

Review

Perceived satisfaction of web-based medical appointment system in Saudi Arabia: a systematic review and meta-analysis

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Abstract

Background A web-based medical appointment system is an electronic service that is available in a smartphone application and enables patients to book, cancel, or reschedule their appointment for a specified clinic at a primary health care center (PHCC). This review aimed to assess the perceived satisfaction of web-based appointment systems in Saudi Arabia “Sehhaty”.

Methods We searched the Cochrane, Trip, EMBASE, and Google Scholar databases for original research published during 2018–2023. The inclusion criteria included all the available studies that investigated the perceived satisfaction with the web-based appointment system in Saudi Arabia. A random effect model was used for data analysis, and the results were presented as odds ratios (ORs) with a 95% confidence interval (CI).

Results The review included 781 patients from three observational studies conducted in different regions of Saudi Arabia. Overall, the review recorded that more than half (59.41%) of the studied subjects were satisfied with the use of the web-based appointment system. Moreover, about two thirds of the included patients believed that the web-based appointment system improved the accessibility of PHCC services.

Conclusion The web-based appointment system is a significant tool that improves the accessibility of PHCC services and consequently enhances patients’ perceived satisfaction.

Keywords Web-based appointment system · Perception · Satisfaction · Primary health care centers

1 Background

Primary health care centers (PHCC) are the base of healthcare services and should be accessible to all populations. Improved health accessibility leads to increased quality of care and, consequently, patient’s perceived satisfaction [1]. Patient satisfaction has become a goal of healthcare organizations and a cornerstone of health system planning and development [2].

The Saudi Ministry of Health launched many health initiatives to enhance patients’ satisfaction via convenient access to health services. One of these initiatives is the web-based appointment system. It is an electronic service that is available

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in a smartphone application called “Sehhaty”. This application enables patients to book, cancel, or reschedule their appointment for any PHCC covered by the Saudi Ministry of Health [3–5].

The advantage of such a web-based appointment system is the organization of appointment schedules according to the patient’s requirements. This allows healthcare providers to better understand the patient’s concerns and be more prepared for their demands. Furthermore, it has the ability to reduce the amount of time patients have to wait, saving time and resources and enhancing the effectiveness of healthcare services provided and patients’ accessibility to receive these services [6, 7]. Accessibility for primary health care, which can be improved by implementing a good appointment system, is perceived by providers and consumers as an indicator of the quality of care [8]. Besides, it is documented that the use of web-based tools for appointments has the potential to ensure patients’ satisfaction and the efficiency of delivered health services by reducing waiting times, thus saving time and resources [9, 10].

Although the traditional methods of booking appointments are associated with many challenges, many patients attending PHCC are still seen on a walk-in basis for medication refills, lab test requests, or for no reason, which may increase the healthcare providers’ workload and decrease the quality of care delivered to patients [11].

According to previous studies, useful web-based appointment systems with excellent performance are associated with a high proportion of patients’ satisfaction. Minimizing waiting time and having an appointment reminder feature enabled the recognition of usefulness. The performance of the web-based appointment system is probably linked to its ease of use, being less complicated, reflecting the actual scheduled appointment, and having few errors [5, 12–14].

In Saudi Arabia, three studies focused on the established web-based appointment system, Sehhaty, to assess its performance, benefits, and impact on patients’ satisfaction [15–17]. Hence, the present study sought to assess the consensus or discrepancies in prior studies conducted in Saudi Arabia regarding patients’ perceived satisfaction and opinions regarding the effectiveness of Sehhaty in enhancing the accessibility of PHCC care.

2 Methodology

2.1 Inclusion and exclusion criteria

The review included all the available studies that investigated the patients’ perceived satisfaction with the web-based appointment system for PHCC in Saudi Arabia. We excluded studies conducted in other countries and other studies that focus on the utilization and performance of the appointment system before its implementation.

2.2 Search methods

We searched the Cochrane, Trip, EMBASE, and Google Scholar databases in the last 5 years. In addition, we reviewed the reference lists of the selected articles. We used the following terms in the search: web-based appointment system, OR appointment system, OR primary health care centers, OR Saudi Arabia and consumers’ perceived satisfaction, OR patients’ perceived satisfaction, OR consumers’ opinions.

