.01). A one-point increase in self-rated religiosity was associated with a 0.42-point higher HCS score (B = 0.42, 95% CI 0.02–0.81; p = 0.04). Examination timing was associated with HCS as a coded model term (B = 0.58, 95% CI 0.08–1.09; p = 0.02). Its interpretation depends on the category coding and should not be read as a one-year effect or a specific comparison between examination groups. Exercise frequency (p = 0.13) and knowing someone diagnosed with cancer (p = 0.34) were not statistically significant in this model. Gender and age were not shown as covariates in the reported model, so no age- or gender-adjusted conclusions are made. The adjusted R^2 was 0.06,

indicating modest explanatory value; statistical significance should not be equated with strong predictive performance or a causal effect.

Table 6. Participants' Characteristics Associated with Overall Level of Health Consciousness - Multivariable Linear Regression (N = 320)

Model	B	Std. Error	Beta	t	p-value	Lower Bound	Upper Bound	Tolerance	VIF
Constant	21.30	2.60	-	8.21	<0.01	16.19	26.40	-	-
Marital status	4.61	1.63	0.16	2.83	0.01	1.40	7.81	0.98	1.02
Self-rated religiosity (0–10)	0.42	0.20	0.12	2.08	0.04	0.02	0.81	0.95	1.05
Exercise frequency (coded term)	0.63	0.42	0.09	1.50	0.13	-0.19	1.45	0.93	1.07
Last physical examination (coded term)	0.58	0.25	0.13	2.30	0.02	0.08	1.09	0.93	1.08
Knows someone diagnosed with cancer	-0.66	0.69	-0.05	-0.95	0.34	-2.02	0.71	0.99	1.01

Dependent variable: total Health Consciousness Scale score. B, unstandardized coefficient; Beta, standardized coefficient; CI, confidence interval; VIF, variance inflation factor. Lower and upper bounds are the reported 95% CI limits. Adjusted R^2 = 0.06. Each ordinal variable is represented by one reported coefficient; interpretation depends on its numerical coding. No causal effect is estimated.

3.5 Discussion

This cross-sectional survey described health consciousness among 320 students enrolled in non-healthcare programs at three universities in Oman. The mean total HCS score was 31.17 ± 5.88, but no validated threshold was used to classify students as having high or low health consciousness. Studies in other settings also examine health consciousness in relation to student health and lifestyle, although differences in instruments, scoring, and populations limit direct numerical comparisons (Huang et al., 2025; Moravecz and Kovács, 2025; Jayarathne, 2025). Comparing the present domains on a per-item basis, health alertness was highest and health involvement lowest. The involvement items concern attention to and engagement with personal health; they do not support conclusions about environmental health knowledge (Marsall et al., 2021). The domain pattern may guide further investigation, but should not be interpreted as a validated ranking of intervention priorities.

The coexistence of self-reported health awareness with infrequent routine examinations is noteworthy: 54.7% had never attended an annual physical examination, and 79.1% mainly obtained health information from the internet. This pattern is compatible with a distinction between health-related awareness and enacted behavior, but does not demonstrate that awareness is ineffective or explain why students did not attend examinations. Barriers to care, perceived need, availability of services, and quality of online information were not directly assessed. Evidence on health literacy, check-up attendance, and healthcare seeking among young adults provides relevant context, but does not establish the mechanism in this sample (Lee et al., 2021; Tran and Silvestri-Elmore, 2021). Recommendations should concern age- and risk-appropriate preventive care, not assume that all young adults require annual examinations or cancer screening.

Marital status, self-rated religiosity, and examination timing were statistically associated with total HCS scores in the reported multivariable model, but the adjusted R^2 of 0.06 indicates that its explanatory contribution was modest. Most variability remained unexplained, and the model was not evaluated as a prediction tool in a separate sample. The marital-status estimate must be interpreted particularly cautiously because only 14 participants were married. Partner support is a possible explanation for the association, but it was not measured, and differences in age, social circumstances, or other unmeasured characteristics could contribute. Religiosity was assessed using a single self-rating, rather than a multidimensional measure. Research on religiosity and well-being in Oman provides contextual background (Hossain and Rizvi, 2016), but the present study cannot show that religiosity causes greater health consciousness or that a religiously framed intervention would be effective.

