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Cancer-Related Stigma among University Students in Oman: Implications for Cancer Care

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Abstract

Introduction:

Cancer-related stigma (CRS) refers to negative perceptions and attitudes associated with a cancer diagnosis, often resulting in discrimination, social exclusion, delayed healthcare-seeking behaviors, psychological distress, and poor health outcomes. As cancer incidence continues to increase in Oman and globally, assessing CRS is essential for informing interventions to improve cancer awareness and health outcomes.

Aim

To explore the prevalence of CRS and the associated factors among university students in Oman.

Methods

A descriptive cross-sectional study was conducted. Data were collected from students across multiple universities in Oman (N = 380) using self-administered questionnaires comprising the Cancer Stigma Scale and the Health Consciousness Scale. Descriptive and inferential statistical analyses were conducted to identify factors associated with CRS.

Results

More than 30% of participants believed that insurance companies could reconsider policies for individuals diagnosed with cancer (31%), felt that cancer ruins a person's career (32%), considered individuals with cancer partly responsible for their condition (33%), and reported embarrassment discussing cancer with someone diagnosed with the disease (40%). The mean Cancer Stigma Scale score (2.26 ± 0.71) indicated an overall low level of CRS. However, male gender and lack of experience with a family member diagnosed with cancer were significantly associated with higher stigma scores ($p \leq 0.01$). Higher health alertness, female gender, and being the first family member to attain university education were independent predictors of low CRS ($p < 0.05$).

Conclusion

Targeted, culturally sensitive public cancer education campaigns are needed to reduce CRS and promote health consciousness among university students in Oman.

Introduction

The effects of cancer impact the affected person's physical, psychological, spiritual, and social aspects of life [1]. This is one of the reasons why, in some settings, up to 25% of people consider a cancer diagnosis to be a death sentence, and 50% believe that the burden of cancer treatment outweighs that of the disease itself [1]. It has been reported that such attitudes and beliefs about cancer are shaped by cultural values and religious beliefs about health and illness, and they influence healthcare practices within specific communities [2]. The negative attitudes and beliefs about cancer have social, psychological, and quality of life consequences because they contribute to cancer-related stigma (CRS).

Cancer-related stigma (CRS) refers to negative perceptions and attitudes toward a cancer diagnosis that can lead to discrimination and social exclusion [2]. It includes exclusion, rejection, blame, and devaluation driven by actual or anticipated negative social judgment [2]. Although health-related stigma has been widely studied in conditions such as epilepsy, HIV/AIDS, and mental illness, cancer has received comparatively less attention [3]. CRS is nevertheless common and has been documented in other settings. For example, a study of South Korean cancer survivors (N = 433) found that 21% experienced employment prejudice and 24% lost their jobs after diagnosis [4]. Survivors who believed recovery was uncertain and who viewed cancer as a stigmatized disease were 3.1 times more likely to lose their jobs. Workplace discrimination increased the risk of job loss fourfold. To reduce CRS and its social and economic consequences, the authors recommended support networks and public awareness initiatives [4].

In Oman, literature shows that Arab women diagnosed with breast cancer often face feelings of avoidance and blame for their illness, and subsequently experience fear of abandonment, divorce, and constant worry that their diagnosis could harm the marriage prospects of their daughters or sisters, and family reputation [1]. In Oman, patients with cancer also experience psychological distress due to stigma, and experiencing stigma was associated with delayed treatment [5]. Such issues are common in Arab societies [6] and lead many patients to seek treatment or second opinions abroad to find privacy and to relieve their families from stigma [1].

In Oman, current trends show an increase in cancer cases of diverse types, and late diagnosis when the disease is in advanced stages [7]. However, there are very few studies that have explored the attitudes of different sections of society towards cancer and the impact of negative attitudes on cancer patients, undermining a comprehensive understanding of CRS and its impact. Literature shows that CRS is a significant global problem, with rates ranging from 13% to 80% depending on the type of cancer and cultural factors [8]. Many patients with cancer experience CRS in the form of negative attitudes and social discrimination, leading to feelings of guilt, isolation, and avoidance [9]. Similarly, many cancer patients report feeling avoided by others after diagnosis, and the fear of being stigmatized prevents them from disclosing their condition to others[10].

Moreover, CRS is also common in countries with well-established healthcare systems. For instance, in the United States, 52% of individuals with breast cancer reported being avoided or feared by others [11]. Reports from regions of Turkey show that CRS leads to significant consequences such as shame, social isolation, and anxiety [2], and these can hinder early detection and treatment [12]. In many cases, the social and emotional burden of stigma can be more distressing than the illness itself, affecting quality of life and psychological well-being [2].

Social and cultural beliefs can exacerbate stigma since common perceptions, such as the belief that cancer is incurable, can lead others to feel people with cancer are incompetent or incapacitated, and this can turn into social exclusion and discrimination. To address these issues, there is a need to promote positive role models and awareness campaigns aimed at reducing stigma and improving community understanding of cancer [2]. The current study aimed to explore CRS among university students in Oman. Young adults, especially university students, are at a crucial stage where their health attitudes and beliefs are forming, influencing both their personal health behaviors and societal norms [13].

One of the key factors that may influence wellness-related attitudes, health behaviors, and CRS could be health consciousness, defined as the knowledge and care that a person has for preserving or enhancing their own health [14]. In the context of Oman, cultural and religious factors also play a significant role and influence discussions about health issues, including cancer [1]. Traditional beliefs often focus on family honor and societal perceptions, making it difficult to discuss stigmatized diseases like cancer, and this fuels attitudes that lead individuals to feel blamed for their condition and experience increased emotional distress [1]. Additionally, the lack of comprehensive public health education about cancer creates a fertile ground for misconceptions, myths, and stigma.

Many young adults in Oman have limited knowledge about cancer risk factors, prevention, and the importance of early detection [15]. Moreover, misinformation and myths about cancer foster fear and stigma, leading to avoidance of medical care and open discussions about cancer [13]. This gap in awareness affects not only individual health outcomes but also the people with cancer, cancer survivors, and the community's attitudes toward cancer [12]. Thus, it is important to focus on young adults such as university students because they are in a developmental phase where their beliefs and attitudes are being formed. Additionally, the university setting is ideal for educational programs and awareness campaigns targeting emerging professionals and leaders with the capacity to impact future societal views on cancer. Furthermore, understanding the factors associated with CRC among young adults can foster the development of appropriate interventions to promote supportive atmospheres and open dialogue about cancer, mitigating discrimination related to cancer [16]. Given the limited evidence on CRS in non-patient populations in Oman, particularly among young adults, this study aimed to assess the level of cancer-related stigma and the associated factors among university students in Oman.

Methods

Study design

A descriptive cross-sectional design was used to collect data from university students on cancer-related stigma and health consciousness. This design was chosen because few similar studies have been conducted among young adults in Oman, and it allowed the researchers to examine associated factors.

Study participants and setting.

