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Analyzing the Users' Awareness of Data Privacy and Security on Online Social Network in Saudi Arabia: A Systematic Literature Review

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Article History	Abstract
Received: 13 May 2023 Revised: 4 June 2023 Accepted: 30 October 2023	The rise of Online Social Networks has brought about numerous benefits, in particular in the Kingdom of Saudi Arabia, has come an inherent danger that cannot be ignored, the danger from both sides, the users themselves and the attackers. In the literature, we observed that there are various factors influencing the user's behavior regarding their information, privacy and security on OSN. Moreover, in Saudi Arabia, most studies focused only on one aspect of users' awareness which is privacy awareness to assessing the level of users' behavior within OSNs. In addressing this gap, we aim to systematically evaluate the literature on current research to provide a thorough understanding of the factors influencing the user's awareness behavior regarding their privacy and security on OSNs, whether world-wide or in Saudi Arabia studies. The results show interesting inferences e.g. we concentrate on empirical studies only to extract the privacy and security-related factors and determine the relationships between them and their impact on the users' awareness behavior on Online Social Networks. Further, our findings declared that most of the selected research studies adopt the quantitative approach for their investigation.
CC License CC-BY-NC-SA 4.0	Keywords: Cybersecurity, Online Social Networks, Privacy Factors, Security Factors, Users' awareness Behavior

1. Introduction

Online Social Network (OSN) received a noticeable increase of its users and their different activities, goals and orientations in recent years. The social media platforms provide the users with an environment of fast, immediate and effortless processes for different purposes to make relationship, sharing knowledge and start business, etc. [1].

According to a recent statistics analysis [2], there were 36.31 million internet users in Saudi Arabia at the beginning of 2023, when the country's internet penetration rate was 99.0%. Furthermore, 29.10 million Saudi Arabians used social media in January 2023, accounting for 79.3% of the country's total population. [2] (see Figure 1).

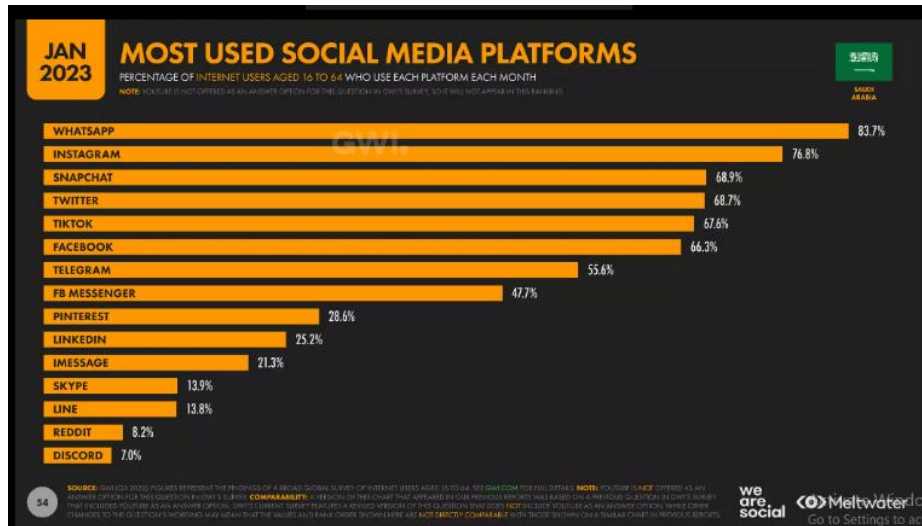


Figure 1. The most used Social Media Platforms in Saudi Arabia [2]

This sharp increase in OSN users makes them vulnerable and a perfect spot for the attackers to launch attacks [3]. A US FBI investigation stated that during the current COVID-19 pandemic, there has been a 300% rise in cybercrimes. [4]. The direct interaction of OSN users in sharing personal information about themselves, whether by text, pictures, videos and live broadcast, personal beliefs and thoughts, geo-locations, age or gender with other people, which, in contrast, raises serious privacy and security issues [5], [6]. For example, attackers can create fake accounts or impersonate others to gain trust and steal personal information [7].

Some studies declare security as the level of OSN users' knowledge about the security mechanisms to protect themselves from security risks and threats [5], [8], [9], [10], [11].

The users of OSN are unconsciously exposing themselves to attackers, making the awareness behavior an urgent concern. Information security awareness (ISA) and individual differences were examined in the study [12]. The Protection Motivation PMT theory's four components were employed in the study [13] to raise users' awareness by keeping them from making unsafe decisions. Additionally, the study [14] covered how students use OSNs to monitor their awareness of cyber security awareness. Furthermore, in the literature, many research studies have discussed the privacy aspect and the factors that influence the users' behavior on OSNs [15], [16].

Saudi users are concerned about privacy in social media, which is connected somehow with the previous privacy issues experienced inside these sites [17]. Further, the self-disclosure behavior had spread among Saudi users on OSN despite the antecedent experience of social media issues [18]. To be honest, the most important entity in the live cycle of social media usage phenomena is the OSN users themselves [19], [20]. Accordingly, awareness behavior on social media becomes an essential protection way against cyber violations [21], [22], [23].