2.3 Trial participants

The review included adult patients who visited PHCC and booked their appointments using the web-based appointment system. Patients attending PHCC centers with unscheduled encounters that include walk-ins and emergency cases were excluded.

2.4 Outcome measures

The outcome measure is the patients’ perceived satisfaction with the use of the web-based appointment system in booking their appointments at PHCCs. In addition, the patients’ opinions towards performance and the benefit of the web-based appointment system in improving the accessibility of PHCC services.

2.5 Data collection and extraction

Two authors independently reviewed the collected articles for eligibility. Then, they extracted the following characteristics: study setting, duration, and design, participants, and outcome measures.

2.6 Assessment of the risk of bias

Two authors independently judged the risk of bias among the included studies based on the Newcastle Ottawa scale for observational studies [18]. The scale grouped the risk of bias into low, high, or unclear categories. The studied domains included adequate case definition (selection bias), consecutive representative of cases (selection bias), blinding of outcome assessment (detection bias), incomplete outcome data (attrition bias), and selective reporting of outcome (reporting bias).

2.7 Dealing with heterogeneity

The consistency across the included studies was measured using the I^2 test. Based on the test, two authors independently graded the heterogeneity into low insignificant ($I^2 < 30\%$), moderate ($I^2 = 30\%–60\%$), substantial ($I^2 = 60\%–75\%$), and considerable significant ($I^2 > 75\%$) [19].

2.8 Quality of studies included

Two authors independently judged and graded the quality of evidence for each outcome as high, moderate, low, or very low based on the GRADE approach [20]. The approach graded the quality according to study design, risk of bias, heterogeneity, and precision.

2.9 Statistical analysis

Data analysis was conducted utilizing the Review Manager program version 5.3 with a random effect model. We reported the outcome measures as odds ratios (ORs) with a 95% confidence interval (CI) [21].

3 Results

3.1 Results of the search

We searched 146 articles; 76 remained after the removal of duplicates. Only nine articles were assessed for eligibility, and three of them met the inclusion criteria. The details of the search method are explained in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram (Fig. 1).

3.2 Included studies

The review included three cross-sectional studies conducted in Saudi Arabia and assessed the perceived satisfaction and the opinion of PHCCs visitors towards the web-based appointment system [15–17]. The characteristics of these studies are explained in Table 1.

