

Utilization of Routine Medical Checkup and Factors Influencing Use of Routine Medical Checkup among Saudi Students Studying in the USA in 2019

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Keywords

Routine checkup · Use of routine checkup · Use of routine checkup in Saudi Arabia

Abstract

Introduction: The few studies that have investigated patterns of routine checkup (hereafter routine checkups) among Saudis have found overall low rates of use. Those studies focused mainly on understanding the influence of individual characteristics on use of routine checkup. **Aims:** The main purpose of this study was to consider a wider array of factors beyond individual characteristics, including system-based factors, beliefs, attitudes, and satisfaction, and to examine their influence on use of routine checkup among Saudi students studying in the United States. **Methods:** A cross-sectional survey targeting Saudi students studying in the United States aged 19 years or older was conducted to gather information about their sociodemographic characteristics, needs for healthcare, use of routine checkup and satisfaction with access to primary care services. Descriptive statistics and logistic regression analysis were conducted to deter-

mine factors influencing use of routine checkup among Saudis. **Results:** 381 surveys were eligible to be included in the analyses. Among the included participants, only 25.5% had a routine checkup after the age of 18 years. The likelihood of having routine checkup after the age of 18 was significantly higher among those who trusted provided primary care, believed in the importance of routine checkup, had health insurance, had chronic conditions and were physically active, and was significantly lower among married individuals. **Conclusions:** The use of routine checkup is low among Saudis and this study has laid the foundation for future research that can inform policy and decision-making related to improving use of routine care in Saudi Arabia.

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Introduction

Citizens of the Kingdom of Saudi Arabia (KSA) suffer from high rates of preventable chronic diseases, many of which are among top risk factors for most of the death

Table 1. Undiagnosed and borderlines diabetes and hypercholesterolemia among Saudi adults aged 15 years or older

| Conditions | Age-groups, years | | | | | |
|-------------------------|-------------------|-------|-------|-------|-------|------|
| | 15–24 | 25–34 | 35–44 | 45–54 | 55–64 | 65+ |
| Undiagnosed weighted, % | | | | | | |
| Diabetes | 4.1 | 5.7 | 6.0 | 7.4 | 13.5 | 8.0 |
| Hypercholesterolemia | 3.8 | 5.8 | 7.8 | 10.2 | 8.0 | 7.6 |
| Borderlines weighted, % | | | | | | |
| Diabetes | 13.5 | 13.8 | 19.4 | 17.9 | 16.9 | 15.0 |
| Hypercholesterolemia | 12.0 | 21.7 | 27.6 | 29.3 | 27.6 | 20.5 |

and disability in the country [1, 2]. The 2013 Saudi Health Interview Survey (SHIS) revealed that rates of obesity (28.7%), diabetes (13.4%), hypertension (15.1%), hypercholesterolemia (8.5%), and risky health behaviors, such as smoking (21.5%), are high and increasing in the KSA [1, 3]. Indeed, obesity and diabetes rates were higher in the KSA than in the USA, a country known for “epidemics” of these conditions, highlighting a substantial concern for the KSA population and its healthcare system.

Data from 2013 SHIS revealed that many Saudi adults have undiagnosed chronic diseases or were at borderlines to develop chronic diseases yet were not aware of that. Table 1 shows the percentages of undiagnosed and borderline diabetes and hypercholesterolemia among Saudi adults overall and among younger aged adults. For example, 4.1% of adults aged 15–24 had undiagnosed diabetes, while 13.5% of them were at the borderline to develop diabetes [4]. Nearly a quarter (21.7%) of adults aged 25–34 were at borderline to develop hypercholesterolemia [5].

To address the individual and societal burden of disease, the US Centers for Disease Control and Prevention (CDC) advises that adults should routinely seek health checkups to detect medical problems before they start or find them in early stages when the chances for the treatment and cure are high [6]. A routine checkup is defined as a general physical exam, not an exam for a specific injury, illness, or condition [7]. Moreover, 2 systematic reviews related to routine medical checkups (here after routine checkups) found them to be beneficial in diseases detection [8, 9].

Unfortunately, citizens of the KSA are not taking advantage of the country’s well-developed governmental healthcare system. The 2013 SHIS revealed that 75.5% of Saudis ≥ 15 years of age have never had a routine checkup [10], and 88.0% of Saudis ≥ 15 years of age have never had a routine dental checkup [11]. One of the common impediments to use of healthcare is cost. The KSA’s provision of governmental healthcare services should remove

this major barrier to healthcare use for its citizens; Saudis are not seeking routine care [10, 11].

