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# Methods of Protection Against the Attraction and Recruitment of Terrorist Groups Through Social Media

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Abstract: This study aimed to identify the methods that can be used to protect Saudi women from being attracted and recruited by terrorist groups through social media from teaching staff members in Saudi universities. The study used an analytical descriptive methodology to collect data using questionnaires from 382 teaching staff members in Saudi universities. Findings revealed that entertainment, filling leisure time and the desire to know the news were the most dominant motivations among Saudi women for using social media websites. Moreover, the ability to access Saudi women and offer the ideas to them by various and attractive methods, and differentiating by interactive property were the methods used by terrorist groups for attracting and recruiting Saudi women. The study therefore, recommend to develop a comprehensive national strategy aimed at limiting the ability of terrorist groups and organizations to employ digital media in general and social media, especially in attracting and recruiting Saudi nationals.

Keywords: Attracting, Recruiting, Saudi Women, Terrorist Groups, Social Media.

### **1** Introduction

The perceived use of social media has been widely emerged as a preferred medium where impressionable minds are radicalized with extremist ideology [1]. Tumblr, Instagram, Facebook, and Ask.fm are some of the platforms targeted by the researchers and media, with specific attention given towards Twitter as the radical setting of preference [2]. The establishment of numerous online communities is facilitated by the initial reluctance of Twitter to infringe the freedom of speech of members, which motivate jihadist organizations across the globe. Existing online support has been classified as recruitment and propaganda strategies for the jihadist organizations such as Al-Qaeda and its affiliates [3].

The active involvement of women through social media platforms is a crucial public policy issue, while jihadist organizations have previously used the internet for sharing their message. Both ISIS and Al-Qaeda have transmitted their official propaganda in which they clearly stated the need for women outside their intended domestic horizon [4]. Similarly, the supporters of the ISIS often share their message on social media that emphasizes women as active fighters in the battleground (Winter, 2015). Furthermore, women are facilitated by the IS, who are radicalized, to interact with possible female recruits to stimulate other women to migrate as well on social media [5]. Saltman & Smith (2015) have indicated that the online community of ISIS usually affects the online supports to interact with each other by sharing ideologically driven propaganda.

It is perceived that women recruited by terrorist groups in their activities should not be considered trappd by falsified tactics, but instead consider this recruitment to lead women military campaigns and political changes. It is improbable that a woman would plan, start, and execute the operation either military or political [6]. Islamist radicalized women have ensured to be completely effective and operative in suicidal and military attacks. For instance, the British Muslim convert, the Black Widow planned and executed the deadly attack on the Westgate mall in Nairobi, whereas numerous attacks in Russia were planned and executed by black Chechen widows.

There is also a difference in the way the world responds to a terrorist activity planned and executed by different gender initiators. Women have a tendency to receive wider media attention as compared to men as a logical outcome of the low exposure [7]. This also shows that the engagement of terrorist women was not or less potentially expected in this

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activity. The societal structure of terrorist groups can possibly associate and explain this activity when they encourage women beliefs. For instance, men have a tendency to be more violent and showed fewer emotions and dominancy, while a woman holds a more nurturing and caring identity [8]. This might be enforced that the public will condemn more the woman rather than a man who is involved in a terrorist activity. On the contrary, this falsification can create a specific mindset, which ignores any type of security authorities to be appropriately planned.

A variety of strategies and methods are used by terrorist groups and organizations for attracting and recruiting women such as propaganda strategy, promotion of persuasion to the ideology and ideas of the group, and psychological warfare strategies. The use of social media in operating, planning, and implementing conflict activities was initially promoted by terrorist groups and organizations. These groups use their strategies for attracting and recruiting women, considering the possibilities and characteristics of these platforms. Practically, the significance of this study is based on the seriousness of the phenomena to attract and recruit women by terrorist groups in general and Saudi women in particular using social media. Previously, studies have been conducted to identify the motivations of women interacting and joining terrorist groups. However, no studies were conducted to determine the strategies used by terrorist groups to recruit women through social media platforms. One of the novel factors of this study is the identification of methods or ways that can prevent terrorist groups to attract and recruit women through social media.