The participants were recruited from universities in Oman because the study focused on young adults who are university students. Specifically, the study targeted university students because of their future value to Omani society. Awareness of cancer and reducing CRS in young adults is important because they are the future leaders and contributing citizens in the country. Moreover, to be effective, cancer education for adolescents and young adults should target specific areas of cancer prevention, stigma, myths, misinformation, and the barriers to engagement in preventative behaviors [17].

The required sample for the study was estimated using the formula recommended for projects that explore the prevalence of a phenomenon [18]. The minimum required sample for the study was 318 participants, and the study was able to achieve a sample of 320 participants. The sample was obtained using a convenience sampling technique. Students who were available and willing to participate at the time of data collection completed an electronic survey that was distributed via email to all eligible participants.

Inclusion and exclusion criteria

To be included in the study, the participants had to be students aged 18 years or older and actively registered in a university program in Oman, and not in a health science-related program. The participants were excluded if they had recently dropped out of the university or if they were students in nursing, dental, medical, pharmacy, or other health sciences programs. The students in healthcare-related programs were excluded because the professional training requires them to avoid prejudice and have neutral attitudes towards patients, humans, and conditions that affect human health.

Study instrument

A self-administered questionnaire comprising the demographic data sheet, the Cancer Stigma Scale (CASS), and the Health Consciousness Scale (HCS) was used to collect data. The demographic datasheet collected data about the students' gender, age, field of study, year of study, work status, self-rated religiosity, personal experience with cancer, chronic health problems, and other relevant characteristics. The CASS and HCS were used to measure cancer-related stigma and health consciousness. The CASS is designed for the general population and measures multiple dimensions of cancer stigma in a non-patient population [3]. The scale has six distinct domains with three factors relating to people's perceptions of cancer and three factors capturing social aspects and anticipated behavior toward individuals with cancer. The CASS consists of twenty-five items distributed into six domains: Awkwardness (5 items), Severity (5 items), Avoidance (5 items), Personal responsibility (4 items), Policy opposition (4 items), and Financial discrimination (3 items). The participants' responses are rated on a six-point Likert scale (1 = strongly disagree/not; 2 = disagree/probably not; 3 = slightly disagree/possibly not; 4 = slightly agree: yes, possibly; 5 = agree moderately/yes, probably; and 6 = agree strongly/yes, definitely). The total score is calculated by averaging the item scores across all subgroups. Items 10, 11, 21, 22, and 23 are reverse-scored. The total score ranges from 25 to 130, and high scores indicate high levels of stigma. The CASS and its subscales have adequate reliability with Cronbach's alpha ranging from 0.73 to 0.87 [3]. The CASS has been used in the general population of Oman [1]. Permission to use the CASS was obtained.

The HCS addressed components such as integration of health behavior, attention to one's health, health information seeking and usage, personal health responsibility, and health motivation [19]. The HCS measures respondents' attitudes and perceptions towards health and has nine items assessed on a five-point, Likert-type scale ranging from 1 to 5 ("strongly disagree" to "strongly agree"). Higher total scores indicate greater health consciousness [14]. The HCS has four subscales measuring health alertness, health self-consciousness, health environment, and health self-monitoring [14]. The HCS has adequate internal consistency with Cronbach's alpha ranging from 0.92 to 0.95 in numerous studies [20, 21]. The HCS is available for use in the public domain. A pilot study was conducted to assess the clarity of the demographic data sheet, the order of the scales, and the time needed to complete the electronic questionnaire. The pilot involved thirty students, and its data was excluded from the final analysis. Findings showed that all items were clear and culturally appropriate, and that the survey took approximately 40 minutes to complete.

Ethical considerations

Ethical review and approval were obtained from the Institutional Review Board of the College of Nursing at Sultan Qaboos University (CON/GP/2025/7) before seeking permission to conduct the study from the respective universities. Permission was sought from the administration of the universities to recruit students through email. Data collection commenced only after getting ethical approval and permission from the universities. Eligible participants were required to complete the consent form before completing the electronic survey sent via official student emails. The consent form provided information about the purpose, procedures, participants' rights, privacy, and confidentiality. The data collected did not include personal identifying information. The results are presented in aggregates to prevent identification of individual responses or institutions. The study did not involve invasive procedures or sensitive topics and therefore presented minimal risk to participants. All electronic data files were stored in password-locked files accessible only by the student researcher and their instructor.

Data collection procedures

After obtaining ethical approval, the investigators contacted the university offices responsible for sharing information to request permission to conduct the study. Once approval was granted, an electronic link containing the consent form and self-administered questionnaire was distributed to eligible participants. Students who agreed to participate read and signed the consent form electronically before completing the survey. Survey completion was considered confirmation of consent to participate in the study.

Data analysis

The data were managed and analyzed using SPSS Version 26. The data from each participant were checked for completeness, and frequencies were run to determine outliers before data analysis. Cronbach's alpha coefficients were calculated to assess the internal consistency reliability of the HCS and the CASS. Frequencies, percentages, means, and standard deviations were used to describe the sample, health consciousness, and cancer-related stigma. The independent Samples t-test and Spearman correlation statistics were used to assess factors associated with cancer-related stigma. Linear regression was performed to identify predictors of cancer-related stigma. The significance level was set at $p \leq 0.05$ for all statistical analyses.

Results

Description of the Sample

A total of 320 students from multiple universities in Oman responded to the survey. The participants were recruited from Sultan Qaboos University (81.2%), University of Nizwa (16.6%), and the University of Buraimi (2.2%). The findings in Table 1 summarize the demographic characteristics and demonstrate that most participants were studying in programs related to agriculture and environmental sciences (18.8%), education (13.4%), science (11.3%), or business and management (10.6%); and they were female (61.9%), single (95.6%), and in good academic standing with cumulative grade point average above two (65%). Most participants rated their religiosity as greater than seven on a scale of zero to 10 (73%). The mean age and cumulative grade point average (CGPA) were 20.90 ± 2.16 years and 3.02 ± 0.45, respectively.

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)	20.9 ± 2.16
	21–23	158 (49.4)	
	≥ 24	21 (6.6)	
Marital status	Single	306 (95.6)	
	Married	14 (4.4)	
Current GPA in the Program	≤ 2.0	4 (1.3)	3.02 ± 0.45
	2.1–3.0	117 (36.6)	
	≥ 3.1	91 (28.4)	
	Don’t want to disclose	108 (33.6)	
Self-rating of religious practice and behavior on a scale of 0 to 10	0–3	6 (1.9)	7.37 ± 1.64
	4–6	82 (25.6)	
	≥ 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)	

Characteristics		n (%)	M ± SD
First person in the family to get a university education	Yes	36 (11.2)	
	No	284 (88.8)	

Participants' Self-Reported Health-Related Behaviors

The results in Table 2 highlight aspects related to the participants' health and health behaviors. A large number reported getting health-related information from online sources (79.1%), rarely engaged in deliberate physical exercise (43.1%), had never been to a doctor for an annual physical examination (55%), knew of a person diagnosed with cancer (69%), and had experience with a family member or friend with cancer (45%). The majority reported that they were eating fruits and vegetables often or regularly (86%). The other common actions they were taking to prevent cancer were dieting and exercise (14.4%), dieting only (13.8%), and avoiding known risk factors (11.3%).