The majority of research conducted in Saudi Arabia addressed privacy-related issues and variables that affect user behavior. Furthermore, there aren't many studies that include both the security and privacy elements. [19], [20].

As we know, in Saudi Arabia, there is no systematic review study that addresses both privacy and security-related factors and their influence on the user's awareness behavior on OSNs. We give a classification of the most common factors used to analyze the user's behaviour on social media. In light of this, we extract the most prevalent and recent privacy and security aspects from user awareness behaviour on OSN in Saudi Arabia that have not yet been studied. We perform a systematic review in this study and take into account security and privacy features and factors, as well as how they affect users' awareness behaviour on OSN in Saudi Arabia and around the world.

1.1 Research Questions

- 1) What are the factors examined in the literature that address users' behaviours and privacy on social media, whether in general studies or in Saudi Arabia?
- 2) What are the factors examined in the literature that address users' behaviours and information security on social media, whether in general studies or in Saudi Arabia?

1.2 Research Contributions

The primary contributions of this work are presented as follows:

- 1) We conduct a systematic review to cover and collect the recent research studies that address OSN security and privacy aspects and users' behavior, factors and the adopted theories.
- 2) We contribute to Saudi Arabia studies and give more insights into the cybersecurity (privacy and security) factors and users' awareness behavior.

The structure of the paper is as follows: The background is provided in Section 2. The method by which the review processes were carried out is described in Section 3. The study's results are shown in Section 4. The answers to the research questions are displayed in Section 5. The main findings are covered in Section 6. Lastly, Section 7 brings the paper to a close.

2. Background

2.1 Social Media and Privacy

The term privacy in OSNs has different perspectives, including user privacy, information privacy and privacy policies provided by the service provider [24], [25]. Despite sizeable privacy concerns, OSN users maintain to disclose non-public information online [24]. Furthermore, there is an immediate need for access control mechanisms to avoid the risk of disclosure [26].

2.2 Social Media and Cybersecurity

The major purpose of OSN security is to protect the users, information and services from other users and themselves or attackers. According to some research studies [27], [28], a lot of businesses lack comprehensive social media security coverage locally and are unclear of how to implement more effective social media safety measures to lessen the risks associated with social media protection. In multiuser systems such as OSNs, data security and privacy are critical. [29].

2.3 Social Media and Awareness Usage

The term awareness explains the users' understanding, behavior, intending, attitude and use of OSNs for different purposes, whether socially or in organizations and companies [30], [31]. According to [32], younger people have fewer privacy concerns than adults, which might put them at greater risk due to the threats on OSN increasing and evolving, which shows the importance of raising awareness of those threats to reach a high level of security and to be aware of what can be shared on OSN.

3. Review Method

A Systematic Literature Review (SLR), which covers all of the research literature that is currently accessible on a certain topic or research issue, is a highly dependable and replicable procedure that is included in this study [33]. This kind of review's primary goal is to compile, synthesize, and assess data regarding OSN users' understanding of and actions related to data security and privacy.

3.1 Review Protocol

Conceptually, performing a systematic review is greatly facilitated by the review protocol, which specifies the methods to be used [34]. In our systematic review, we gave a brief background of the research topic and identified our research questions.

3.2 Inclusion and Exclusion Criteria

We consider only the research studies from journal articles, conference papers in the English language between 2015 and 2022. We restrict our selection of the research studies that chose the empirical approach (quantitative- qualitative- mixed methods). The study's purpose behind this selection is to extract the privacy and security factors from an accurate analysis of users' behavior inside OSN sites. Through a peer-review process, research articles that did not relate to social media use in a privacy and security behavior setting were excluded by us. In Table 1, we illustrate the inclusion and exclusion criteria.

Table 1. Inclusion and Exclusion Criteria

Research Inclusion	Research Exclusion
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<ul style="list-style-type: none"> - Research studies found in complete form. - Research studies that are published in journals or conferences. - Period of publication between 2015 and 2022. - Methodology: Empirical Research studies (qualitative- quantitative- mixed- methods). - Use of English as the primary language. 	<ul style="list-style-type: none"> - Incomplete or inaccessible research studies (e.g. need to pay). - Published before 2015. - Methodology: Review and Comparative research studies. - Written in a language other than English.
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3.3 Research Query

In our search process, we used the following keywords ("Social media" OR "Online Social Networks" AND (" Saudi Arabia" OR "KSA" OR "Saudis") AND ("privacy" OR "privacy concern" OR "self-disclosure") AND ("security" OR "control" OR "information security" AND (factor* OR components*)) AND ("OSN' usage" OR "users' behavior").

3.4 Search Approach

Our search plan made use of both manual and automatic searches. Accordingly, we divided the search strategy into two sections: OSN's privacy- related studies and OSN's security- related studies in public or in Saudis literature.