Other non-cost-related factors that affect use of routine checkups have been identified. For example, several studies found a positive association between age and use of routine checkup, as age increases, use of routine checkup increases [12–14]. Also, a significant association between gender and utilization of routine checkup have been found, with women using routine checkups more than men [15, 16]. The studies have also found that people who had chronic conditions were more likely to use routine checkups compared to those with no chronic conditions [12, 13, 15, 16].

This raises the question about what factors, other than cost, affect access to and utilization of routine checkups in the KSA. To date, only a limited amount of research has focused on understanding why Saudis do and do not utilize the governmental healthcare system. In general, that research concludes that healthcare-seeking behavior among Saudis is not well documented, and it suggests conducting more research on healthcare-seeking behaviors that considers a wider array of factors, such as system-based factors, beliefs, attitudes, and satisfaction. Additionally, that research is insufficient to understand healthcare-seeking behavior among Saudis because of the following: (1) it was mainly focusing on individual characteristics that can affect the utilization of healthcare services; (2) it did not assess the healthcare system characteristics that affect the utilization of healthcare services; and (3) it did not examine the association between satisfaction with healthcare services and utilization.

Therefore, the primary objectives of the present study were to assess the use of a validated instrument on use of routine checkups in a convenience sample and to address the limitations of the existing research on use of routine checkup by examining additional factors known to affect their use as an initial step toward identifying factors that influence the utilization of routine checkups among the general population of Saudi adults.

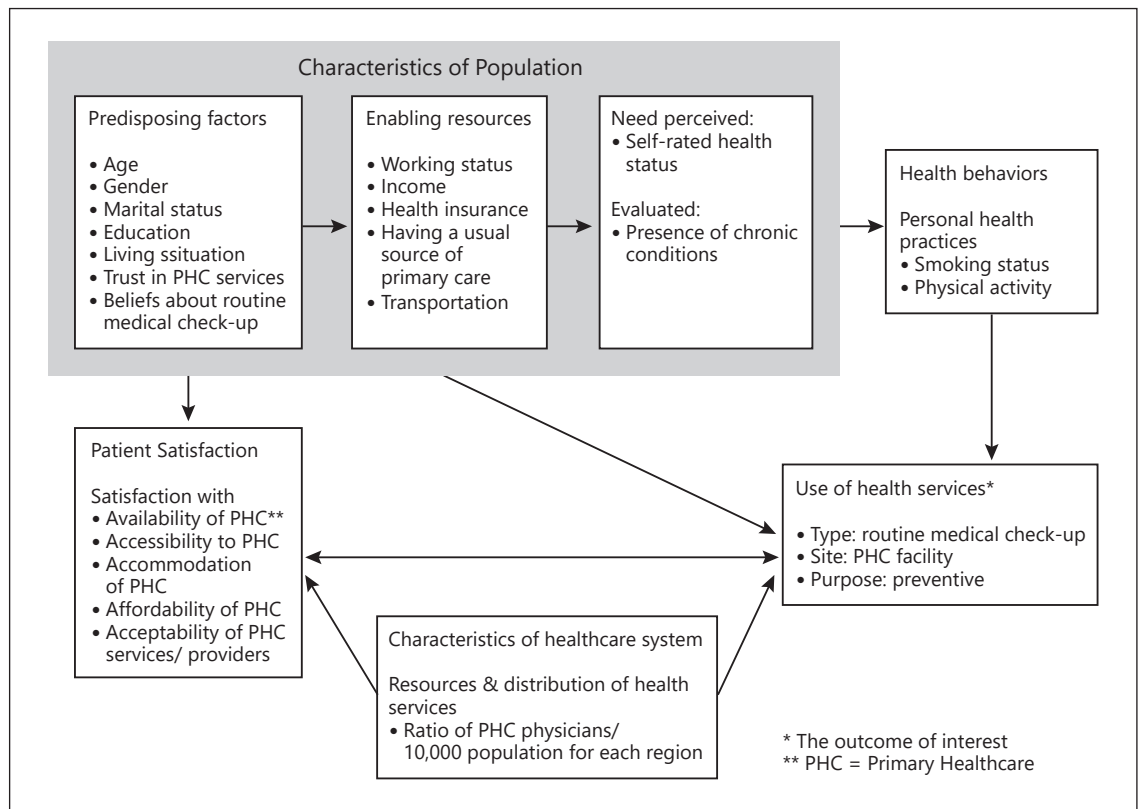


Fig. 1. The conceptual model of factors influencing the utilization of routine medical checkup among Saudis. PHC, primary healthcare.