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 engage in deliberate physical exercise?	Never or Rarely	138 (43.1)
	Often	131 (40.9)
	Regularly	51 (15.9)
How often do you eat vegetables and fruit?	Never or Rarely	45 (14)
	Often	172 (53.8)
	Regularly	103 (32.2)
When was the last time you went to see the doctor for your annual physical examination?	Never	175 (54.7)
	3 years ago	25 (7.8)
	2 years ago	37 (11.6)
	1 month to 1 year ago	83 (25.9)
Has experience with a family member or friend with Cancer	Yes	144 (45)
	No	176 (55)
Has ever been admitted to the hospital	Yes	140 (43.8)
	No	180 (56.3)
Knows a person who has been diagnosed with cancer	Yes	220 (68.8)
	No	100 (31.3)
Do you have any chronic illnesses?	Yes	24 (7.5)
	No	296 (92.5)

Behavior or experience		n (%)
Type of chronic illness	None	301 (94.1)
	Migraine	4 (1.3)
	Sickle cell disease	3 (0.9)
	Asthma	3 (0.9)
	Eczema and skin problems	2 (0.6)
	Anemia	2 (0.6)
	Inflammatory bowel disease	2 (0.6)
	Thyroid disease	2 (0.6)
	Polycystic ovary syndrome	1 (0.3)
Actions performed to prevent cancer in the future	Diet and exercise.	156 (48.8)
	Avoiding known risk factors	44 (13.8)
	Attending medical checkups	36 (11.3)
	Dieting only	46 (14.4)
	Physical exercise	5 (1.6)
	Increasing personal awareness	7 (2.2)
	Psychological and spiritual activities	5 (1.6)
	No specific action	19 (5.9)
	Others	2 (0.6)

The Prevalence of Cancer -Related Stigma

The results in Table 3 focus on the responses to each item of the Cancer Stigma Scale (CASS) to explain the prevalence of CRS. The findings demonstrate that more than a third of the sample felt that it is acceptable for insurance companies to reconsider a policy if someone has cancer (31%); having cancer ruins a person's career (32%); a person with cancer is to blame for their condition (33%); and would feel embarrassed discussing cancer with someone who has cancer (40%). The findings indicate aspects of CRS that are prevalent in young adults and that need to be addressed by public health education interventions.

Table 3
Participants' Response to Items of the Cancer Stigma Scale (N = 320)

Item		Response (%)	
		Disagree	Agree
Severity	Once you've had cancer, you can never be 'normal' again	70.6	29.4
	Getting cancer means having to mentally prepare oneself for death	75	25
	Having cancer usually ruins a person's career	68.1	31.9
	Cancer usually ruins close personal relationships	84.7	15.3
	Cancer devastates the lives of those it touches	76.9	23.1
Personal responsibility	A person with cancer is to blame for their condition	67.2	32.8
	A person with cancer is accountable for their condition	80	20
	A person with cancer is liable for their condition	91.3	8.7
	If a person has cancer, it's probably their fault	92.5	7.5
		Response (%)	
		No	**Yes**
Awkwardness	I would feel at ease around someone with cancer	71.6	28.4
	I would feel comfortable around someone with cancer	72.5	27.5
	I would find it difficult to be around someone with cancer	79.7	20.3
	I would find it hard to talk to someone with cancer	82.2	17.8
	I would feel embarrassed discussing cancer with someone who had it	60	40
Avoidance	I would try to avoid a person with cancer	87.2	12.8
	I would feel angered by someone with cancer	91.9	8.1
	I would feel irritated by someone with cancer	92.2	7.8
	I would distance myself physically from someone with cancer	88.1	11.9
	If a colleague had cancer, I would try to avoid them	91.6	8.4
Policy opposition	The needs of people with cancer should be given top priority	79.1	20.9
	More government funding should be spent on the care and treatment of those with cancer	84.7	15.3
	We have a responsibility to provide the best possible care for people with cancer	82.8	17.2
Financial discrimination	It is acceptable for banks to refuse to make loans to people with cancer	87.2	12.8
	Banks should be allowed to refuse mortgage applications for cancer-related reasons	76.6	23.4
	It is acceptable for insurance companies to reconsider a policy if someone has cancer	69.1	30.9

Level of Cancer-Related Stigma and Health Consciousness

The results in Table 4 show that the scales used to measure CRS (the Cancer Stigma Scale) and health consciousness (the Health Consciousness Scale) were reliable, as demonstrated by Cronbach's alpha of 0.86 and 0.88, respectively. The overall mean CRS scores were 2.26 ± 0.71 on a 1–6 scale, indicating a low overall level of stigma. At the domain level, the highest mean scores were found in awkwardness (2.54 ± 0.94), policy opposition (2.48 ± 1.35), severity (2.45 ± 1.07), and financial discrimination (2.43 ± 1.14), suggesting that participants had a less accommodation and favorable attitude towards social interactions with people with cancer,

support for polices favoring cancer patients, support for financial consideration for people with cancer, and perceived cancer as a severe disease. In contrast, lower mean scores were found in aspects related to personal responsibility (2.13 ± 1.02) and avoidance (1.64 ± 1.06), indicating that participants were less likely to blame individuals for their cancer or to endorse active social distancing from people with cancer.

Table 4
Participants' attitudes, behavior, and stigma towards people with cancer and level of health consciousness (N = 320)

Scale	Domains	Number of items	Cronbach's Alpha	Range	M ± SD	Standard Error of the Mean
Cancer Stigma Scale (CASS)	Overall scale CASS	25	0.86	1–6	2.26 ± 0.71	0.04
	Severity	5	0.83	1–6	2.45 ± 1.07	0.06
	Personal responsibility	4	0.79	1–6	2.13 ± 1.02	0.06
	Awkwardness	5	0.48	1–6	2.54 ± 0.94	0.05
	Avoidance	5	0.90	1–6	1.64 ± 1.06	0.06
	Policy opposition	3	0.87	1–6	2.48 ± 1.35	0.08
	Financial discrimination	3	0.66	1–6	2.43 ± 1.14	0.06
Health Consciousness Scale (HCS)	Overall HCS	9	0.88	9–45	31.17 ± 5.88	0.33
	Health alertness	2	0.78	2–10	7.36 ± 1.54	0.09
	Health self-monitoring	3	0.75	2–10	7.18 ± 1.50	0.13
	Health self-consciousness	2	0.75	3–15	10.62 ± 2.27	0.10
	Health environment	2	0.65	2–10	6.01 ± 1.83	0.83

Factors Associated with Cancer-Related Stigma

The overall participants' total CRS scores were significantly associated with the level of health alertness (r_s= -0.152, $p < 0.01$), health self-consciousness (r_s= -0.108, $p < 0.05$), and health self-monitoring (r_s= -0.120, $p < 0.05$). The results demonstrated that low levels of health alertness, self-consciousness, and self-monitoring are associated with high CRS tendencies. On the other hand, there was no significant correlation relationship between overall CRS and the level of consciousness of the health environment (r_s = 0.026, $p > 0.05$).