In the automatic search, we first search the studies by using the general keywords related to the search. We conduct an automatic search using online scientific databases and Google Scholar. The most common scientific databases in OSN' usage and user data privacy and security were Science Direct, IEEE Explore, Springer, ACM Digital Library, AIS and Taylor & Francis. From this first step, we extract the targeted keywords from the research studies' titles, abstracts and index terms. For the second round of this study, a thorough manual review was employed. We excluded the duplicated research studies by using the Mendeley application. Figure 2 illustrates the process conducted for selecting the research studies.

3.5 Study Selection Process

We demonstrate the process of selecting studies for the Systematic Literature Review in this section. Figure 2 shows the five main phases.

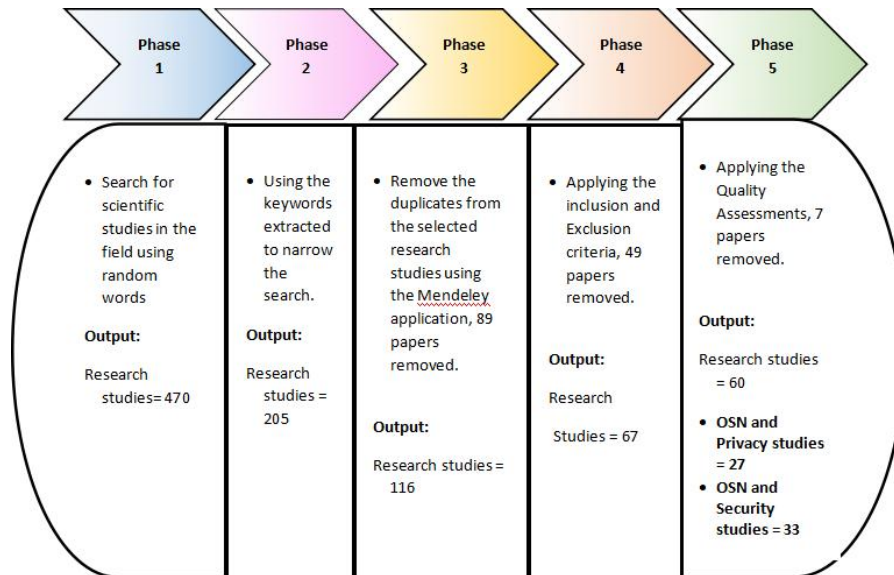


Figure 2. Overview of the Study Selection Process

3.6 Quality Assessment

We undertake a quality assessment of this review in order to determine the correctness and caliber of the chosen primary research. According to our SLR, we follow the quality assessment (QA) of [33]. We propose seven quality assessment questions for both sections. The first two QA questions are different contexts regarding two sections, as detailed in Table 2.

Table 2. Quality Assessment Questions

Sec1. Privacy-related Studies	Sec2. Security-related Studies
<ul style="list-style-type: none"> - QA 1: Does the study's topic have anything to do with how people use social media and how they protect their privacy? 	<ul style="list-style-type: none"> - QA 2: Does the study's topic have anything to do with social media usage patterns and security?
QA for Both Sections	
<ul style="list-style-type: none"> - QA 3: Does the study's theme have anything to do with social media and awareness-based behaviour? - QA 4: Does the research study contain a conceptual framework for their investigation? - QA 5: Has the research study developed hypothesis statements for their investigation? - QA 6: Is the data analysis methodology appropriately assessed in the research? - QA 7: Does the research technique provide enough details? - QA 8: Is the research study containing "factors" in their examination? 	

The 67 research papers that were chosen were assessed using the eight quality assessment questions mentioned above in order to increase the researchers' confidence in the reliability of their findings. 'High', 'medium', and 'poor' quality rankings were utilized to assess quality levels based on these parameters. The quality of each study can be assessed using the load score that was acquired. Based on the quality level criterion, the results were divided into three ratings. First off, a study that satisfied every quality requirement was given a score of two. Second, a study that just partially satisfies a quality requirement will receive a rating of 1. Finally, studies that failed to meet a quality requirement received a score of 0. As a result, a study can have a maximum score of 14 (or 7 x 2) for the seven quality criteria, and a minimum score of 0 (or 7 x 0). In this analysis:

- A study's quality was considered high if it scored 10 or more.
- The quality of a study with a score of 9 was considered average.
- A study with a score below 9 was deemed to be of low quality.

Most studies received pretty high scores in both SLR areas in terms of quality assurance, indicated in Figure 3 and Figure 4, respectively. Table 3 and Table 4 indicate the list of Quality Assessment ratings of privacy and security-related studies.