Therefore, the primary objective of this study is to determine the ways through which Saudi women can be protected from attracting and recruiting by terrorist groups through social media, considering the viewpoint of faculty members in Saudi Universities. Furthermore, the secondary objectives of this study include (1) to determine the motives of Saudi women using social media from the perspectives of faculty members in Saudi universities; and (2) to determine the preferences of terrorist groups for using social media to attract and recruit Saudi women from the perspectives of faculty members in Saudi universities.

From the historical perspective, the active interaction of women was limited by the explanations of a gendered jihad throughout jihadist organizations [9]. This facilitated many women to fulfil the administrative and domestic responsibilities within the organization, whereas men were positioned in combat and leadership positions. The internet providing secrecy allows women to disobey the previously developed gender norms that are currently present among extremist and jihadist organizations and to become active online participants [10]. The development of the online jihad into the monarchy of social media additionally liberated women and facilitated them to become gradually involved throughout their online community that was not achievable in the early years of internet use by terrorist groups. Afterwards, the engagement of women in online radical platforms has progressively increased. It is essential for faculty members in Saudi universities and scholars to understand the management of organizations in the recent recruitment of women, and to identify the strategies used by terrorist groups in influencing the participation of women online.

Extremists have taken benefit of the internet to inexpensively and effectively communicate, recruit supporters, and transmit propaganda with minimal risk of retaliation from counterterrorism organizations [11]. The use of password. protected discussion boards facilitated current members communicating among one another with associated secrecy during the earlier influx of the internet as the preferred setting [12]. Within these networks, male membership dominated these networks due to the reliance on previously current real-world contacts needed to access the closed discussion boards. Discussion forums facilitated registered members for conversing on all topics associated to their jihad. On the contrary, it was extremely complicated to share their agenda and attract further members outside of their network. According to Weidmann, (2016), online terrorism departed in 2008 from its roots on obscure discussion forums and made its public debut. Terrorist groups published video-taped sermons to call for a violent jihad onto file-sharing services such as YouTube. The online jihadism has facilitated current members to interact with the general public for further developing their jihadist ideology.

The liberal views of the social media platforms are effectively leveraged by jihadist organizations on the freedom to speech to share their propaganda with minimal resistance. According to Weimann (2015), the use of official websites is no longer required for transmitting their extremist assumptions. However, the de-centralized nature of social media facilitated rapid transmission of propaganda among its new members. Among the pro-jihadist communities on social media, the rapidity of growth caused an increase in public pressure to restrict the distribution of terrible rhetoric [13]. Jihadist groups have revealed another milieu for disseminating their message such as Twitter, which they use to remove pro-jihadis message and remove the accounts that shared the content.

The dependency on Twitter to disseminate extremist ideology has caused varying degrees of achievement that has been relied on the recruitment strategies of the individual group and the content of their propaganda [14]. Terrorist organizations have had major success in their social media campaigns and have spread their dissemination strategies by creating dedicated media wings that emphasize particularly on the development of propaganda and the interaction of their followers [15]. Terrorist groups are able to share their ideology to a wider audience through the use of multi-lingual documents, music videos, and battlefield footage [16]. For instance, the ISIS has cultivated a large community

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of supporters through an aptitude by using Twitter that has surpassed the ability of other terrorist groups [17]. The propaganda section of ISIS portrays high quality recruitment videos that imitate the special effects observed in action movies, online magazines, and music videos. According to Stern & Berger (2015), the message of their propaganda usually comprises an association of extreme violence with phases of a utopic community.

Discussions shared on Twitter range from ordinary life events to comprehensive discussions of subjects on the ideology of their respective organization. Terrorist groups often uploads their posts with images of torture, executions, and the death of those who are considered to be unbelievers [18]. One of the features that defines the propaganda strategy of these terrorist groups is the portrayal of violence exhibited in the continuous stream on social media, which differentiate them from other jihadist groups.

Jihadist organizations have established a variety of approaches to gather additional female support on social media due to the growing levels of female interaction online [19]. The message of official propaganda directed towards women disseminate similar ideological underpinnings and observations on female engagement. In fact, the ISIS and Al-Qaeda have official magazines with content found to be approximately identical, which portrayed the assumption that women are to remain in their credited domestic horizon [20]. For instance, ISIS provided information geared particularly toward women by creating a Twitter account. The ISIS official account aims to prepare possible female recruits of the ISIS for their jihad. The important skills are propagated by the account that women should be able with previous to migrate Iraq or Syria, such as design and editing software to create propaganda, cooking and sewing, and first aid.