The results in Table 5 demonstrate that specific participant demographic characteristics, health behaviors, and individual experiences were significantly associated with high levels of stigma in specific domains. For instance, male participants had significantly higher levels of overall CRS ($p < 0.01$), and stigma in the domains of Personal Responsibility ($p < 0.01$), avoidance ($p < 0.01$), and Policy Opposition ($p \leq 0.05$), compared to female participants. The participants who were not the first individuals in the family to get university-level education reported significantly higher levels of overall CRS ($p \leq 0.01$) and stigma in the domain of Severity ($p < 0.01$), compared to those who were the first person in the family. Regarding personal health behaviors, the participants who often or regularly engaged in physical exercise reported significantly high levels of stigma in the domain of Personal Responsibility ($p < 0.01$).

Moreover, participants with high levels of self-rated religious practices and behaviors reported significantly higher levels of stigma in the domains of Personal Responsibility compared to those with lower levels of practices and behaviors. The participants who lacked a personal experience with a family member with cancer reported significantly higher levels of overall CRS ($p \leq 0.01$), and high levels of stigma in the domain of Personal Responsibility ($p < 0.01$), awkwardness ($p < 0.05$), Avoidance ($p < 0.01$), and Policy Opposition ($p < 0.05$). Additionally, not knowing any person who has been diagnosed with cancer was associated with high levels of stigma in the domains of Avoidance ($p \leq 0.01$) and Policy Opposition ($p < 0.05$). Reporting a positive history of being admitted to a hospital was also associated with high levels of stigma in the domains of Personal Responsibility ($p \leq 0.05$) and Avoidance ($p \leq 0.01$).

The results of the regression analysis in Table 6 demonstrated that the most significant predictors of overall CRS in the sample were the level of health alertness ($p < 0.05$), gender ($p < 0.01$), and being the first person in the family to get university level education ($p < 0.05$). These three factors were responsible for 8.5% of the variance in CRS, indicating that there are other factors beyond those included in this model that influence stigma. The regression analysis shows that a one-point increase in health alertness score is associated with an 8% decrease in the individual's overall CRS score ($p = 0.03$). Being female was associated with 30% of a point decrease in the overall total CRS score ($p < 0.01$), indicating that females have significantly lower cancer-related stigma scores than males. On the other hand, being the first person in the family to get a university education was associated 25% of a point increase in overall CRS score ($p < 0.05$), suggesting that first-generation students reported a higher level of cancer-related stigma after controlling for other factors. The collinearity statistics (tolerance 0.45–0.99, VIF 1.01–2.24) indicate no problematic multicollinearity among the predictors.

Table 5
Difference in aspects of cancer-related stigma across selected characteristics (N = 320)

Characteristics		CASS M ± SD	Severity M ± SD	Personal responsibility M ± SD	Awkwardness M ± SD	Avoidance M ± SD	Policy opposition M ± SD	Financial discrimination M ± SD
Gender	Male	2.44 ± 0.79	2.60 ± 1.10	2.43 ± 1.12	2.66 ± 0.99	1.87 ± 1.17	2.59 ± 1.20	2.63 ± 1.30
	Female	2.14 ± 0.64	2.36 ± 1.05	1.94 ± 0.90	2.47 ± 0.90	1.49 ± 0.95	2.32 ± 1.09	2.39 ± 1.37
p-Value[a]		0.00**	0.06	0.00**	0.07	0.003**	0.05*	0.12
Age in years	18–20	2.27 ± 0.67	2.46 ± 1.13	2.84 ± 1.03	2.49 ± 0.93	1.61 ± 0.97	2.46 ± 1.11	2.61 ± 1.46
	21–23	2.23 ± 0.71	2.41 ± 1.01	2.04 ± 0.96	2.60 ± 0.93	1.62 ± 1.04	2.38 ± 1.11	2.43 ± 1.23
	≥ 24	2.36 ± 0.97	2.68 ± 1.07	2.41 ± 1.32	2.47 ± 1.07	1.96 ± 1.61	2.59 ± 1.52	2.03 ± 1.35
p-Value[b]		0.70	0.57	0.20	0.58	0.34	0.67	0.15
Marital status	Single	2.24 ± 0.71	2.44 ± 1.07	2.12 ± 1.01	2.53 ± 0.94	1.61 ± 1.03	2.42 ± 1.13	2.48 ± 1.34
	Married	2.56 ± 0.83	2.82 ± 1.12	2.39 ± 1.21	2.91 ± 0.81	2.31 ± 1.48	2.59 ± 1.38	2.21 ± 1.35
p-Value[a]		0.20	0.26	0.45	0.12	0.12	0.67	0.48
Self-rating of religious practice and behavior on a scale of 0 to 10	0–3	1.92 ± 0.34	2.43 ± 1.30	1.54 ± 0.56	2.13 ±0.81	1.00 ± 0.00	2.28 ± 0.91	2.39 ± 1.71
	4–6	2.28 ± 0.66	2.34 ± 1.00	1.92 ± 0.82	2.67 ± 0.99	1.55 ± 0.84	2.34 ± 0.94	2.74 ± 1.40
	≥ 7	2.27 ± 0.74	2.49 ± 1.09	2.22 ± 1.08	2.51 ± 0.92	1.68 ± 1.13	2.46 ± 1.21	2.39 ± 1.31
p-Value[b]		0.45	0.53	0.03*	0.24	0.21	0.65	0.13
Currently working	Yes	2.46 ± 0.54	2.55 ± 0.90	2.32 ± 1.03	2.91 ± 0.87	1.72 ± 1.01	2.72 ± 0.93	2.73 ± 1.67
	No	2.45 ± 0.72	2.45 ± 1.08	2.12 ± 1.02	2.53 ± 0.94	1.63 ± 1.06	2.42 ± 1.45	2.47 ± 1.34
p-Value[a]		0.23	0.74	0.55	0.18	0.77	0.30	0.62
First person in the family to get a university education	Yes	2.04 ± 0.49	2.02 ± 0.73	1.92 ± 0.74	2.34 ± 0.97	1.52 ± 0.69	2.17 ± 1.01	2.50 ± 1.43