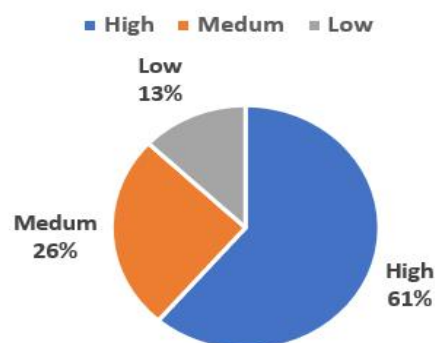


Figure 3. Distribution of Privacy-related Research Studies

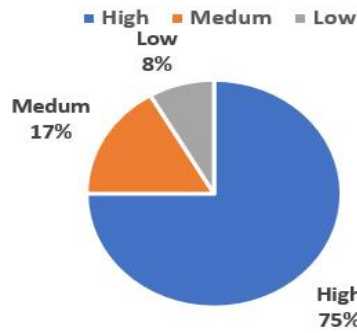


Figure 4. Distribution of Security-related Research Studies

Table 3. Quality Assessment Scores of Each Selected Privacy- Related Studies

Study	Quality Assessment Questions							Total Score
	QA 1	QA 3	QA 4	QA 5	QA 6	QA 7	QA 8	
[35]	2	0	2	2	2	2	2	12
[36]	2	1	2	2	2	2	2	13
[37]	2	1	2	0	2	2	2	11
[38]	2	1	0	2	2	2	2	11
[39]	2	1	2	0	1	2	2	10
[40]	2	0	2	2	2	2	2	12
[41]	2	1	2	2	2	2	2	13
[42]	2	1	2	2	2	2	2	13
[17]	2	1	2	2	2	2	2	13
[19]	2	2	0	2	2	2	2	12
[21]	2	2	0	0	2	2	2	10
[18]	2	1	2	2	2	2	2	13
[43]	1	2	2	2	2	2	2	13
[44]	2	1	2	2	2	2	2	13
[45]	2	2	2	2	2	2	2	14
* Studies in blue bold format indicate the research studies in the Kingdom of Saudi Arabia.								

Table 4. The Quality Assessment Scores of Each Selected Security-related Studies

Study	Quality Assessment Questions							Total Score
	QA 2	QA 3	QA 4	QA 5	QA 6	QA 7	QA 8	
[46]	1	1	2	2	2	2	2	12
[47]	2	2	2	2	2	2	2	14

[48]	1	1	2	2	2	2	2	12
[49]	2	1	2	2	2	2	2	13
[50]	2	0	0	2	2	2	2	10
[51]	1	1	2	2	2	2	2	12
[52]	2	2	2	0	2	2	2	12
[53]	1	0	2	2	2	2	2	11
[54]	1	1	2	2	2	2	2	12
[55]	2	2	0	2	2	2	2	12
[56]	2	2	2	2	2	2	2	14
[57]	1	0	2	2	2	2	2	11
[58]	2	0	2	2	2	2	2	12
* Studies in blue bold format indicate the research studies in the Kingdom of Saudi Arabia.								

4. Data Extraction and Reasoning Interpretation

We created a data extraction form in this phase. We meticulously capture every detail from 60 research. The main goal is to accurately capture the information gathered during the review by using data derivation forms. Using Mendeley and Microsoft Excel spreadsheets, each review is examined in order to extract pertinent data for this interaction. The review embraced a few components proposed by previous information extraction studies (see Table 5).

Table 5. Data Extraction for Each Study

Feature	Description
SID	Unique Reference Number
Year	Published year
Study Factors	Privacy and security factors or other factors used
Approach	Quantitative, Qualitative, or mixed methodologies
Model	If the study provides a research hypotheses model or relies on a theoretical-based search
Questions	If the study contains any research questions for the examination.
Platform Type	Adopted social media platform

4.1 Historical Views

Figure 5 displays the distribution of all research conducted between 2015 and 2022. Of the sixty papers found, seven research were published in each of the years 2015, 2017, and 2019. As shown in Figure 5, the peak of the publication of literature that features the examination of a singular's conduct comparable to his protection and data security on long-range interpersonal communication locales varies in intensity between 2015 and 2020. After that, the literature begins to decline in 2021 and 2022.