Methods

This study used a cross-sectional survey design to identify individual and environmental factors associated with use of routine checkups among Saudis. The study was guided by Andersen's Behavioral Model of Health Services Utilization, which conceptualizes the use of routine checkups as the effect of individual characteristics (predisposing factors, enabling resources, and healthcare needs), healthcare system characteristics (availability of the resources and their distribution), personal health behaviors (personal health practices), and patient satisfaction (shown in Fig. 1). Predisposing factors include sociodemographic characteristics. Enabling resources are supports available to facilitate healthcare services use. Healthcare needs represent mental and physical conditions which require healthcare [17, 18].

Data Sources

The study used data on individual characteristics, personal behaviors and satisfaction collected through a fielded survey (described below). Characteristics of the KSA healthcare system were drawn from the statistical yearbooks issued by the KSA Ministry of Health [19].

Survey Development

The survey was constructed primarily of questions drawn from existing surveys assessing health status, health beliefs and behav-

ior, healthcare utilization, and satisfaction with healthcare services [1, 20–22]. Five adult Saudi students studying in the US representing the target respondents were asked to complete the survey to assess completion time, wording, length of questions, response options, and format. Then, the survey was pretested among 15 different Saudi students studying in the US. Finally, the development process was under the supervision of experts (Holly C. Felix and M. Kate Stewart with expertise in the field of access to and use of health services, and James P. Selig and Taren Swindle with expertise in survey research methods). The survey was programmed into Research Electronic Data Capture (REDCap), a secure web-based data collection application.

Sample and Recruitment

Target participants for the survey were adult KSA citizens (≥ 19 years of age) studying in universities, colleges, and institutes, such as English-language institutes in the USA. The sample size for the study was chosen based on the desired precision for estimates from the survey. The sample size of 381 was chosen to achieve a confidence interval for estimates that had a width of ± 5 percentage points. When the survey was fielded, there were 47,271 Saudi students meeting the eligibility criteria.

Data Collection Process

To recruit participants, information regarding the study and a link to the online survey was posted on social media platforms (e.g.,

Table 2. Sociodemographic characteristics of the study sample at the time of survey completion

| Respondents, <i>N</i> | 381 | |
|-----------------------------------|----------|-------|
| | mean | SD |
| Current age (years) | 29.8 | 5.05 |
| Tenure in the USA | 4.6 | 2.75 |
| | <i>N</i> | (%) |
| Female gender | 100 | 26.25 |
| Program of study in the USA | | |
| English program | 40 | 10.50 |
| Associate degree | 3 | 0.79 |
| Bachelor's degree | 98 | 25.72 |
| Master's degree | 113 | 29.66 |
| Doctoral degree | 127 | 33.33 |
| Current marital status | | |
| Never been married/single/engaged | 161 | 42.26 |
| Married | 213 | 55.91 |
| Divorced | 6 | 1.57 |
| Separated | 1 | 0.26 |
| Widowed | 0 | 0 |
| Current level of education | | |
| High school | 65 | 17.06 |
| Associate degree | 29 | 7.61 |
| Bachelor's degree | 124 | 32.55 |
| Master's degree | 150 | 39.37 |
| Doctoral degree | 13 | 3.41 |
| Current living situation | | |
| Lives alone | 96 | 25.20 |
| Lives with parents or relatives | 35 | 9.19 |
| Lives with my spouse | 160 | 41.99 |
| Lives with my child/children | 138 | 36.22 |
| Lives with friends or roommates | 55 | 14.44 |
| Other living status | 6 | 1.57 |

Twitter, Facebook, and Snapchat) of organizations serving Saudi students studying in the USA: Saudi Arabian Cultural Mission, Saudis in USA, and individual university-based Saudi Student Clubs. Individuals interested in the survey were directed to the study's webpage, which provided a description of the study and contact details of the principal investigator, instructions for completing the survey and the survey questions. To increase the response rate, participants were informed that all those who completed the survey and provided an email address would be entered into a drawing to receive one of three USD 50 gift cards. The USD 50 gift cards reward might have encouraged students to submit >1 record to increase the chances of winning in the drawing, but records were checked for duplications, and duplicated records were excluded. To avoid missing data, all fields of the questionnaire were required. The survey was open and available for 50 days (April 12–June 2, 2019).