[a] Independent sample t-testing, [b] ANOVA, * $p \leq 0.05$, ** $p \leq 0.01$

Characteristics		CASS M ± SD	Severity M ± SD	Personal responsibility M ± SD	Awkwardness M ± SD	Avoidance M ± SD	Policy opposition M ± SD	Financial discrimination M ± SD
	No	2.28 ± 0.73	2.51 ± 1.09	2.16 ± 1.05	2.57 ± 0.93	1.65 ± 1.09	2.46 ± 1.52	2.48 ± 1.34
p-Value[a]		0.01**	0.001**	0.10	0.20	0.47	0.11	0.93
Main source of information about health issues	Television	2.26 ± 0.42	2.29 ± 0.62	2.18 ± 0.91	2.83 ± 1.50	1.54 ± 0.59	2.19 ± 0.81	2.67 ± 1.04
	Internet	2.26 ± 0.69	2.46 ± 1.09	2.11 ± 1.00	2.57 ± 0.89	1.61 ± 0.98	2.42 ± 1.11	2.50 ± 1.34
	Healthcare profession	2.25 ± 0.84	2.45 ± 1.06	2.12 ± 1.11	2.38 ± 1.05	1.74 ± 1.35	2.50 ± 1.30	2.37 ± 1.41
p-Value[b]		0.99	0.92	0.75	0.27	0.70	0.76	0.74
How often do you exercise?	Never	2.21 ± 0.67	2.24 ± 1.09	1.82 ± 0.69	2.73 ± 1.06	1.63 ± 0.81	2.64 ± 1.43	2.36 ± 1.32
	Rarely	2.21 ± 0.62	2.54 ± 1.07	1.91 ± 0.86	2.55 ± 0.91	1.49 ± 0.88	2.33 ± 1.05	2.54 ± 1.41
	Often	2.34 ± 0.78	2.45 ± 1.08	2.38 ± 1.12	2.57 ± 0.99	1.76 ± 1.22	2.58 ± 1.15	2.42 ± 1.27
	Regularly	2.18 ± 0.76	2.31 ± 1.05	2.11 ± 1.05	2.39 ± 0.84	1.66 ± 1.03	2.21 ± 1.19	2.54 ± 1.42
p-Value[b]		0.41	0.51	0.002**	0.56	0.25	0.13	0.87
How often do you eat vegetables and fruit?	Never	2.20 ± 1.07	1.60 ± 0.57	1.88 ± 1.24	2.40 ± 1.41	2.10 ± 1.56	2.67 ± 1.41	3.00 ± 0.00
	Rarely	2.21 ± 0.74	2.39 ± 1.13	2.01 ± 0.93	2.41 ± 0.93	1.60 ± 1.15	2.57 ± 1.12	2.47 ± 1.38
	Often	2.35 ± 0.73	2.58 ± 1.07	2.23 ± 1.06	2.69 ± 0.96	1.70 ± 1.11	2.50 ± 1.16	2.54 ± 1.34
	Regularly	2.11 ± 0.66	2.29 ± 1.04	2.02 ± 0.98	2.35 ± 0.86	1.54 ± 0.91	2.24 ± 1.10	2.39 ± 1.36
p-Value[b]		0.05*	0.10	0.33	0.02*	0.58	0.23	0.78
When was the last time you went to see the doctor for your annual physical examination?	Never	2.25 ± 0.68	2.52 ± 1.02	2.08 ± 0.99	2.61 ± 0.94	1.59 ± 0.93	2.38 ± 1.08	2.39 ± 1.26
	3 years	2.41 ± 0.70	2.66 ± 1.18	2.22 ± 0.92	2.66 ± 0.90	1.80 ± 1.24	2.72 ± 1.11	2.55 ± 1.28

[a] Independent sample t-testing, [b] ANOVA, * $p \leq 0.05$, ** $p \leq 0.01$

Characteristics		CASS M ± SD	Severity M ± SD	Personal responsibility M ± SD	Awkwardness M ± SD	Avoidance M ± SD	Policy opposition M ± SD	Financial discrimination M ± SD
	2 years	2.05 ± 0.55	2.32 ± 1.06	1.95 ± 0.81	2.16 ± 0.81	1.39 ± 0.64	2.40 ± 1.03	2.33 ± 1.31
	1–12 months	2.32 ± 0.82	2.31 ± 1.14	2.29 ± 1.18	2.54 ± 0.97	1.80 ± 1.34	2.47 ± 1.14	2.72 ± 1.53
p-Value[b]		0.81	0.31	0.27	0.06	0.17	0.55	0.28
Has experience with a family member or friend with Cancer	Yes	2.14 ± 0.61	2.43 ± 1.06	1.95 ± 0.89	2.41 ± 0.88	1.45 ± 0.89	2.28 ± 1.07	2.44 ± 1.38
	No	2.35 ± 0.78	2.47 ± 1.08	2.27 ± 1.10	2.65 ± 0.97	1.79 ± 1.15	2.55 ± 1.18	2.51 ± 1.32
p-Value[a]		0.01**	0.70	0.004**	0.02*	0.003**	0.04*	0.68
Has ever been admitted to the hospital	Yes	2.34 ± 0.79	2.56 ± 1.13	2.26 ± 1.13	2.56 ± 0.93	1.82 ± 1.24	2.55 ± 1.23	2.39 ± 1.23
	No	2.19 ± 0.64	2.37 ± 1.01	2.03 ± 0.91	2.53 ± 0.94	1.49 ± 0.86	2.33 ± 1.06	2.55 ± 1.43
p-Value[a]		0.06	0.11	0.05*	0.76	0.01**	0.11	0.30
Knows a person who has been diagnosed with cancer	Yes	2.20 ± 0.66	2.47 ± 1.04	2.10 ± 0.99	2.51 ± 0.94	1.52 ± 0.95	2.33 ± 1.09	2.42 ± 1.35
	No	2.37 ± 0.82	2.42 ± 1.13	2.19 ± 1.08	2.62 ± 0.93	1.88 ± 1.23	2.65 ± 1.22	2.62 ± 1.35
p-Value[a]		0.08	0.72	0.47	0.32	0.01**	0.02*	0.21
Do you have any chronic illness?	Yes	2.24 ± 0.75	2.41 ± 1.16	2.12 ± 1.11	2.56 ± 0.76	1.64 ± 1.07	2.03 ± 1.02	2.76 ± 1.61
	No	2.26 ± 0.71	2.46 ± 1.07	2.13 ± 1.01	2.54 ± 0.95	1.63 ± 1.06	2.46 ± 1.43	2.46 ± 1.32
p-Value[a]		0.89	0.84	0.95	0.91	0.98	0.06	0.37

[a] Independent sample t-testing, [b] ANOVA, * $p \leq 0.05$, ** $p \leq 0.01$

Table 6
Predictors of Cancer-Related Stigma (N = 320)