Terrorist groups are able to interact with both men and women through their propaganda and recruitment efforts across the world. Both the researchers and public have taken great consideration to understand the role of social media in forming online pro-jihadist societies. However, there lacks evidence about the level of recruitment and attraction of women through online platforms. Therefore, this study aims to address this gap through the use of descriptive analysis for the ways used to protect women from being recruited by terrorist groups through social media.

## 2 Methodologies

### Study Design and Setting

This study has used a descriptive analytical approach to identify the ways for protecting women from being attracted and recruited by terrorist groups through social media. In this regard, the study was conducted in Saudi Arabia and targeted Saudi Arabian universities.

### Sampling

The study has aimed to examine analytically the perspectives of faculty members in Saudi universities toward the recruitment procedures of terrorist groups for Saudi women. A total of 79608 faculty members are currently working in Saudi universities. For calculating the sample size for this study, G-power version 3.3.1.2 was used considering 95% significance interval, 5% confidence interval, 79608 as population, and 50% power size. Minimal sample size recommended by the software was 321. The total faculty members sampled in this study were 382, which fulfils the criteria of sampling.

### Procedure

A self-administered questionnaire was constructed to collect data from both male and female faculty members. The purpose of constructing the questionnaire was to address the motives for Saudi women to use social media; reasons for using social media for attracting and recruiting Saudi women from the perspective of terrorist groups; and methods used by terrorist groups from the perspective of faculty members. The questionnaire was distributed among study participants after making amendments in the pilot study stage. These amendments were guided by an expert, who evaluated the questionnaire items and then indicated some changes based on the existing items. After validation, 450 faculty members were initially provided the questionnaire, but only 385 questionnaires were received. Three questionnaires were excluded due to incomplete and irrelevant answers.

The reliability of the questionnaire items was ensured in the pilot study phase by including 50 faculty members who were not included in the final sample. A Cronbach Alpha coefficient was used to measure the reliability of the questionnaire items. The study has achieved a high Cronbach Alpha coefficient, i.e., 0.913, which fulfils the requirement of standard benchmark of 0.70.

### Statistical Analysis

The study has used statistical package for social sciences (SPSS) version 21 to analyze the data collected. Descriptive statistics have been used including frequencies, percentages, and ranking.



# Table 1 presents demographic characteristics for the study participants. A total of 64.7% female members took part in the study while 35.3% of the faculty members were male. Out of 382 faculty members, 43.2% of the participants were assistant professor, followed by associated professor (26.7%), and professors (8.6%). Further, 51.3% of the faculty members belonged to humanity college, followed by science college (28.3%), and medical college (20.4%).

Gender	Frequencies	Percentages	
Male	135	35.3	
Female	247	64.7	
Profession	Frequencies	Percentages	
Professor	33	8.6	
Co-professor	102	26.7	
Assistant Professor	165	43.2	
Other	82	21.5	
College type	Frequencies	Percentages	
Humanity	196	51.3	
Science	108	28.3	
Medical	78	20.4	
Total	382	100.0	

Table 1: Demographic Characteristics

The "entertainment and occupy leisure time" was the only motive that obtained the high degree of approval with a mean value 4.40 (Table 2). This shows that the issuance of this motivation makes sense, given the large leisure time experienced by Saudi women who do not work (the largest proportion of Saudi women), and that the decline of entertainment places and diversity, makes them look for other entertainment through social media. Other motives include the desire to know the new news, the search for suitable work, the participation of other employees in some hobbies, and the expression of opinion freely on the various issues of concern to Saudi women.