Measures

Routine checkup was assessed by a single-item dichotomous question modified for the targeted population: "After you turned 18 years of age, did you ever have a routine medical checkup in

Saudi Arabia? (A routine medical checkup is a general physical exam, not an exam for a specific injury, illness, or condition)." Pre-disposing factors were captured with questions on age (in years), gender (female or male), marital status (married or unmarried), education (college degree or less than college degree), living situation (living alone or living with others), trust in primary care in Saudi Arabia (yes = 1 and no = 0), and belief in the importance of routine checkups (yes = 1 and no = 0). Enabling resources questions included working status (working = 1 or not working = 0), income ($\geq 15,000$ Saudi Riyals = 1 or $\leq 14,999$ Saudi Riyals = 0), having a usual source of primary care (yes = 1 and no = 0), and transportation (yes = 1 and no = 0). Although there is a governmental health-care system in the KSA, some individuals obtain private health insurance to access the private providers. Therefore, health insurance status was included as a measure of enabling resources (had health insurance = 1 and had no health insurance = 0). Perceived (self-rated health status) and evaluated (presence of chronic conditions) health was used to measure need for care. Perceived need was assessed by asking participants to rate their health status (excellent, very good, good, fair, or poor), which was then dichotomized (1 = excellent/very good and 0 = poor/fair/good). Evaluated need was assessed by reports of health provider diagnosed chronic conditions (diabetes, hypertension, high blood cholesterol, heart disease, or any other chronic conditions), dichotomized as 1 = have chronic conditions and 0 = do not have chronic conditions. Health behaviors were assessed with smoking status (smoker = 1 and non-smoker = 0) and engaging in regular vigorous or moderate physical activity at least 3 times a week (yes = 1 and no = 0). The average ratio of primary care physicians per 10,000 Saudi populations per region for 2013–2017 was used to characterize the healthcare system. Satisfaction was assessed across Penchansky and Thomas's [20] 5 dimensions of access (availability, accessibility, accommodations, affordability, and acceptability of primary healthcare), using a 6-point Likert scale (1 = very dissatisfied and 6 = very satisfied). A summary satisfaction score was created by adding the responses for the twelve satisfaction questions (range 12–72).

Statistical Analysis

To document the use of routine checkups among Saudi students studying in the US before they came to the US, summary statistics (e.g., frequency distribution and percentages) were employed. To identify individual and environmental characteristics that influence the use of routine checkups among Saudi students studying in the USA before they came to the USA, multivariate logistic regression analyses were conducted. All analyses were conducted in SAS 9.4, and the α was set at 0.05.

Protection of Participants

The study protocol was submitted to the University of Arkansas for Medical Sciences' Institutional Review Board for review and approval. The institutional review board reviewed the study protocol and classified it as exempt because the study involved the collection of data in which the subjects' responses could not be connected to identifying information of the subjects (the survey software captured responses and identifying information in separate files). Waivers of written informed consent and HIPAA authorization were approved. These waivers were justifiable because this research involved no more than minimal risk to the subjects, would not adversely affect the rights and welfare of the subjects, and could not practicably be carried out without them.

Table 3. Sociodemographic characteristics of the study sample when last in Saudi Arabia