	Unstandardized Coefficients		Standardized Coefficients	t	p value	95.0% Confidence Interval		Collinearity Statistics	
	B	Std. Error	β			Lower Bound	Upper Bound	Tolerance	VIF
Constant	2.90	0.38		7.70	0.00	2.16	3.65		
Health alertness score	-0.08	0.04	-0.17	-2.23	0.03	-0.15	-0.01	0.50	1.99
Health self-consciousness score	0.04	0.03	0.13	1.58	0.12	-0.01	0.09	0.45	2.24
Health self-monitoring score	-0.04	0.03	-0.09	-1.40	0.16	-0.11	0.02	0.68	1.47
Gender (female = 1; Male = 0)	-0.29	0.08	-0.19	-3.55	0.00	-0.44	-0.13	0.98	1.02
The first person in your family to get a university education.	0.25	0.12	0.11	2.03	0.04	0.01	0.49	0.99	1.01
How often do you eat vegetables and fruits?	-0.06	0.06	-0.05	-0.98	0.33	-0.17	0.06	0.99	1.01
Adjusted R Square = 0.085									

Discussion

The study explored cancer-related stigma (CRS) in young adults (university students) in Oman and found that more than a third felt that it is acceptable for insurance companies to reconsider a policy if someone has cancer (31%), that cancer ruins a person's career (32%), that a person with cancer is to blame for their condition (33%), and that they would feel embarrassed discussing cancer with someone who has cancer (40%). The overall level of CRS was low, but analysis of specific domains revealed moderate levels of stigma in aspects such as awkwardness, perceived severity, policy opposition, and financial discrimination. This pattern is broadly consistent with findings from the general non-patient population, which reported comparatively higher levels of stigma in aspects of personal responsibility, avoidance, financial discrimination, and policy opposition [1, 15].

The persistence of CRS in specific domains is worrying because stigma influences health-seeking behavior and is associated with the late diagnosis of cancer [22]. The fear of being labeled leads patients with cancer to anticipate discrimination, delay treatment, resort to traditional healers instead of biomedical treatments, and maintain secrecy about their symptoms [23]. Therefore, in countries like Oman with a young population and developing cancer care systems, and where the future burden of cancer is projected to increase, there is an urgent need for cancer education to reduce the prevalence of myths, misconceptions, and negative beliefs and attitudes that fuel cancer-related stigma.

Multiple multifaceted factors can lead people to refuse or stop cancer treatment (cost, access to health facilities, security and conflicts, treatment toxicity, use of alternative medicine), but it is important to highlight that CRS also plays a critical role [22]. CRS is particularly concerning when it is persistent in educated groups of society, such as university students. University students have more exposure to accurate information about health and are more likely to engage in critical discussions about issues such as non-communicable diseases or cancer, compared to the general population. Such forums and exposures are expected to avert blame, myths, misconceptions, and general stigma about cancer and other diseases, and not leave considerable uncertainty and discomfort about communicating with people living with cancer.

The findings of the current study are consistent with observations recorded in other countries. For instance, a study to investigate CRS among Japanese cancer survivors found that 61.6% felt stigmatized to some extent, with 10.2% feeling quite a bit and 4.3% feeling absolutely stigmatized [24]. Increased stigma was linked to younger age, lower income, worse physical function, and gynecological, breast, and urinary malignancies [24]. In China, a study of stigma in breast cancer survivors found moderate stigma, particularly in relation to financial insecurity, and this was experienced by 76.7% of survivors [25]. Like the current study, in Malaysia,

a study among university students reported that stigma in aspects such as awkwardness, misconceptions about normality, relationships, and careers remains common [16]. Studies from countries such as Iran show that patients with cancer report substantial stigma related to social rejection and blame, often linked to cultural beliefs about contagion, fate, and family reputation [26].

The overall low stigma levels in the present study are consistent with the broader pattern whereby patient populations, experiencing the direct consequences of disease and social reactions, report higher stigma than community or student samples. However, even at low levels of stigma, it is important to implement interventions to curtail its impact on patients, survivors, and society at large. Some interventions can be used to curtail CRS, and these may include Photonovelas to deliver educational health messages, psychoeducation and cognitive challenges, group-based psychotherapy, telemedicine-based interventions, spiritual intelligence training, problem-solving and behavioral activation, narrative therapy, mass media campaigns, psychoeducational materials, psychotherapeutic support groups, and others [27]. Such interventions are increasingly needed because cancer statistics for adolescents and young adults aged 15 to 39 are trending upwards. For instance, in the USA, the incidence of cancer among adolescents and young adults increased by rates ranging from 3% to 4% between 2007 and 2016 [28]. There has also been a rise in obesity-related cancers like kidney and uterine cancers, and the survival rates vary by cancer type, showing a need for equitable healthcare access, early detection awareness, and public education interventions [28].

The factors highlighted as the significant predictors of CRS in the current study were aspects related to the level of health alertness ($p < 0.05$), gender ($p < 0.01$), and being the first person in the family to get a university-level education ($p < 0.05$). Similar patterns have been noted in studies of university and community samples in Malaysia, India, and Europe, where contact with patients or survivors is associated with greater empathy and less endorsement of stereotypes, consistent with contact theory [29, 30]. Other studies have also demonstrated that among non-patient populations, men tend to endorse more stigmatizing attitudes, including blame and social distance, across various illnesses, including cancer [31]. This consistency suggests that gendered socialization and norms such as expectations of strength, self-reliance, and limited emotional expression among men may be shaping attitudes towards serious illness, producing more critical or distancing responses [32]. The present findings, therefore, reinforce the need for gender-sensitive cancer education strategies and increased involvement of men in health-related discussions and campaigns.

The influence of having close personal contact with a person diagnosed with cancer is associated with a lower overall stigma score, demonstrating an opportunity that can be exploited for cancer education. For instance, interaction with cancer survivors could be used as a strategy to educate young adults about the cancer disease trajectory, survival, and other outcomes. Interactions with survivors who are Omani also present an added advantage of having discussions that are respectful of the cultural and religious contexts in Oman. The present study also found that students who had been admitted to the hospital themselves had higher avoidance scores, which appears contradictory. This finding is not widely reported in the literature and may reflect specific contextual experiences, such as witnessing severe illness or distress in a hospital, that heighten anxiety and avoidance rather than reducing stigma [33]. In other words, controlled exposure to cancer survivors and public cancer education seems to be beneficial, whereas unstructured or frightening experiences in the hospital may reinforce fear and avoidance.

The findings about higher health alertness being associated with lower CRS are broadly consistent with international research linking health awareness and literacy to more favorable attitudes toward prevention and serious illness [34]. In the present study, health alertness was an independent negative predictor of stigma, whereas other HCS domains showed weaker associations. Literature demonstrates that being actively alert to one's health and changes in bodily status may be more directly tied to active information seeking and critical appraisal of myths than are the more diffuse constructs of self-consciousness or environmental monitoring [35].

On the other hand, the result for first-generation university students having lower CRS scores seems to contradict the literature that associates higher educational attainment with lower stigma. Several factors may explain this discrepancy. Rather than directly contradicting the general pattern of more education, less stigma, this result suggests that family educational background exerts a nuanced influence that may override or interact with individual education in complex ways [36, 37]. Future studies stratifying by field of study and parental education may clarify this issue.