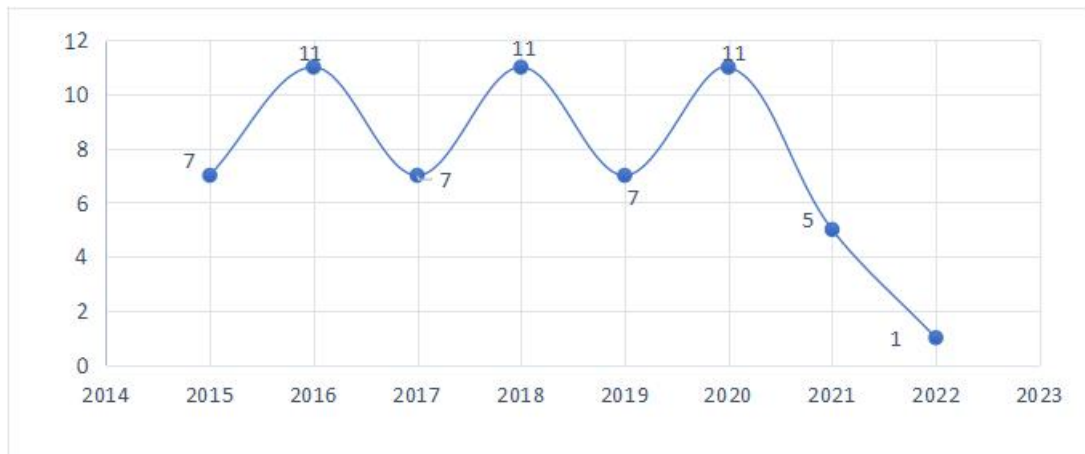


Figure 5. Publications Numbers by Year

4.2 Research Methodologies Used

Figure 6 illustrates that in most of the privacy-related studies, about 73% adopt quantitative methodology in their examination. Further, 12% of the studies were qualitative methodology, while 15% were mixed method approaches. For the security-related studies, in Figure 7, 70% of the studies are quantitative methodology, while the qualitative method achieved 21% of the selected studies and 9% are mixed methods.

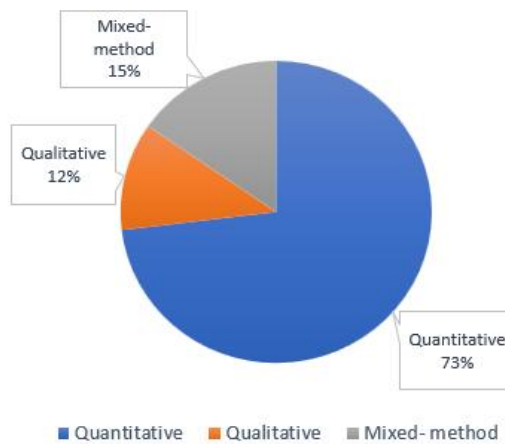


Figure 6. Research Approach Used in OSN' Privacy-Related Studies

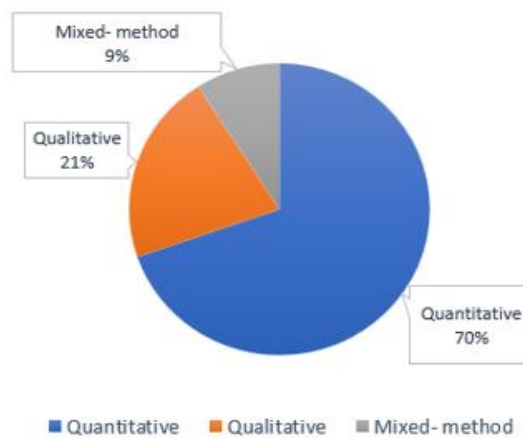


Figure 7. Research Approach Used in OSN' Security- Related Studies

5. Research Questions Results

We present a comprehensive discussion of the essential inferences from the collected studies and enlighten us about the different aspects of the users' behavior regarding their privacy and security on OSNs.

Q1: What are the factors that address users' behaviours and privacy on social media, whether in general studies or in Saudi Arabia?

Figure 8 and Figure 9 illustrate the classification of the different factors that examined the different privacy-related behaviors on OSNs, respectively.