| | N | % |
|---|-------------|----------|
| <i>Predisposing characteristic</i> | | |
| Age, years | 25.5 (mean) | 4.8 (SD) |
| Marital status | | |
| Unmarried | 219 | 57.48 |
| Married | 162 | 42.52 |
| Level of education completed | | |
| Less than college degree (high school) | 98 | 25.72 |
| College degree | 283 | 74.28 |
| Living situation | | |
| Lives alone | 71 | 18.64 |
| Lives with others | 310 | 81.36 |
| Trusted primary care services provided in Saudi Arabia | 278 | 72.97 |
| Believe routine medical checkup is important | 229 | 60.10 |
| <i>Enabling factors</i> | | |
| Working status | | |
| Not working | 143 | 37.53 |
| Working | 238 | 62.47 |
| Monthly income in Saudi Riyal | | |
| ≤14,999 | 249 | 65.35 |
| ≥15,000 | 132 | 34.65 |
| Had health insurance | 140 | 36.75 |
| Had usual source of primary care (a medical record in a primary healthcare facility) | 226 | 59.32 |
| Had transportation | 355 | 93.18 |
| <i>Need</i> | | |
| Had chronic conditions | 107 | 28.08 |
| Health status | | |
| Good/fair/poor | 63 | 16.54 |
| Excellent/very good | 318 | 83.46 |
| <i>Health behaviors</i> | | |
| Smoking status | | |
| Smoker | 141 | 37.01 |
| Nonsmoker | 240 | 62.99 |
| Engaged in weekly physical activity (at least 3 times a week of vigorous or moderate physical activity) | 206 | 54.07 |
| Use of health services | | |
| Had routine medical checkup after the age of 18 | 97 | 25.46 |

Results

A total of 525 surveys (hereafter records) were received but only 381 records were included in the analyses due to noneligibility on age ($n = 65$); duplication or empty records ($n = 19$); or inconsistent, inaccurate (e.g., skip logic error), or missing responses ($n = 60$). Table 2 shows the sociodemographic characteristics of the participants at the time of survey completion. The mean age of the par-

ticipants was 29.8 years (standard deviation 5.1 years); 73.6% were males, 55.9% were married, and the vast majority (89.5%) were pursuing college degrees in the USA (mostly masters or doctoral degrees [63.0%]) as opposed to developing English language skills (10.5%).

Only 25.5% of participants reported they had a routine checkup after the age of 18 years but while living in the KSA. Nearly three-quarters (73.0%) indicated they trusted the primary care provided in Saudi Arabia, and 60.1%

Table 4. Multivariate (adjusted) logistic regression analysis of individual factors predicting use of routine medical checkup among included participants

| Variable | Use of routine medical checkup | | |
|---|--|-----------|----------------|
| | OR | 95% CI | <i>p</i> value |
| <i>Predisposing factors</i> | | | |
| Age (years) | 1.04 | 0.97–1.11 | 0.31 |
| Gender | | | |
| Female versus male | 1.19 | 0.62–2.26 | 0.61 |
| Marital status | | | |
| Married versus unmarried | 0.47 | 0.24–0.91 | 0.02* |
| Education | | | |
| College degree versus less than college degree | 1.75 | 0.84–3.66 | 0.14 |
| Living situation | | | |
| Living with others versus alone | 0.91 | 0.46–1.83 | 0.80 |
| Trust in provided primary care | | | |
| Yes versus no | 3.21 | 1.56–6.61 | 0.002* |
| Believe routine medical checkup is important | | | |
| Yes versus no | 2.31 | 1.31–4.05 | 0.004* |
| <i>Enabling resources</i> | | | |
| Working status | | | |
| Working versus not working | 0.98 | 0.53–1.81 | 0.95 |
| Monthly income (in Saudi Riyals) | | | |
| ≥15,000 versus ≤14,999 | 0.88 | 0.49–1.56 | 0.66 |
| Health insurance | | | |
| Yes versus no | 1.74 | 0.99–3.04 | 0.05 |
| Had usual source of primary care | | | |
| Yes versus no | 1.71 | 0.98–2.99 | 0.06 |
| Transportation | | | |
| Yes versus no | 0.96 | 0.33–2.78 | 0.94 |
| <i>Need</i> | | | |
| Chronic conditions | | | |
| Yes versus no | 1.82 | 1.03–3.21 | 0.04* |
| Health status | | | |
| Very good/excellent versus fair/poor/good | 0.60 | 0.30–1.20 | 0.15 |
| <i>Health behaviors</i> | | | |
| Physically active | | | |
| Yes versus no | 2.01 | 1.16–3.47 | 0.01* |
| Smoking status | | | |
| Smoker versus nonsmoker | 1.43 | 0.82–2.52 | 0.21 |
| Variable | Use of routine medical checkup | | |
| <i>Satisfaction with access</i> | | | |
| Satisfaction score | 1.03 | 0.99–1.05 | 0.07 |
| <i>Characteristics of the healthcare system</i> | | | |
| PCPs/10,000 persons in region | 0.99 | 0.99–1.00 | 0.07 |
| Hosmer-Lemeshow goodness of fit test | $\chi^2 = 7.27, p \text{ value} = 0.507$ | | |

OR, odds ratio; CI, confidence interval; REF, reference group; PCPs, primary care physicians. * $p \leq 0.05$, the significant level.

reported believing in the importance of routine checkups. In general, participants indicated they were in good health when last in the KSA as indicated by 83.5% reporting their health status as excellent or very good health status and only 28.1% reported having a chronic condition (Table 3).