Overall, the current study extends our understanding of CRS in young adults who are educated and more likely to shape future policy and practice. At the regional level, the pattern of relatively low stigma scores, but with pockets of high prevalence of stigma in aspects related to insurance policies, cancer fatalism, and future careers, blaming the victim, and embarrassment when discussing cancer with someone who has cancer, points to the potential for discrimination and mirrors the general attitudes towards cancer in

the Middle East region [33, 38]. The findings seem to suggest that CRS is a multifaceted phenomenon that is attenuated but not eliminated by education, health awareness, and positive contact, and therefore should remain a target for evidence-based interventions [33, 38].

Implications for practice and policy

The findings have several implications for cancer control, health-promotion, and public health. First, the relatively high number of students who feel that it is acceptable for insurance companies to reconsider a policy if someone has cancer (31%), that cancer ruins a person's career (32%), that a person with cancer is to blame for their condition (33%), and who feel embarrassed discussing cancer with someone who has cancer (40%); highlight an urgent need for public cancer education campaigns to inform the public about myths related to disease trajectory, survival rate, effectiveness of treatments, and the rights of people with cancer. The concept of cancer survivorship needs to be popularized in society and normalized to increase acceptance of the rights of patients and curtail discrimination by employers and financial services.

Second, efforts to increase health consciousness, particularly health alertness and self-monitoring, may have ancillary benefits in reducing stigma and could be incorporated into public cancer education campaigns, health-promotion programs, and student health services. Third, targeted interventions aimed at male students and those with lower health alertness may be especially important, given their higher likelihood of having a high level of CRS. Fourth, leveraging students' individual experiences with cancer, through peer educators and survivor testimonies, may help to humanize cancer and undermine stereotypes. Collaboration with religious leaders and student faith organizations could also facilitate integration of culturally resonant messages that emphasize compassion, social justice, and collective responsibility for supporting people living with cancer, thereby addressing the subtle influence of religious interpretations.

Strengths and limitations

The strengths of the current study include the use of validated instruments (CASS and HCS) with acceptable internal consistency for most domains, a large and diverse sample of university students from three institutions, and the simultaneous assessment of health consciousness, health behaviors, and a range of sociodemographic and experiential factors. The study also contributes novel data on cancer stigma among university students in Oman, complementing recent work in the general Omani population and among Arab patients with cancer. On the other hand, the study has limitations that need to be considered when interpreting its findings. First, the use of self-report questionnaires may have affected the reliability of responses, and self-reports are vulnerable to recall and social-desirability biases. Second, the cross-sectional design precludes causal inference, and therefore it is not possible to determine the exact cause triggers of CRS in the sample.

Finally, the sample consisted of young, unmarried university students with limited life experiences and exposure to health problems. Youthfulness may make university students feel invulnerable and thus more likely to blame chronic diseases such as cancer on old age and poor self-care. Third, the lack of a random sample and low response rate from some universities due to busy academic schedules affected the representativeness of the sample. Therefore, generalizability to the wider population of university students in Oman is limited. Future research should employ longitudinal designs to track changes in health consciousness and CRS over time and in response to cancer educational interventions. Qualitative studies are needed to explore in depth how Omani students interpret cancer, negotiate conflicting cultural and religious narratives, and integrate traditional beliefs and experiences related to cancer.

Conclusion

Cancer-related stigma among university students in Oman was low, but with moderate levels in aspects such as blame, avoidance, awkwardness, fatalistic beliefs, and discriminatory policies. The level of health alertness, gender, and personal experience with family members who have cancer were key factors associated with the level of CRS. These results highlight the need for targeted, culturally sensitive public cancer education interventions and campaigns in universities and in the wider community. Such intervention can help to boost health consciousness, health alertness, and to correct misconceptions and myths that fuel CRS.

Declarations

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Data availability: The datasets used and/or analyzed during the current study available from the corresponding author on reasonable request.

Declarations, Ethics approval, and consent to participate: This study was approved by the Ethics Committee of the College of Nursing (Sultan Qaboos University) under code CON/GP/2025/7. All procedures involving human participants were conducted in accordance with the Declaration of Helsinki and the national ethical guidelines of Iran. Before participation, all individuals were informed about the study objectives and provided written informed consent. Participation was voluntary; participants could withdraw at any time without penalty. Data were collected anonymously to protect confidentiality, and all analyses were performed at the group level.

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References

1. Al Naabi, M. & Al Zaabi, A. Quantitative Evaluation of Cancer Stigma among Non-Patient Population in Oman. *Asian Pac. J. Cancer Prev.* **25** (4), 1223–1229. https://doi.org/10.31557/APJCP.2024.25.4.1223 (2024).
2. Yilmaz, M. et al. Cancer-Related stigma and depression in cancer patients in a Middle-Income country. *Asia-Pacific J. Oncol. Nurs.* **7** (1), 95–102. https://doi.org/10.4103/apjon.apjon_45_19 (2019).
3. Marlow, L. A. & Wardle, J. Development of a scale to assess cancer stigma in the non-patient population. *BMC Cancer*. **14** (1). https://doi.org/10.1186/1471-2407-14-285 (2014).
4. Shim, S. et al. Association between cancer stigma and job loss among cancer survivors. *Psycho-Oncology* **30** (8), 1347–1355 (2021).
5. Al-Fahdi, A. et al. Prevalence of psychological distress and associated factors among Omani women diagnosed with breast cancer: a single-center, cross-sectional study. *BMJ Open.* **13** (9), e073967. https://doi.org/10.1136/bmjopen-2023-073967 (2023).
6. Rice, Z. S. & Liamputtong, P. Cultural determinants of health, cross-cultural research, and global public health. In Handbook of social sciences and global public health 689–702. Cham: Springer International Publishing. (2023).
7. Al-Sayegh, H., Al-Zadjali, S. & Al-Moundhri, M. Analyzing cancer incidence trends in Oman from 1996 to 2019: A comprehensive study of the national cancer annual reports. JCO Global Oncology 10:e2300337. (2024). https://doi.org/10.1200/GO.23.00337
8. Ernst, J., Mehnert, A., Dietz, A., Hornemann, B. & Esser, P. Perceived stigmatization and its impact on quality of life - results from a large register-based study including breast, colon, prostate, and lung cancer patients. *BMC Cancer*. **17** (1). https://doi.org/10.1186/s12885-017-3742-2 (2017).
9. Huang, Z., Yu, T., Wu, S. & Hu, A. Correlates of stigma for patients with cancer: a systematic review and meta-analysis. *Support. Care Cancer*. **29** (3), 1195–1203. https://doi.org/10.1007/s00520-020-05780-8 (2021).
10. Heley, K., Vedham, V. & Vanderpool, R. C. The Global Landscape of Cancer Stigma Research and Practice: Perspectives, Measures, Interventions, and Actions for Change. JNCI Monographs. (2024). https://academic.oup.com/jncimonograph/article/2024/63/1/7687976
11. Fujisawa, D. & Hagiwara, N. Cancer Stigma and its Health Consequences. *Curr. Breast Cancer Rep.* **7** (3), 143–150. https://doi.org/10.1007/s12609-015-0185-0 (2015).
12. Akin-Odanye, E. O. & Husman, A. J. Impact of stigma and stigma-focused interventions on screening and treatment outcomes in cancer patients. *Ecancermedicalscience* **15** https://doi.org/10.3332/ecancer.2021.1308 (2021).