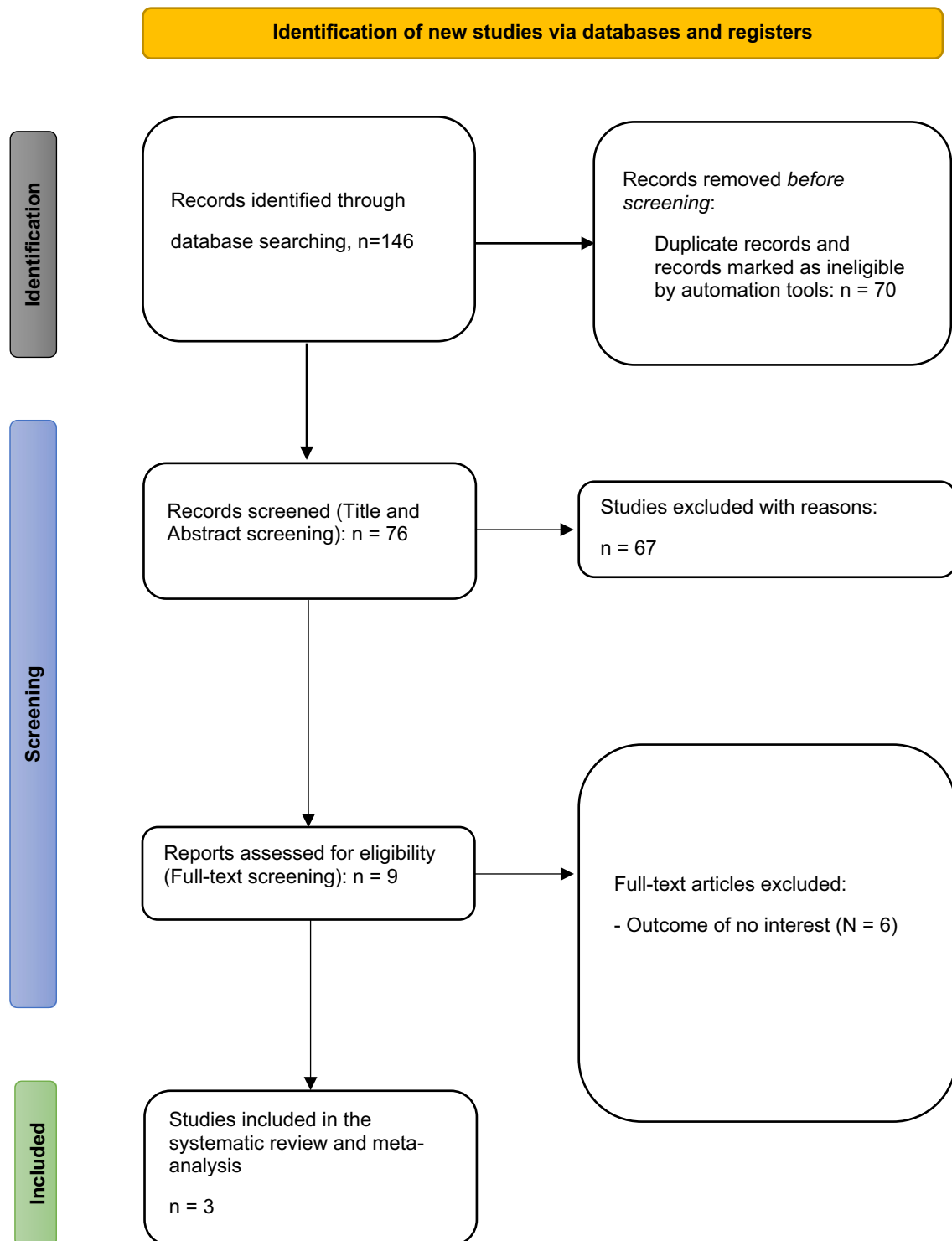


Fig. 1 PRISMA flow diagram

3.3 Trial participant

The review included 781 patients who booked their appointments at PHCCs using the web-based appointment system. They were male and female patients attending PHCCs in Makkah (n = 214), Jizan (n = 421), and Alahsa (n = 146)

Table 1 Characteristics of included studies

Author(s)	Title	Study design	Setting, duration	Aim	Participants	Outcome
Mahfouz et al	Evaluation of Patient Satisfaction with the New Web-Based Medical Appointment Systems "MAWID" at Primary Health Care Level in Southwest Saudi Arabia: A Cross-Sectional Study	Cross-sectional survey	Two PHC centers in Jazan region located in the southwest of the Kingdom of Saudi Arabia	To evaluate patients' perception and satisfaction with the web-based medical appointment systems "Web-based appointment system" in phccs	421 (218 males and 203 females) attendees to PHC centers aged from 18->45 years	The overall level of satisfaction was 94.3% with 95% C.I. (91.7–96.1). 89.1% of the participants agreed that the booking system improves health services
Hayatalhazm and Alharbi	The Level of Satisfaction and Its Determinants with the New Application-Based Appointment System (MAWID) among Al Iskan Primary Healthcare Center Beneficiaries in Makkah, Saudi Arabia 2020	Cross-section study	Al-Iskan PHC centers, Makkah City in Saudi Arabia during the year 2020	To evaluate patient's satisfaction towards "MAWID" system in Al-Iskan Primary Health Care Center in Makkah City	214 patients aged ≥ 18 and parents of patients below 18 attending well-baby clinic or vaccination clinic, who booked their appointments using (web-based appointment system) application	The majority of patients believed that "web-based appointment system" application improved the service provided compared to the previous way of appointment booking, $p=0.047$. Overall, 48.1% of patients were satisfied with the services of "web-based appointment system" application
Alali et al	Evaluation of the Patient Experience with the MAWID App. During the COVID-19 Pandemic in Al Hassa, Saudi Arabia	A cross-sectional survey	Al Hassa, Saudi Arabia	To evaluate the patient experience with the web-based appointment system during the COVID-19 pandemic in Al Hassa, Saudi Arabia	146 adult patients who accessed the web-based appointment system at least once and were citizens of Al Hassa, Saudi Arabia	More than half of the participants (65.8%) opined that application was easy to use. 65.1% considered it to be very easy and easy to search for the required information, and 63.7% of reflected that it was easy to book an appointment