Items	Mean	SD		ree of re			e e nug	200101		-			Ranking
				<sup>,</sup> high	High		Med	ium	Low		Very low		0
Entertainment and leisure time.	4.40	0.80	221	57.9	98	25.7	56	14.7	7	1.8	0	0.0	1
Wanting to know new news.	3.96	0.85	121	31.7	134	35.1	117	30.6	10	2.6	0	0.0	2
Looking for a suitable job.	3.81	1.04	100	26.2	175	45.8	56	14.7	38	9.9	13	3.4	3
Share other users in some hobbies.	3.73	0.75	31	8.1	254	66.5	58	15.2	39	10.2	0	0.0	4
Expressing opinions freely on various issues of concern to Saudi women.	3.71	0.88	56	14.7	200	52.4	97	25.4	17	4.5	12	3.1	5
Seeking and sharing information.	3.70	0.93	83	21.7	141	36.9	124	32.5	30	7.9	4	1.0	6
Get religious fatwas.	3.60	0.82	44	11.5	174	45.5	133	34.8	28	7.3	3	0.8	7
Looking for new girlfriends.	3.48	0.91	24	6.3	219	57.3	60	15.7	76	19.9	3	0.8	8
The desire to present their problems and find who interacts with them.	3.41	0.96	33	8.6	170	44.5	119	31.2	41	10.7	19	5.0	9
Identify efforts to combat terrorism.	3.25	1.04	46	12.0	111	29.1	134	35.1	75	19.6	16	4.2	10
Escape from family problems.	3.20	1.01	28	7.3	135	35.3	125	32.7	72	18.8	22	5.8	11

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Learn about terrorism-	3.09	1.22	26	6.8	157	41.1	90	23.6	42	11.0	67	17.5	12
related news.													
Looking for a chance to	3.08	1.14	27	7.1	137	35.9	105	27.5	66	17.3	47	12.3	13
get married.													
Conducting research	2.50	1.13	20	5.2	54	14.1	106	27.7	119	31.2	83	21.7	14
and scientific studies													
related to terrorist													
groups.													

Table 3 presents the reasons of faculty members in Saudi universities regarding the preference of terrorist groups for attracting and recruiting Saudi women with an average arithmetic response 4.13 and a standard deviation 0.70. One of the most important reasons for terrorist groups preferring to use social media including the ability of social media to reach Saudi women despite the conservative habits of Saudi society. Other reasons include the possibility of using multimedia in the presentation of ideas in a variety of ways and attractive, the lure of its users, and its ability to penetrate the border geographic, regulatory and political barriers.

Table 3: Reasons why Terrorist Groups Prefer to Use Social Media to Attract and Recruit Saudi Women

Items	Mean	SD   Degree of response											
			U	high	High		Me	dium	Lov	N	Very low		C
Her ability to reach Saudi women despite the conservative customs of Saudi society.	4.26	0.84	179	46.9	136	35.6	56	14.7	8	2.1	3	0.8	1
The ability to use multimedia in the presentation of ideas in a variety of ways and attractive	4.23	0.94	185	48.4	129	33.8	41	10.7	23	6.0	4	1.0	2
It is characterized by an interactive feature that enables terrorist groups to courted and woo their users.	4.21	0.89	170	44.5	142	37.2	56	14.7	7	1.8	7	1.8	3
Their ability to penetrate borders and geographical, regulatory and political barriers.	4.20	0.94	186	48.7	106	27.7	79	20.7	3	0.8	8	2.1	4
Allow for the possibility of stealth and remote monitoring by the security services.	4.12	1.06	187	49.0	101	26.4	50	13.1	40	10.5	4	1.0	5
Combiningthecharacteristicsofmassmasscommunicationwithpersonal communication.	4.08	0.95	149	39.0	151	39.5	54	14.1	21	5.5	7	1.8	6
Low cost compared to other means of communication and media.	4.04	0.95	153	40.1	116	30.4	91	23.8	19	5.0	3	0.8	7
Providing information on female employees to facilitate their classification and identification of the most appropriate methods of recruitment.	3.90	1.07	134	35.1	132	34.6	72	18.8	33	8.6	11	2.9	8

The average mean value and standard deviation was 4.08 and 0.74 for the methods used by terrorist groups for recruiting and attracting women using social media. The methods used by terrorist groups include demonstrate empathy



with women's issues and supporting it, stealth sites that are accepted by women as cooking and family websites, and sites that discuss women's issues, fake sites to figure Dinah and the public with the audience in order to lure women, promoting rumors and misrepresentation of vital information data and facts, and work on death and destruction spreading terror in the hearts of the innocent (Table 4).