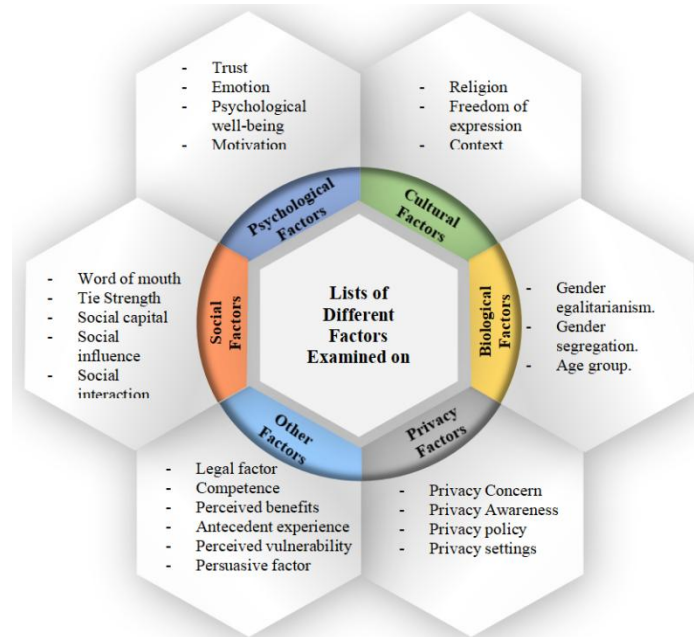


Figure 8. Privacy-related Factors Classification

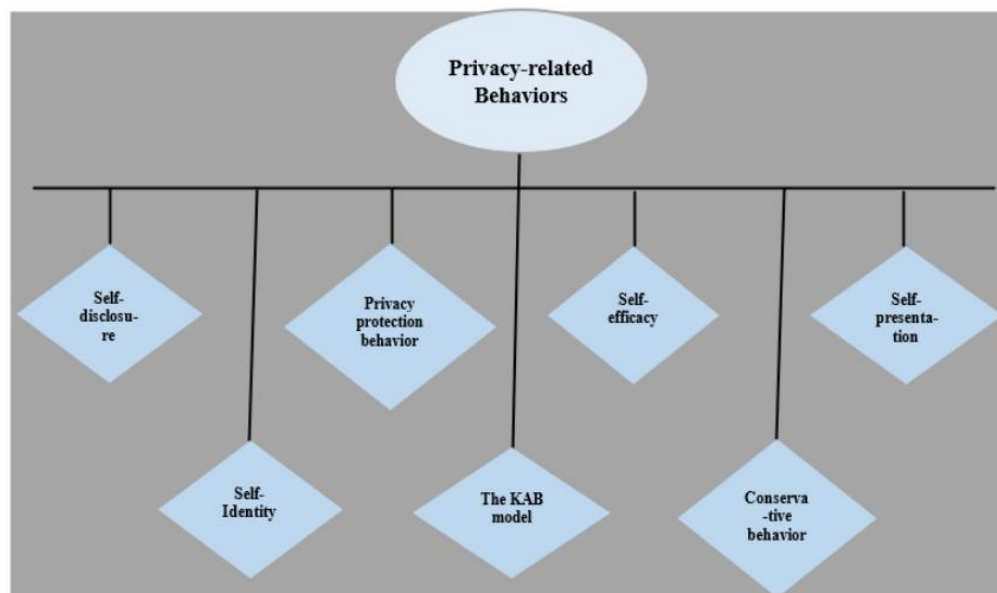


Figure 9. The Analyzed Privacy-related Behaviors on OSNs

From the collected privacy-related studies, we extract the factors that affect the user's behaviors regarding their privacy on OSNs:

- **Privacy Concern:** People cannot overcome privacy worries on their own because the detrimental impact of privacy concerns on disclosing personal information is so great that social rewards for positive behavior are insufficient [35], [41].

- **Privacy Awareness:** Privacy settings and privacy policies are sort of "Continue step" to access the OSN app [35]. Also, high privacy risk awareness users will influence how much they disclose about themselves on social media [16].

- **The Biological Factors:** The influence of the biological factors on users' behavior, for instance, the age group moderator, is affecting the users' behavior, meaning that younger people have less privacy concerns than adults [35].

- **The Legal Factor:** A research study claimed that the influence of the legal factor on users' behavior regarding their privacy is very challenging since it is complicated to prove the violation happened on their personal information [35].

Table 6 and 7 show the extracted information from each OSN privacy-related study.

Table 6. OSN Privacy Adopted Theories and Influence Factors

SID	Year	Factors	Research Methodology	Research		Platform Type
				Hypothesizes Model/Theoretical-based	Questions	
[31]	2019	<ul style="list-style-type: none"> - Privacy Awareness - Information Sharing - Privacy Policy - Trust 	Quantitative Study	*	*	General
[40]	2019	<ul style="list-style-type: none"> - Self-Identity - Privacy Management - Self-Disclosure - Perceived Privacy Control 	Quantitative Study	*		Facebook
[41]	2020	<ul style="list-style-type: none"> - Privacy Risk - Privacy Concerns - Privacy Control - Engagement On Osns. - Information Sensitivity - Perceived Benefits 	Quantitative Study	*		General
[42]	2021	<ul style="list-style-type: none"> • Users' Privacy Behavior <ul style="list-style-type: none"> • Self-Disclosure • Privacy Concerns • Information Security Awareness <ul style="list-style-type: none"> • Privacy Control • Consumer Alienation 	Quantitative Study	*	*	General

In Saudi Arabia, we investigate privacy-related factors and their influence on users' behavior inside OSN sites from different perspectives [22], [44].

- **Privacy Concern:** The degree of privacy concerns and the adoption of privacy-protecting behaviors are positively correlated [17]. The study [45] illustrated that there is an obvious effect of the factor on users' privacy concerns when using Snapchat.

- **Privacy Awareness:** when using Snapchat, privacy concerns were unaffected by knowing of the privacy policy [45].

- **Self-presentation:** self-presentation and OSN usage behavior are not substantially correlated [43]. We conclude that the reason behind this derivation is that they adopted only one OSN platform, Twitter. In contrast, our study will take into consideration the OSNs in general. Cultural differences, e.g. Gender Segregation and Religion, significantly influence the women's self-presentation on Instagram for athletic trainers [59].

• **Social Factors:** it is changing according to gender, age and experience moderators when using OSNs [43]. Further, social factors are significantly associated with the usage of global SNSs [18].

• **Competence:** can significantly predict users' vulnerability to cyber threats on OSNs [44]. There is an immediate need to report the service provider or the government about any cyber violation that happened to them on OSN sites [21].