Fig. 2 Risk of bias graph based on authors' judgement

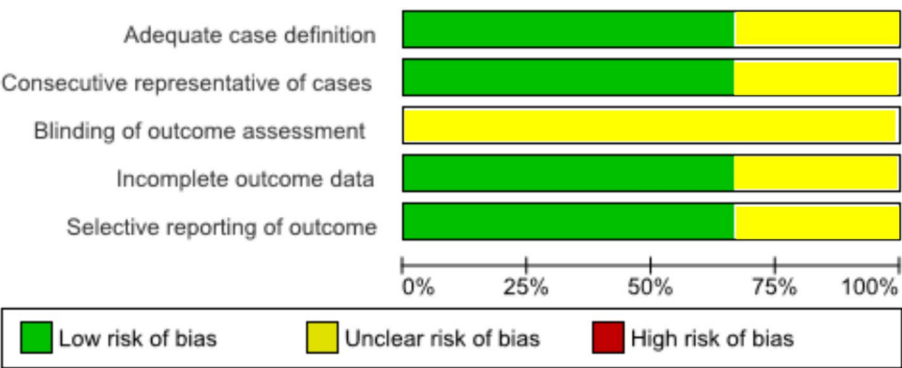
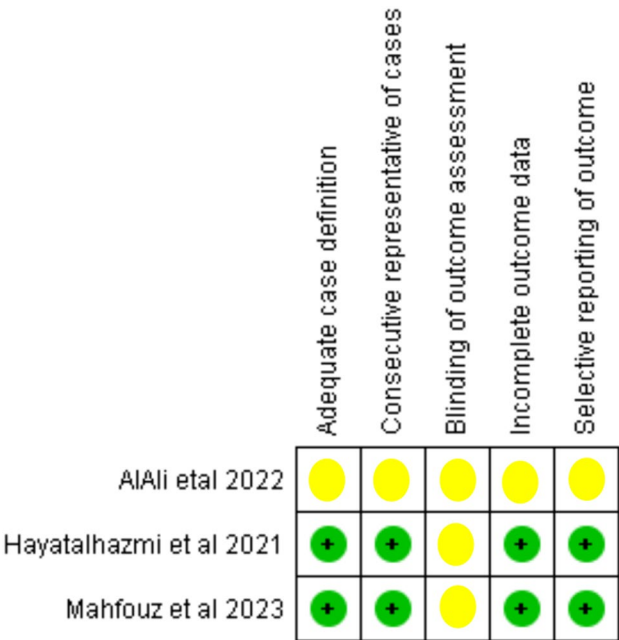


Fig. 3 Risk of bias summary based on authors' judgement



cities [15–17]. Those patients were adults, and most of them were female (57.5%).

3.4 Risk of bias among the included studies

Overall, the review reported a low risk of bias among the included studies for most of the studied domains. Nevertheless, blinding of the outcome measures bias was unclear in two studies, while consecutive representative of cases bias was unclear in one study (Figs. 2 and 3).

3.5 Outcome measures

Figure 4 presents a forest plot analysis of the overall perceived satisfaction with the web-based appointment system among the studied subjects. More than half of them (59.41%) are satisfied with the web-based appointment system, yet, females recorded a higher level of satisfaction than males (55.48% versus 44.52% respectively). Nevertheless, no significant difference was recorded between them regarding the overall satisfaction (OR= 1.00, CI 0.73–1.37, P=0.42). In addition, no heterogeneity was recorded across the included studies ($I^2=0\%$, $P=0.51$). We judged the quality of evidence for this outcome to be moderate. We downgraded the quality by one level due to the cross-section design of the included studies.