The relationship between examination timing and health consciousness may operate in either direction: health-conscious students may seek preventive care, healthcare encounters may increase awareness, or both may reflect other influences. The

cross-sectional design cannot distinguish these explanations. The examination-timing coefficient also depends on how its ordinal categories were coded and cannot quantify the effect of a specific interval in years. The observed association therefore supports further investigation of campus healthcare access and engagement, rather than a claim that more frequent examinations will improve HCS scores. Longitudinal studies and evaluations of age-appropriate preventive services are needed before making causal or service-effectiveness claims.

Having a family member or friend with cancer was associated with higher HCS scores in bivariate analysis. This variable should be distinguished from the broader question of knowing someone with cancer, which was the cancer-contact variable included in the regression and was not statistically significant there. Consequently, the present results do not establish an independent association for family or friend cancer experience. Personal proximity to illness is a possible topic for qualitative and longitudinal investigation. Peer-led cancer education has been evaluated in other student populations (Poudel et al., 2021), but whether a comparable approach would improve health consciousness among university students in Oman remains untested.

The findings support treating health consciousness as a construct requiring careful measurement and contextual interpretation. Future studies should formally evaluate the Arabic and English HCS versions, examine whether the proposed domain structure is appropriate, and investigate additional social, psychological, and institutional correlates. Prospective research could assess whether specific domains precede changes in preventive behavior. Any subsequent intervention study should evaluate both HCS outcomes and observable or independently verified health behaviors, rather than assume that a change in awareness produces a change in action.

3.6 Implications for practice and policy

Universities could use these findings to inform the co-design and pilot evaluation of health-information and preventive-care initiatives, rather than to justify immediate system-wide implementation. Potential approaches include integrating health-information appraisal into orientation activities, improving navigation of campus health services, and offering age- and risk-appropriate preventive advice. Peer-led and digital formats may be feasible options, but their acceptability, reach, and effectiveness should be evaluated locally. The modest model fit and limited subgroup sizes do not justify selecting or excluding students from services solely on marital status or religiosity.

Cultural and religious preferences may be considered during voluntary, student-centered program development. Consultation with diverse students, healthcare professionals, and, where appropriate, religious representatives could help explore acceptable communication approaches. Such consultation should remain inclusive of students with different levels of religious observance and should not imply that lower religiosity is a health deficit. The study did not test a faith-based intervention, and cannot establish its effectiveness. Campus programs should be evaluated prospectively for participation, equity, knowledge, preventive-care engagement, and unintended effects.

3.7 Strengths and limitations

Strengths include the use of a structured nine-item instrument, good internal consistency of the total HCS in this sample (Cronbach's $\alpha = 0.88$), and participation across academic disciplines, years of study, and government and private university settings. These features provide context-specific descriptive evidence, but do not establish population representativeness or confirm that the scale measures the same construct across institutions or language versions.

Several limitations constrain interpretation. The cross-sectional design cannot establish temporal order or causality, and reverse causation is possible. Convenience recruitment and voluntary online participation may have favored students already interested in health or more engaged with university email. Recruitment was uneven across the three institutions (81.2%, 16.6%, and 2.2%), and institution-specific estimates, weighting, or cluster-adjusted results were not reported. Thus, the results should not be generalized to all university students in Oman, healthcare students, non-students, or other national settings. The unavailable invitation and nonresponse counts further limit assessment of selection bias.

All health behaviors, examination timing, religiosity, and HCS responses were self-reported and were not independently verified. Recall error, social desirability, and common-method bias may affect their associations; qualitative labels such as 'often' and 'regularly' may also be interpreted differently by participants. The religiosity item does not capture the multiple dimensions of religious practice or belief. The administered HCS versions have not undergone formal local validation, and measurement invariance across language versions was not established. The reported reliability estimates were lower for self-monitoring ($\alpha =$

0.65) than for the total scale, while the involvement domain had α = 0.75. Reliability alone does not establish the validity of the proposed domains.