13. Kaul, P. et al. Assessing the prevalent myths and misconceptions among caregivers of patients with cancer: a Cross-Sectional study. Cureus. (2023). https://doi.org/10.7759/cureus.51332
14. Gould, S. J. Health consciousness and health behavior: the application of a new health consciousness scale. *Am. J. Prev. Med.* **6** (4), 228–237 (1990).
15. Al-Azri, M., Al-Saadi, W. I., Harrasi, A. A. & Panchatcharam, S. M. Knowledge of Cancer Risk Factors, Symptoms, and Barriers to Seeking Medical Help among Omani Adolescents. *Asian Pac. J. Cancer Prev.* **20** (12), 3655–3666. https://doi.org/10.31557/apjcp.2019.20.12.3655 (2019).
16. Justine, M., Jafri, M. S., Joanny, A. & Akmar, A. N. Stigmatization towards cancer among university students in Malaysia. *J. Health Sci.* **11** (3), 149–153 (2021).
17. Abraham, O., Szela, L., Feng, E., Egbujor, M. & Gay, S. Exploring youth perceptions about cancer prevention and preferences for education: a qualitative study. *J. Cancer Educ.* **38** (1), 50–59. https://doi.org/10.1007/s13187-021-02077-0 (2023).
18. Sharma, S. K., Mudgal, S. K., Thakur, K. & Gaur, R. How to calculate sample size for observational and experimental nursing research studies. *Natl. J. Physiol. Pharm. Pharmacol.* **10** (1), 1–8 (2020).
19. Hong, H. Scale development for measuring health consciousness: Re-conceptualization. That Matters to the Practice 212. (2009).
20. Remr, J. Validation of the Health Consciousness Scale among the Czech Population. *Healthcare* **11** (11), 1628. https://doi.org/10.3390/healthcare11111628 (2023).
21. Marsall, M., Engelmann, G., Skoda, E. M., Teufel, M. & Bäuerle, A. Validation and test of measurement invariance of the adapted health consciousness scale (Hcs-g). *Int. J. Environ. Res. Public Health*. **18** (11), 6044. https://doi.org/10.1007/s13187-021-02077-0 (2021).
22. Johnson, S. E. & Samson, M. Cancer stigma: the need for policy and programmatic action. JNCI Monographs 2024(63):45–50. (2024). https://doi.org/10.1093/jncimonographs/lgae014
23. Oystacher, T. et al. Understanding stigma as a barrier to accessing cancer treatment in South Africa: implications for public health campaigns. *Pan Afr. Med. J.* **29** (1), 1–12 (2018).
24. Fujisawa, D., Umezawa, S., Fujimori, M. & Miyashita, M. Prevalence and associated factors of perceived cancer-related stigma in Japanese cancer survivors. *Jpn J. Clin. Oncol.* **50** (11), 1325–1329 (2020).
25. Jin, R., Xie, T., Zhang, L., Gong, N. & Zhang, J. Stigma and its influencing factors among breast cancer survivors in China: a cross-sectional study. *Eur. J. Oncol. Nurs.* **52**, 101972 (2021).
26. Hasan Shiri, F., Mohtashami, J., Nasiri, M., Manoochehri, H. & Rohani, C. Stigma and Related Factors in Iranian People with Cancer. *Asian Pac. J. Cancer Prev.* **19** (8), 2285–2290. https://doi.org/10.22034/APJCP.2018.19.8.2285 (2018).
27. Zheng, S. et al. The effectiveness of interventions to reduce cancer-related stigma: An integrative review. *J. Clin. Nurs.* **33** (7), 2438–2455. https://doi.org/10.1111/jocn.17014 (2024).
28. Miller, K. D. et al. Cancer statistics for adolescents and young adults, 2020. *Cancer J. Clin.* **70** (6), 443–459 (2020).
29. Squiers, L. et al. *Perceived, Experienced, and Internalized Cancer Stigma: Perspectives of Cancer Patients and Caregivers in India* (RTI, 2021). https://doi.org/10.3768/rtipress.2021.rr.0044.2104
30. Zoromba, M. A. et al. Exploring breast cancer stigma among medical students in Egypt: a national multi-center cross-sectional study. *BMC public. health*. **25** (1), 3604. https://doi.org/10.1186/s12889-025-24656-2 (2025).
31. Shrestha, R., Shrestha, G. & Paneru, P. Cancer stigma in non-patient population visiting b&b hospital, lalitpur, nepal: A descriptive cross-sectional study. *Asian Pac. J. Cancer Care*. **8** (2), 275–279. https://doi.org/10.31557/apjcc.2023.8.2.275-279 (2023).
32. DeGuzman, P. B., Vogel, D. L., Bernacchi, V., Scudder, M. A. & Jameson, M. J. Self-reliance, Social Norms, and Self-stigma as Barriers to Psychosocial Help-Seeking Among Rural Cancer Survivors With Cancer-Related Distress: Qualitative Interview Study. *JMIR formative Res.* **6** (5), e33262. https://doi.org/10.2196/33262 (2022).
33. Alaloul, F. et al. Perceived cancer-related stigma among Arab patients: A cross-sectional study. *PloS one*. **20** (9), e0333185. https://doi.org/10.1371/journal.pone.0333185 (2025).
34. Uncu, F., Evcimen, H., Çiftci, N. & Yıldız, M. Relationship between health literacy, health fatalism, and attitudes towards cancer screenings: latent profile analysis. *BMC public. health*. **25** (1), 2056. https://doi.org/10.1186/s12889-025-23277-z (2025).

35. Jeitani, C., Van den Broucke, S. & Leemans, C. Interventions Addressing Health Literacy in Cancer Care: A Systematic Review of Reviews. *Int. J. Environ. Res. Public Health*. **22** (2), 212. https://doi.org/10.3390/ijerph22020212 (2025).
36. Hussain, M. H. & Zaini, N. A. B. Understanding mental health literacy, stigma, and help-seeking attitudes among university students in the Maldives: a mediation analysis. *BMC Psychol.* **13** (1), 1165. https://doi.org/10.1186/s40359-025-03468-4 (2025).
37. Carvalho, P. S., Pombal, N., Gama, J. & Loureiro, M. Mental Health Awareness: Stigma and Help-Seeking Among Portuguese College Students. *Healthcare* **12** (24), 2505. https://doi.org/10.3390/healthcare12242505 (2024).
38. Shalaby, A. S. et al. Perceived stigma toward individuals with mental illness and their families: perspectives of patients' relatives in a multicentric Egyptian study. *Middle East. Curr. Psychiatry*. **32** (1), 83. https://doi.org/10.1186/s43045-025-00576-0 (2025).