Table 4: Methods Terrorist Groups Use to Attract and Recruit Women via Social Media

Items	Mean	SD	D Degree of response										
	wican	5D		high	High		Med	ium	Lov	v	Ver	y low	Ranking
Demonstrate sympathy	4.27	0.94	200	52.4	110	28.8	58	15.2	<b>LOV</b>	<b>v</b>	10	2.6	1
and support for women's issues.	4.27	0.94	200	52.4	110	20.0	50	13.2	4	1.0	10	2.0	1
Disguise in locations that women accept, such as cooking, family, and women's issues.	4.24	1.02	212	55.5	80	20.9	73	19.1	4	1.0	13	3.4	2
Create fake websites for religious and public figures with an audience to attract women from this audience.	4.14	1.07	192	50.3	94	24.6	62	16.2	24	6.3	10	2.6	3
Demonstrate itself as a lawyer about Islam and Muslims seeking to support him.	4.14	1.08	185	48.4	112	29.3	55	14.4	12	3.1	18	4.7	4
The incorrect interpretation of the Qur'anic verses and hadith to facilitate the attraction of women.	4.11	1.04	177	46.3	114	29.8	55	14.4	28	7.3	8	2.1	5
Promoting rumors and misrepresenting information, opinions and facts to serve the purposes of the group and explaining the validity of its positions.	4.10	0.92	148	38.7	149	39.0	71	18.6	4	1.0	10	2.6	6
Justify its activities and actions related to murder, sabotage and spread terror in the hearts of the safe .	4.09	1.04	171	44.8	120	31.4	52	13.6	32	8.4	7	1.8	7
Promoting its ideas of violence and terrorism as based on Islamic law.	4.04	1.07	166	43.5	113	29.6	69	18.1	21	5.5	13	3.4	8
Establishing lengthy interactive dialogues with women to get them into the group's ideas and recruit them to work with them.	4.02	1.04	149	39.0	136	35.6	64	16.8	20	5.2	13	3.4	9
Take advantage of crises by showing sympathy for the crisis and amplifying the scale of the crisis.	3.99	1.09	167	43.7	91	23.8	89	23.3	24	6.3	11	2.9	10
Analyze the causes of the crises and return them to default the	3.92	1.10	156	40.8	86	22.5	102	26.7	28	7.3	10	2.6	11

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government.													
Establishing mock	3.90	1.05	136	35.6	120	31.4	87	22.8	30	7.9	9	2.4	12
charity sites that take													
care of the family,													
children and orphans													
and provide financial													
support.													

Table 5 presents the methods through which Saudi women can be protected from recruiting and attracting by terrorist groups with an average mean value of 4.15 and standard deviation 0.72. These reasons include: develop a comprehensive national strategy to reduce the impact of the use of social media by terrorist groups in attracting and recruiting Saudi citizens; through the means of social communication and warning; by including courses for girls' topics to raise awareness of the methods used by terrorist groups and recruit through social networking sites.

 Table 5: Methods for protecting Saudi women to attract and recruit terrorist groups through the means of social communication

Items	Mean	SD	Degree of response										
			Very	<sup>,</sup> high	High	l	Me	dium	Lov	v	Ver	y low	
Develop a comprehensive national strategy to reduce the impact of the use of social media by terrorist groups in attracting and recruiting Saudi citizens, especially women.	4.29	0.80	192	50.3	112	29.3	75	19.6	3	0.8	0	0.0	1
Conducting community awareness campaigns through the various media to expose and warn the methods of attracting and recruiting terrorist groups to women through social media.	4.22	0.94	196	51.3	96	25.1	71	18.6	16	4.2	3	0.8	2
Include courses for girls to raise awareness of the methods used by terrorist groups to attract and recruit them through social media.	4.20	0.97	184	48.2	125	32.7	44	11.5	23	6.0	6	1.6	3
Monitor and block sites that incite violence and terrorism.	4.17	0.99	186	48.7	109	28.5	55	14.4	29	7.6	3	0.8	4
Take advantage of the potential of social media that Saudi women accept in raising awareness about the methods of recruitment and recruitment used by terrorist groups.	4.04	0.97	144	37.7	148	38.7	58	15.2	26	6.8	6	1.6	5
Utilizing the means of mass communication (Friday sermon, seminars.) in raising awareness of the use of social media by terrorist groups to attract and recruit Saudi women.	4.09	0.93	157	41.1	125	32.7	80	20.9	17	4.5	3	0.8	6
Utilizing the means of mass communication (Friday sermon, seminars.) in raising awareness of the use	4.07	0.95	147	38.5	147	38.5	60	15.7	22	5.8	6	1.6	7