The regression explained only a modest proportion of score variation, and potentially important confounders were not fully addressed. Small subgroups, including married students, may produce unstable estimates. Numerous exploratory bivariate comparisons increase the possibility of chance findings. Although the reported tolerance and VIF values do not suggest substantial collinearity, residual, influence, and heteroscedasticity diagnostics and sensitivity analyses are not presented. Departure from normality of the raw outcome does not, by itself, establish violation of the regression residual assumptions, but the available reporting does not permit a full assessment of model adequacy. Interpretation of ordinal-variable coefficients also depends on their numerical coding. Inconsistencies in some reported subgroup and chronic-illness summaries further warrant verification against the original analysis output. Longitudinal, probability-based or otherwise more representative studies with verified behavioral measures are needed.

4. CONCLUSION

Among 320 non-healthcare students recruited by convenience sampling at three universities in Oman, the mean HCS score was 31.17 ± 5.88. Health alertness had the highest per-item mean and health involvement the lowest; no validated high-versus-low classification was applied. Marital status, self-rated religiosity, and examination timing were associated with total HCS in the reported model, but explanatory value was modest (adjusted $R^2 = 0.06$). These cross-sectional associations do not demonstrate causal effects or intervention effectiveness. Locally co-designed, inclusive health-promotion approaches and age-appropriate preventive-care initiatives warrant pilot evaluation, alongside stronger measurement validation and longitudinal, more representative research.

Author Contributions

Conceptualization, J.K.M., E.R.L. and N.A.S.; methodology, J.K.M. and E.R.L.; software, J.K.M. and E.R.L.; validation, S.I.A.J., J.K.M. and E.R.L.; formal analysis, J.K.M. and E.R.L.; investigation, S.I.A.J., A.Z.A.R., H.A.A.S., I.M.A.Z., S.S.A.M., N.A.S., J.K.M. and E.R.L.; resources, S.I.A.J., J.K.M. and E.R.L.; data curation, J.K.M. and E.R.L.; writing - original draft preparation, E.R.L. and J.K.M.; writing-review and editing, S.I.A.J., A.Z.A.R., H.A.A.S., I.M.A.Z., S.S.A.M., N.A.S., J.K.M. and E.R.L.; visualization, E.R.L.; supervision, J.K.M. and E.R.L.; project administration, E.R.L. All authors have read and agreed to the published version of the manuscript.

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Conflict of Interest

The authors declare no conflicts of interest.

Ethics Statement

Ethical approval for the study was obtained from the Institutional Review Board of the College of Nursing at Sultan Qaboos University (CON/GP/2025/7) prior to data collection. Permission to recruit students was subsequently sought and obtained from the administration of each participating university. Informed consent was obtained electronically from all participants before accessing the survey, and participation was entirely voluntary and confidential. Participants were informed of their right to withdraw at any time without penalty, and no personal identifying information was collected.

Informed consent was obtained from all subjects involved in the study.

Data Availability Statement

Data are available on reasonable request from the corresponding author. The datasets are not publicly available because of institutional and national requirements governing confidential research data. De-identified data may be shared for non-commercial research subject to ethics committee and institutional approvals and, when required, a data-sharing agreement.

Public Involvement Statement

There was no public involvement in any aspect of this research.

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Guidelines and Standards Statement

Reporting was guided by the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) recommendations for cross-sectional studies. Limitations in recruitment reporting and statistical documentation are identified in the Methods and Limitations sections.

Use of Artificial Intelligence

ChatGPT was used for language editing, manuscript organization, formatting, and preparation of draft revisions and reviewer responses. NotebookLM (Google LLC, Mountain View, CA, USA) was previously used to prepare a graphical abstract. No participant-level data were generated or reanalyzed by these tools for the present revision. The authors remain responsible for verifying the scientific content, statistical reporting, and final manuscript.

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List of Abbreviations

Abbreviation	Full Term
ANOVA	Analysis of Variance
ASR	Age-Standardized Rate
B	Unstandardized Regression Coefficient
CI	Confidence Interval
CON	College of Nursing
GPA	Grade Point Average
HCS	Health Consciousness Scale
IRB	Institutional Review Board
M	Mean
NCDs	Non-Communicable Diseases
PCOS	Polycystic Ovary Syndrome
SD	Standard Deviation
SPSS	Statistical Package for the Social Sciences
SQU	Sultan Qaboos University
VIF	Variance Inflation Factor
α	Cronbach's Alpha
R^2	Coefficient of Determination
p	p-value (level of statistical significance)

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