Figure 5 explains the forest plot analysis of the opinions of the participants towards items in the web-based appointment system by gender. These items include: (1) easy logging into the application; (2) clarity of data in the

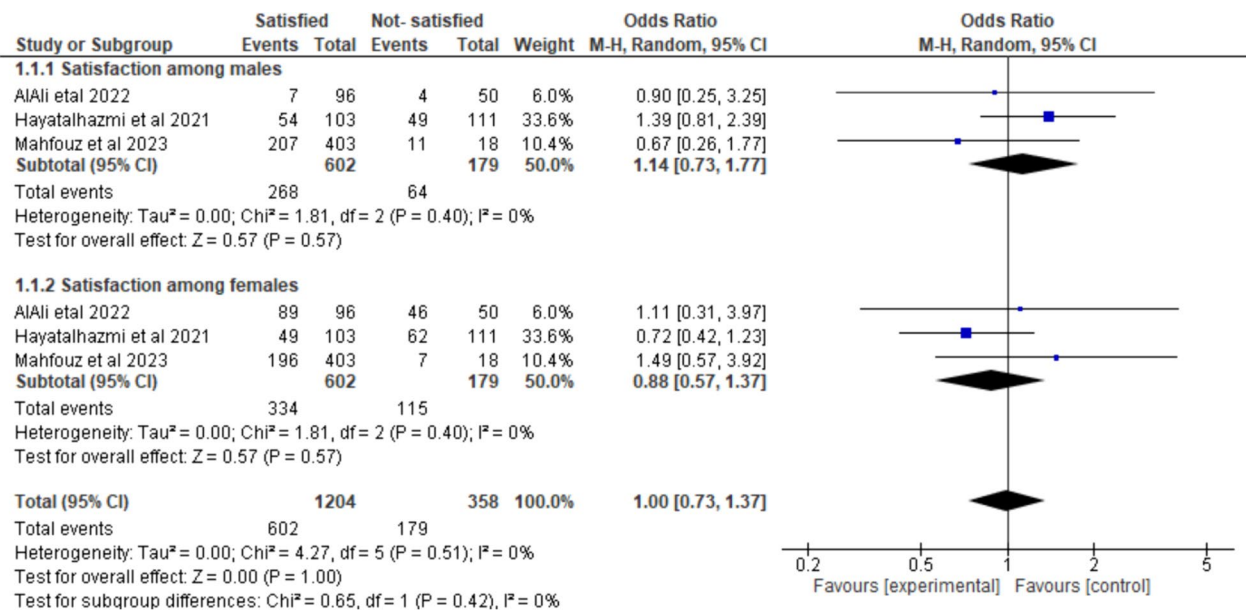


Fig. 4 Forest plot of participants' perceived satisfaction towards web-based appointment system