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of social media by terrorist groups to attract and recruit Saudi women.													
Conduct awareness and training courses for Saudi women against the methods used by terrorist groups through social media to attract and recruit them, and train them on how to detect and confront them.	4.14	0.96	174	45.5	114	29.8	70	18.3	21	5.5	3	0.8	8
Establish 24-hour channels and communication lines to receive Saudi women 's social media reports that terrorist groups use to recruit and recruit women.	4.10	1.04	174	45.5	116	30.4	53	13.9	33	8.6	6	1.6	9

## **4 Discussions**

The faculty members of Saudi universities highly agree on the motives of Saudi women to use social media including entertainment and occupy leisure time, the desire to know news, search for suitable work, the participation of other users in some identities ,in addition to the desire to express opinions freely on Saudi women's issues. Saudi women and girls, especially university students, accept social media, especially Twitter and Facebook, under pressure from terrorist groups due to occupying free time, seeking new information and news, exercising freedom of expression, discussing issues or concerns of Saudi women, and seeking suitable work [21].

The faculty members of Saudi universities strongly agree on a range of methods by which Saudi women can be protected from attracting and recruiting by terrorist groups through social media. The most important of these methods, according to their views, include "develop a comprehensive national strategy to reduce the impact of the use of terrorist groups' social media in attracting and recruiting Saudi citizens, especially women" and "conducting community awareness campaigns through various media to expose the methods of attracting and recruiting by terrorist groups". Social media has become the most important means of communication that terrorist groups rely on to communicate with their members and recruit new members [22]. Social media plays an important role in recruiting young people for ISIS [23]. Al-Qaeda use social media to reach Muslim women, particularly in the Arabian Peninsula communities, to attract them and recruit them to work with the organization and propaganda through these means [24]. Social media is a suitable environment for terrorist groups to attract and recruit Muslim women, especiallyradicals, by allowing both parties to hide from the eyes of security and parents, and the ability to penetrate borders and geographical, censorship and political barriers, mass communication, and personal communication.

Social media by terrorist groups is specifically used for recruiting new members, spreading terrorist thoughts and a culture of violence, and spreading terror in the soul. Bizovi (2014) revealed that the most prominent strategies and methods used by terrorist groups to attract and recruit new members are: psychological warfare, propaganda and promotion of the group's ideology and ideas. Electronic media, especially social media, is at the forefront of the methods used by terrorist groups to recruit Saudi women. The social media campaigns, propaganda strategy, rhetorical appeals and misleading religious conversations of some claimants of religion, and the focus on personal and psychological factors are main strategies that terrorist groups use to recruit and attract women. Most of the faculty members in Arab universities prefer to rely on preventive methods and awareness to face the phenomenon of attracting and recruiting terrorist groups to new member (Bigio & Vogelstein, 2019; Spencer, 2016) [25].

## **5** Conclusions

There are several methods used by terrorist groups in attracting and recruiting Saudi women. It is suggested to conduct comprehensive awareness campaigns throughout the year aimed at sensitizing Saudi women and girls of all ages and social groups about the risks they might face. These campaigns should also aim to guide women and girls on how to identify, detect and report terrorist sites. These campaigns should be carried out through various media and communications including social media and other internet sites along with other means of mass communication such as radio, television and magazines.

### 6 Recommendations

Depending upon the problems outlined in this study, certain recommendations are made in this study.

1. Develop a comprehensive national strategy aims at limiting the ability of terrorist groups and organizations to use digital media in general and social media in particular to attract and recruit Saudi citizens, taking into account gender (men and women) when setting goals, mechanisms and means for the implementation of this strategy.

2. Establishing websites affiliated with the official and unofficial authorities in the country, with the aim of educating Saudi women, and directing them to the ban in dealing with social media and its various sites.

3. Conducting comprehensive awareness campaigns throughout the year aims at educating Saudi women and girls of all ages and social groups about the dangers they may fall into due to their incorrect use of social media.

4. Include in the curricula of the different educational levels for women's awareness lessons about the dangers of social media, and what terrorist groups may be doing in terms of recruiting girls through these sites.

### **Conflicts of Interest Statement**

The authors certify that they have NO affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

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