The regression analysis identified 5 factors that were significantly and positively associated with reports of having routine checkups. The likelihood of having routine checkups was significantly higher among those who trust KSA primary care (OR = 3.21, CI = 1.56–6.61, and $p = 0.002$), believe in the importance of routine checkups (odds ratio [OR] = 2.31, confidence interval [CI] = 1.31–4.05, and $p = 0.004$), had health insurance (OR = 1.74, CI = 0.99–3.04, and $p = 0.05$), had chronic conditions (OR = 1.82, CI = 1.03–3.21, and $p = 0.04$), and were physically active (OR = 2.01, CI = 1.16–3.47, and $p = 0.01$). One factor – being married – was significantly but negatively associated with having routine checkups (OR = 0.47, CI = 0.24–0.91, and $p = 0.02$) (Table 4).

Two goodness of fit tests showed that the regression model was a good fit for the data. The p value from the Hosmer-Lemeshow test ($p = 0.51$) was >0.05 , which indicates a good fit [23]. The area under the receiver operator curve was 0.75, which indicates good predictive power of the model [24] (Table 4).

Discussion

Researchers have found that routine checkups are crucial for general well-being and overall health, to find medical problems before they start, to initiate treatment in early stages of disease when they are most effective, and to reduce healthcare costs [6, 8, 9, 25]. Therefore, it is important to understand the extent to which populations use routine checkups, and what characteristics may facilitate or hamper the use of routine checkups. Previous research has determined that most KSA citizens do not have routine checkups [10, 11] which was confirmed with this study that found just 25.5% of survey participants have had a routine checkup.

This study also found 5 facilitators for routine checkups: trust in provided care, belief in the importance of routine checkups, having health insurance, having chronic conditions, and being physically active. Previous research has shown trust in care and perceived importance of routine checkups as being positively associated with use of routine care. For example, Hammond et al. [12] (2010) found that higher medical mistrust reduced the

odds of receiving routine health examinations among African American men. Moreover, Okura et al. [22] (2018) found that participants who believed in health checkups were more likely to have them compared to those who did not believe in them.

Although a significant body of research has shown that health insurance is associated with greater use of health services [26, 27], including routine checkups [15, 28], the identification of this factor as being important for routine checkups in the KSA was surprising. Healthcare services are available for free in the KSA suggesting that financing mechanisms would not play a significant role in healthcare service utilization. However, it is possible that this study's finding of health insurance as a significant predictor of routine checkups was related to some other characteristics of the participants that makes them different than the average KSA citizen (e.g., seeking higher education in a foreign country).

Previous studies using the Andersen model, which guided this study, have identified need as one of the main predictors of healthcare services utilization, in general [29, 30], and routine checkups, specifically [13, 15, 16]. In particular, studies have found that people with chronic conditions were more likely to use routine checkup compared to those without chronic conditions [13, 15, 16]. Consistent with these findings, the present study found that Saudi students who reported having chronic conditions were more likely to report use of routine checkups compared to those without chronic conditions.

The present study found that participants who were physically active were significantly more likely to use routine checkups compared to those who were not physically active. This finding was also consistent with previous evidence that physically active individuals use routine checkup more than nonactive individuals [15, 31]. Physical activity and use of preventive care (i.e., routine checkup) are both positive self-care behaviors. People who are physically active and/or have routine checkups may be more health conscious than those and therefore engage in other positive self-care behaviors. However, given the cross-sectional nature of this study, it is not possible to tell if being physically active prompted routine checkups or vice versa.

Previous studies have found a significant and positive association between marital status and use of routine checkup [12, 13, 15, 28]. Marital status is a proxy for social support [28], with healthcare seeking behavior among married people influenced by the social support from their spouses. However, in the present study, marital status was significantly but negatively associated with use of

routine checkup, after controlling for all other factors. There are several reasons for this finding that is inconsistent with existing research. The previous research was undertaken with different samples, including older adults [13, 15] and African American men [12], and within the USA. The differences in the demographic characteristics of the studies' samples, the cultural context of the 2 study locations (KSA vs. USA), and the structure of the 2 healthcare delivery systems may have created the conflicting results.