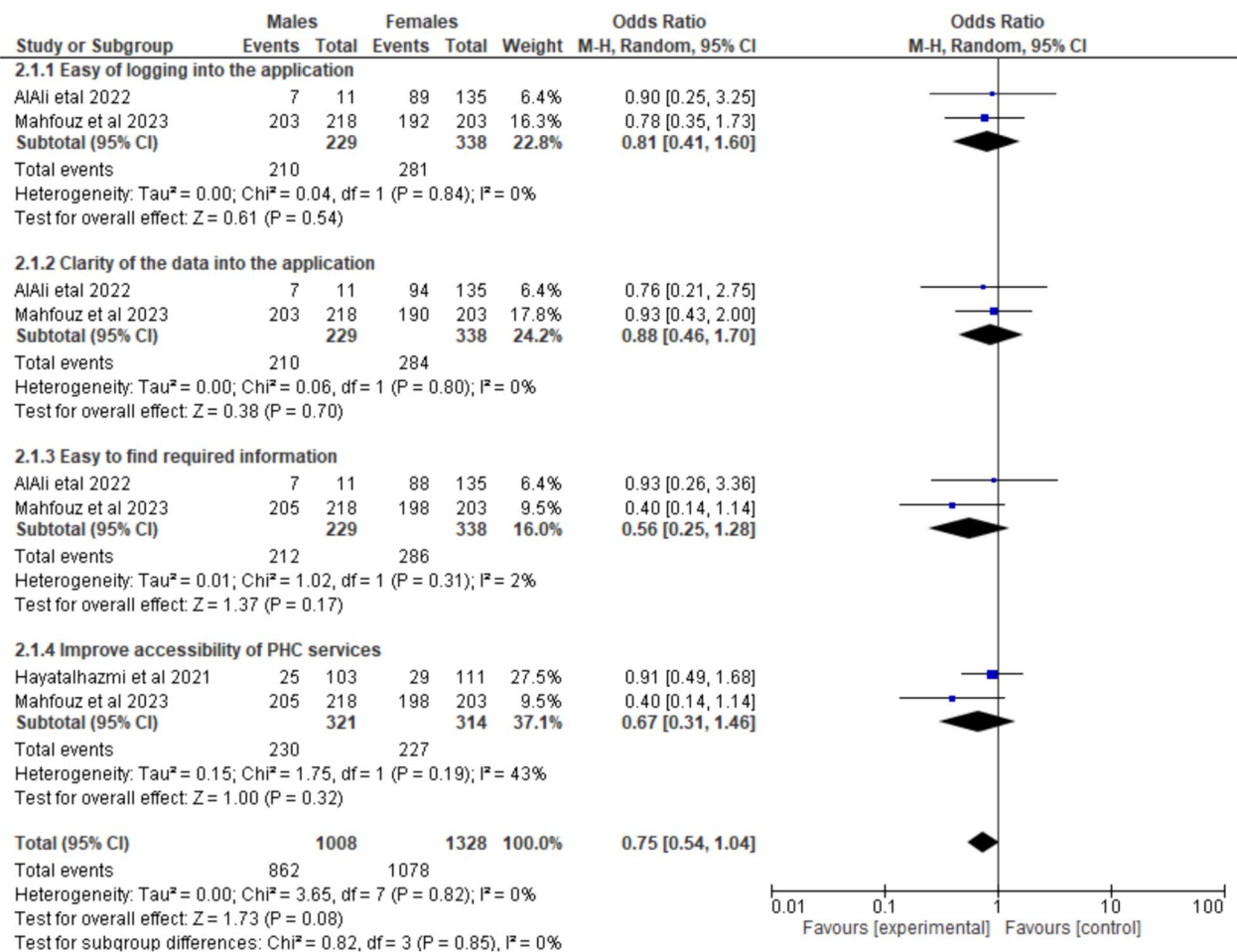


Fig. 5 Forest plot of participants' opinions towards web-based appointment system relative to gender

application; and (3) easy finding the required information. The analysis, which includes 449 subjects, shows that 91.70%, 91.70%, and 92.58% of male subjects and 83.14%, 84.02%, and 84.62% of females, respectively, agreed about the efficient performance of the mentioned items. In addition, about two-thirds of males and females (71.65% and 72.29%, respectively) agreed that the web-based appointment system improve the accessibility of PHCC services. No significant differences were recorded between males and females regarding agreement with these items (OR = 0.75, CI 0.54–1.04, $P = 0.08$). No heterogeneity was reported across the included studies ($I^2 = 0\%$, $P = 0.82$). We judged the quality of evidence for this outcome to be moderate. We downgraded the evidence by one level only due to the observational design of the included studies.

4 Discussion

The present review included 781 patients from three observational studies conducted in different regions of Saudi Arabia, which showed a low risk of bias for most of the studied domains. It was revealed that more than 59% of the studied subjects were satisfied with the use of the web-based appointment system “Sehhaty,” with no significant difference recorded concerning patients’ sex. Moreover, the majority of patients concurred on the effective functioning of the various components of the web-based appointment system and its contribution to enhancing the accessibility of PHCC services.

Although the studies included in this review had certain drawbacks, such as using a cross-sectional design, possible selection bias, and concerns regarding survey validation, there were also advantages. These included the investigation of the same web-based appointment system and the finding of insignificant heterogeneity. Moreover, if the existing results are verified, there is a need to boost the overall satisfaction rate and improve the features of the systems according to the preferences of the users. Therefore, it is imperative to examine the requirements of patients and devise strategies for the enhancement of the web-based appointment system in order to streamline visits to the PHCC.

Several studies, conducted globally, assessed peoples’ satisfaction or perception toward web-based appointment systems at the level of primary healthcare. Graham et al. [6] showed that 75% of patients were satisfied with the web-based patient portal applied in Canada as it saved time when scheduling an appointment. In addition, the researchers observed that no-show rates were obviously decreased among patients using the web-based system. Kinney and Sankaranarayanan [22], which used regression analysis, found that patients’ satisfaction was improved by utilizing web-based portals applied in the United States [6, 22]. Besides, researchers in Dubai and Skopje revealed that about 72–74% of walk-in patients were in-favor of applying a web-based system to facilitate appointment booking [23, 24]. Furthermore, numerous previous studies reported that web-based appointment services improve patients’ perceived satisfaction in registration, reduce appointment failure, and reduce health care costs with shorter wait times, thus improving health care accessibility [25–29].