Table 7. Summary of the OSN Users' Privacy Research Studies in Saudi Arabia

SID	Year	Factors	Research Methods	Research		Platforms Types
				Hypothesizes Model / Literature based	Questions	
[21]	2020	<ul style="list-style-type: none"> Self- disclosure Cultural factors Privacy concerns, Privacy Awareness Financial incentives. 	Mixed methods	*		General
[23]	2017	<ul style="list-style-type: none"> Users' behavior Privacy control Privacy concern 	Quantitative study		*	WhatsApp
[44]	2022	<ul style="list-style-type: none"> Religiosity Privacy concerns Technology acceptance Use of social media. 	Quantitative study	*		General
[59]	2021	<ul style="list-style-type: none"> Users' behavior and attitude Cultural factors Gender differences Self-presentation 	Qualitative study		*	Instagram

Q2: What are the factors examined in the literature that address users' behaviours and Information Security on social media, whether in general studies or in Saudi Arabia?

Accordingly, in Figure 10 and Figure 11, we illustrate the classification of the different factors that are examined in the different security-related behaviors on OSNs, respectively.

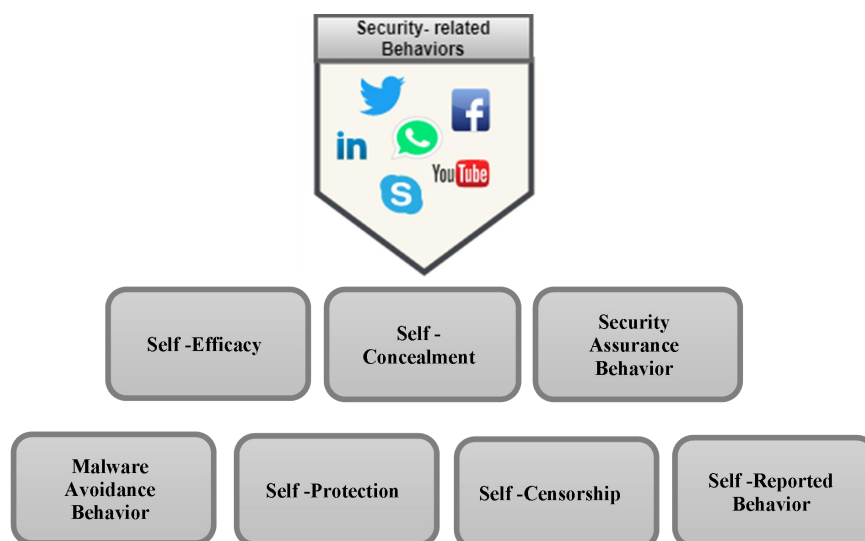


Figure 10. Security-related Factors Classification

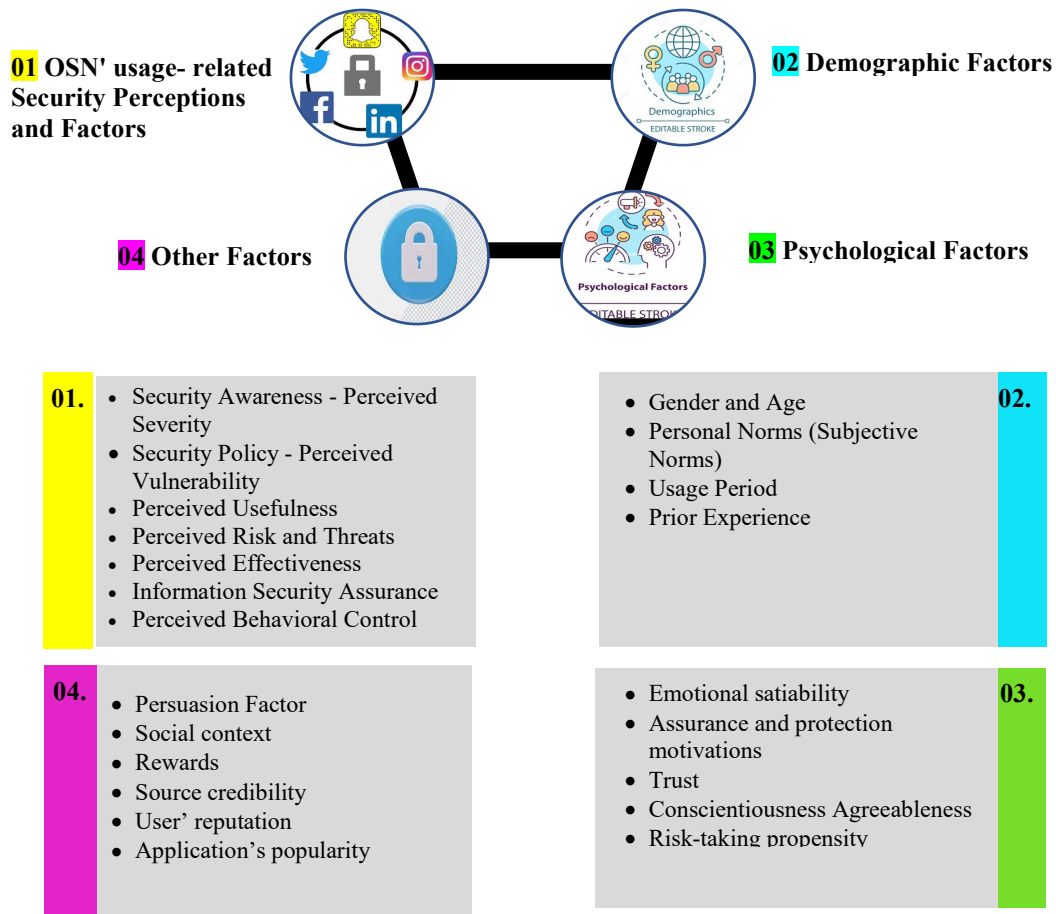


Figure 11. Analyzed Security-related Behaviors on OSNs

We addressed the analysis of some relationships between security-related factors and behaviors on OSN sites:

- **Security Awareness:** some research studies investigate the relationship between information security awareness and users' behavior inside OSNs [11], [50].
- **Self-efficacy:** some studies gave an understanding of users' efficacy when facing security threats inside OSNs [47].
- **Persuasion Factor:** it was employed in developing security awareness systems, and the outcomes demonstrate how well the awareness-based animation film worked to influence OSN users to adopt security-aware behaviour [11], [47].
- **Psychological factors:** trust factor is a predictor of social awareness in different contexts, e.g., Web-of-Trust and OSNs Trust [52].
- **Information Security Awareness (ISA):** in Saudi Arabia, most studies focus on addressing OSN usage and security awareness in the academic field by investigating the users' behavior and attitude toward OSN usage [53] and knowledge sharing [54]. We observe that there is a lack of studies that examine the users' awareness behaviour regarding information security.
- **Self-censorship and Self-protection:** the level of information management declines and the degree of online self-censorship increases in tandem with the level of privacy concern [15].

Table 8 shows the extracted information from each OSN security-related study.

Table 8. OSN Security Adopted Theories and Influence Factors in Saudi Arabia

SID	Year	Factors	Research Approach	Research		Platforms Types
				Hypothesizes Model / Literature based	Questions	