This study has several limitations. First, the study used a convenience sample of Saudi students studying in the USA; hence, the results are not generalizable to the general Saudi population. However, the study does provide insight into the use of routine checkup among a specific group of Saudi citizens – Saudi students studying in the US – which could inform interventions specifically targeting them. A second limitation was related to the cross-sectional design of this study, which inherently limits assessment of the causal relationship between outcomes and predictors. However, the study design did allow for a description of routine checkup use among Saudi students studying in the USA to be generated. Third, this study was limited by recall bias (the inability to remember events or experiences from the past) and social desirability bias (the tendency to provide responses that are thought to be preferable rather than responses that are reflective of actual knowledge, attitudes, or behaviors). Nevertheless, the study used a validated survey instrument to minimize those sources of bias.

Despite these limitations, this study has made contributions to the study of healthcare services utilization in Saudi Arabia. Very few studies have examined the use of routine checkups across a wide range factors influencing such utilization among Saudis. For example, the study by El Bcheraoui et al. [13] (2015) focused only on geographic distance as a measure for access to healthcare. In contrast, the present study recognized the complexity of facilitators and barriers to healthcare utilization and employed a comprehensive framework that incorporated 5 dimensions (availability, accessibility, accommodations, acceptability, and affordability) [20] and multiple domains of access to healthcare services (environment, population characteristics, health behaviors, and outcomes) [18]. Although the current results are limited and may not inform immediate policy change, future research that builds on this foundation can help identify targets for policy and/or programmatic intervention to increase the percent of Saudi citizens who have routine checkups from the current rate of 25.5%. Future research should also

consider updating the validated instrument used in the present study to include questions on any new factors related to routine checkups identified in the literature since this study was undertaken. For example, a recent study found a significant association between health literacy and use of health checkup among Japanese population [32].

Conclusion and Implications

High rates and high costs associated with preventable health conditions in the KSA warrant attention. A potential solution to these individual and societal burdens is use of routine checkups to identify risks for and prompt treatment of chronic conditions identified such as diabetes, hypertension, and obesity. Although healthcare services are available for free in the KSA, this study confirmed the findings of a national study that showed the majority of Saudi citizens are not getting routine checkups [13], and it presents implications for future work. First, the results underscore the need for future research to understand factors related to the low use of routine checkups. The survey created for this study considers a wide array of factors that influence the use of health services, and it has been developed and validated with a sample of Saudi adults. Policy makers and health services researchers can use the validated survey in a study with a representative random sample of Saudi adults to overcome the limited generalizability affecting the current study's results. Generalizable findings will help to inform future policy and programmatic decisions to improve use of routine checkups available through the KSA healthcare system. In addition, subsequent research should engage additional groups to gain perspectives beyond that of patients. Primary care providers should be engaged to explore their opinions about health system-related barriers and facilitators to the use of routine health checkups in Saudi Arabia. All stakeholders – consumers, providers, and policy makers – should be engaged to help identify strategies to address barriers to use of routine checkups may be most effective and politically receptive to adopt.

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Statement of Ethics

The study protocol was submitted to the University of Arkansas for Medical Sciences' Institutional Review Board (IRB) for review and approval. The IRB reviewed the study protocol and classified it as exempt because the study involved the collection of data in which the subjects' responses could not be connected to identifying information of the subjects (the survey software captured responses and identifying information in separate files). Waivers of written informed consent and HIPAA authorization were approved. These waivers were justifiable because this research involved no more than minimal risk to the subjects, would not adversely affect the rights and welfare of the subjects; and could not practicably be carried out without them.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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Authors Contributions

Ali Alzahrani, the primary author, conceptualized the study. He led the design of the study, the development and validation of the questionnaire, data collection, communications with participants, data cleaning and analysis, results interpretation, and drafting the manuscript. Holly C. Felix, M. Kate Stewart, Taren Swindle, and James P. Selig contributed to the design of the study, development and validation of the questionnaire, data analysis, results interpretation, and revising the manuscript. Mohamed Abdeldayem contributed to the development of the questionnaire, results interpretation, and revising the manuscript. All authors approved of the final version of the manuscript and are accountable for all aspects of the research.

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