These outcomes confirmed the importance of adopting web-based appointment systems, which offer a number of benefits, including a reduced no-show rate, decreased staff labor, decreased waiting time, and improved perceived satisfaction [30]. Although the rate of satisfaction in our study was obviously lower than other previous studies, they were consistent with our study in confirming that sex variation has no significant association with the level of satisfaction [12, 31, 32].

Concerning age, as a variable, Atallah et al. [33] and Czaja et al. [34], similar to our study, suggested that the use of mobile applications was more likely seen in patients aged 18–30 years. Czaja et al. stated that people aged more than 60 years are less likely to use technology in general compared to younger age groups [34].

Moreover, Alsalamah et al. [35], like our results, recorded that older patients, females, and those with higher comorbidity scores were significantly associated with being less likely to book the appointment through the mobile application. The authors explained this difference due to local social norms where females tend to rely on males, besides, the lower quality of life among aged patients and those with high comorbidities [36, 37].

Evaluating the experience of PHCC visitors who booked their appointment using a web-based appointment system is important to determine the ability of the application to meet all the needs and expectations of the users [38]. However, the efficiency of such an application is influenced mainly by the behavioral intention to use the application, which is based on the perceived ease and usefulness of use [39]. Other barriers for using such e- appointment scheduling were identified by Zhang et al. [40] including lack of access to the internet, lack of awareness for the service, and low computer skills.

4.1 Potential bias encountered during the review process

In the current systematic review and meta-analysis, we systematically searched most of the major databases for eligible articles. The references to selected articles were also searched for more articles. All the searched eligible articles were included in the study. Two authors independently conducted the research process, extracted data, and judged the risk of bias in the included studies. Any disagreement between the two authors was solved by discussion. Therefore, it is unlikely that bias was introduced in this review.

5 Limitation, conclusion, and recommendations

The most important limitation of this review is the small sample size and only three cross-sections studied conducted in three regions, which is probably due to the recent implementation of the new web-based appointment system in Saudi Arabia, “Sehhaty”. Another limitation is the cross-sectional design of the included studies in the current review, which downgrades the quality of evidence for the outcome measure. Hence, these limitations may affect the generalizability of the results of the current study.

Nevertheless, the study assessed the perceived satisfaction of PHCC visitors with the web-based appointment system and highlighted the role of this application in improving the accessibility of PHCC services. Thus, further studies with a higher quality of evidence are recommended to investigate other facilitators and barriers that determine consumers’ perceived satisfaction with using web-based systems and smartphone applications to book appointments. Furthermore, in case the current outcomes are confirmed, the overall satisfaction percentage required to be improved and the systems’ features should be enhanced based on people’s needs. In addition, populations from other regions should be investigated about their satisfaction. Hence, exploring patients’ needs and how to develop the web-based appointment system to facilitate PHCC visits should be done in a national study.

Author contributions Nashwa Radwan and Abdullah Alkattan contributed in conceptualization and extracted the study characteristics and judged the risk of bias among included studies. Nashwa Radwan and Abdullah Alkattan contributed in writing—original draft preparation. Nashwa Radwan, Abdullah Alkattan, and Nagla Mahmoud contributed in formal analysis. Alhan Haji, Nagla Mahmoud, and Khaled Alabdulkareem contributed in writing—review and editing. Nashwa Radwan, Abdullah Alkattan, and Alhan Haji contributed in resources. All authors have read and agreed to the published version of the manuscript.

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Data availability The data that support the findings are available in the three studies included in the analysis: • Evaluation of Patient Satisfaction With the New Web-Based Medical Appointment Systems “Mawid” at Primary Health Care Level in Southwest Saudi Arabia: A Cross-Sectional Study. <https://doi.org/10.7759/cureus.34038>. • The level of satisfaction and its determinants with the new application-based appointment system “MAWID” among al Iskan primary healthcare center beneficiaries in Makkah, Saudi Arabia 2020. <https://doi.org/10.12691/ajmsm-9-1-2>. • Evaluation of the patient experience with the mawid app during the COVID-19 pandemic in Al Hassa, Saudi Arabia. <https://doi.org/10.3390/healthcare10061008>

Declarations

Competing interests The authors declare no competing interests.

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