[56]	2021	<ul style="list-style-type: none"> - Cyber-security awareness level. - Security practices - Demographic factors 	Quantitative	*	*	General
[57]	2020	<ul style="list-style-type: none"> - Social commerce - Emotional support - Trust - Informational support 	Quantitative	*		Facebook Twitter
[59]	2021	<ul style="list-style-type: none"> - Users' Attitude - Active Users' behavior - Subjective norms - Trust 	Quantitative	*	*	Twitter
[58]	2022	<ul style="list-style-type: none"> - Users' behavior - Cyberbullying severity - Emotional factors 	Qualitative		*	Twitter

6. Discussion

1) In privacy-related studies, the analysis results illustrated that the majority of studies, 73%, adopted the quantitative approach. According to the quality assessments, the majority of studies show high quality score of 61%. Further, the SLR declared that the most privacy factors that influence the users' behavior on OSN sites are privacy concern, privacy awareness, awareness of the effectiveness of privacy policy and perceived social crimes.

2) In security-related studies, the analysis results showed a noticeable point; the majority of studies, 70%, adopt a quantitative approach. Further, the quality assessment has shown that the plurality of studies is 75%, a relatively high score rate (see Table 9).

3) We found that there aren't many Saudi Arabian research papers on social media usage, privacy, and security issues that used a theory in their analysis.

Table 9. Summary of Privacy and Security Factors

Factor	Privacy Factor	Security Factor	SID
Privacy concern	*		[21]
Self-disclosure	*		[16]
Information security awareness		*	[54]
Self-censorship		*	[15]
Self-efficacy		*	[57]

7. Conclusion

In order to address users' understanding and behavior regarding their privacy and security on OSNs, we conducted a thorough, systematic review in this study. We conduct our search strategy both on privacy-related and security-related studies of OSN usage phenomena. Consequently, we gave a synthesis of evidence by extracting information from each study. Also, we classified the privacy and security factors that affect the user's awareness behavior. According to our investigation, we restrict our study selection only to the studies that used empirical approaches, and we conclude that almost all of them examine their perception through conducting a quantitative methodology by a survey questionnaire. Moreover, we conclude that there are privacy and security factors, e.g. perceived privacy risks vulnerability, awareness of the effectiveness of privacy policy, security awareness of the legal rights and perceived social security crimes that need to be investigated on the user's awareness behavior on OSN in Saudi Arabia.

We intend to employ an empirical study, a quantitative technique, and a thorough examination of users' awareness behavior on social networks in the future. We will also take into account the most prevalent and novel privacy and security factors.

8. Acknowledgement

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