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Empowering Saudi women in higher educational institutions: Development and validation of a novel women empowerment scale

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Abstract

The government in Saudi Arabia in 2016 declared the necessity to overcome the ancestral oil-based economy and move towards a more diversified model. One of the significant steps to achieve this goal is to empower Saudi women, who form half of the Saudi population, to actively contribute their much-needed talents and skills to the Saudi labour market. However, there is a scarcity of existing scales to measure women empowerment in Saudi Arabia. The objective of this study was to construct and validate a reliable novel scale for the empowerment of Saudi women employed in higher education institutions. A methodological study was conducted from January to April 2020 among Saudi women academic and administrative staff (n=160) working in the higher educational institutions located in the northwestern and southern regions of Saudi Arabia. The tool underwent content and face validity as well as factor analyses. Internal consistency was analyzed through Cronbach's alpha and Pearson correlation coefficient. The data analysis was conducted using IBM SPSS version 23. A Cronbach's alpha value of 0.94 was obtained in reliability analysis. The results showed that the total women empowerment scale had an exceptional internal consistency (>9). The three domains of the scale and total woman empowerment scale had a score close to 1, indicating a high Intraclass Correlation Coefficient, and showed a high similarity between values at the second and third measurements. Self-esteem and self-efficacy subscales were the most important indicators of women's personal empowerment. Furthermore, a highly positive correlation (p<0.01) was found between the total domains of empowerment scale. A novel women empowerment tool was developed and validated in Saudi women working as academic and administrative staff. This can serve as a reliable tool to measure women's empowerment in higher education institutions. It will eventually enable the formulation of strategies that facilitate women's empowerment and pave the path for a strong foundation for the development of the country. (*Afr J Reprod Health 2021; 25[1s]:13-25*).

Keywords: Saudi women, women empowerment, scale, content validity, reliability

Le gouvernement d'Arabie saoudite a déclaré en 2016 la nécessité de surmonter l'économie ancestrale basée sur le pétrole et d'évoluer vers un modèle plus diversifié. L'une des étapes importantes pour atteindre cet objectif est de donner aux femmes saoudiennes, qui forment la moitié de la population saoudienne, les moyens de mettre activement leurs talents et compétences indispensables au service du marché du travail saoudien. Cependant, les échelles existantes pour mesurer l'autonomisation des femmes en Arabie saoudite sont rares. L'objectif de cette étude était de construire et de valider une nouvelle échelle fiable pour l'autonomisation des femmes saoudiennes employées dans les établissements d'enseignement supérieur. Une étude méthodologique a été menée de janvier à avril 2020 auprès du personnel académique et administratif des femmes saoudiennes (n = 160) travaillant dans les établissements d'enseignement supérieur situés dans les régions du nord-ouest et du sud de l'Arabie saoudite. L'outil a subi une validité de contenu et de visage ainsi que des analyses factorielles. La cohérence interne a été analysée à l'aide du coefficient de corrélation alpha et Pearson de Cronbach. L'analyse des données a été réalisée à l'aide d'IBM SPSS version 23. Une valeur alpha de Cronbach de 0,94 a été obtenue dans l'analyse de fiabilité. Les résultats ont montré que l'échelle totale d'autonomisation des femmes avait une cohérence interne exceptionnelle (> 9). Les trois domaines de l'échelle et de l'échelle d'autonomisation totale des femmes avaient un score proche de 1, indiquant un coefficient de corrélation intraclasse élevé, et présentaient une forte similitude entre les valeurs des deuxième et troisième mesures. Les sous-échelles d'estime de soi et d'efficacité personnelle étaient les indicateurs les plus importants de l'autonomisation personnelle des femmes. De plus, une corrélation très positive (p <0,01) a été trouvée entre les domaines totaux de l'échelle d'autonomisation. Un nouvel outil d'autonomisation des femmes a été développé et validé chez des femmes saoudiennes travaillant comme personnel académique et administratif. Cela peut servir d'outil fiable pour

mesurer l'autonomisation des femmes dans les établissements d'enseignement supérieur. Il permettra à terme la formulation de stratégies qui facilitent l'autonomisation des femmes et ouvrent la voie à une base solide pour le développement du pays. (*Afr J Reprod Health* 2021; 25[1s]:13-25).

Mots-clés: Femmes saoudiennes, autonomisation des femmes, échelle, validité du contenu, fiabilité

Introduction

Women in the Kingdom of Saudi Arabia (KSA) represent nearly 50% of the population; however, their economic development input is far below their numbers. Women's contributions will upsurge national economic growth, empower competition, and improve cultural and civic development¹. According to the Global Gender Gap Report, 2017, KSA suffers from gender inequity as one of the top world countries. It comes at 138 position out of 144 countries, reflecting high gender gaps in economic and political empowerment. For instance, wage inequality for similar work shows that women are worse off by at least 40%, and women's labour market participation is only 21% against 80% for men².

Women represent half of the Saudi citizens. Furthermore, a woman is the mother, sister, and wife of the other half of the community. Highly educated womenfolk extend beyond her small family; she is considered a role model for the next generation of young girls. Based on the 2030 vision, women's empowerment is an essential requirement for community transformation and development².

There are many challenges facing Saudi women at social, economic, political, and cultural levels—for example, lack of awareness about women's rights, unequal access to education, training, and information. There is a lack of knowledge about the degree of women empowerment and weak areas due to the lack of qualitative and quantitative data. The empowerment of Saudi women, especially the highly educated, is considered necessary to enable the full contribution of all citizens towards the development of the KSA³.

Empowering women is a central goal in the international development agenda. It's also a cornerstone in the vision of many international organizations that support development goals—some literature defines empowerment as increasing self-confidence, internal power, reinforcing self-esteem, and giving women authority.

Woman empowerment is a central pillar in any sustainable community development^{4,5}.

Women empowerment does not mean putting women in confrontation with men. It means equality between men and women in opportunities, access to education, and resources without male dominance over females. In Saudi Arabia, most female faculties and administrative staff encounter challenges regarding powerlessness and a low self-efficacy level. In most Saudi universities, males dominate female sectors in both academic and organizational aspects, a phenomenon that has negative implications for the development of the organization itself⁶. A commonly observed feature in Saudi universities is the deficiency of women empowerment, which requires developing appropriate solutions. Customs and traditions of Saudi society does not allow women leaders to be decision-maker in their occupations. They are mostly male followers, although Saudi 2030 vision emphasizes the importance of women empowerment in various fields^{2,7}. The vision offered women more opportunities to enter the job market and to remove obstacles against them. Moreover, the 2030 vision emphasizes that women will contribute to the sustainable development of the KSA by 2030. Therefore, to achieve the 2030 vision, governments and civil society should empower women and develop their potentials⁴.

Feminine academic and administrative leaders need empowerment to reach maximum creativeness and development in both old and emerging Saudi universities⁸. Measuring women empowerment should be based on international standards using evidence from localized gender issues. At the same time, it should respect religious and cultural values, while diminishing gender subordination⁹. Women's empowerment is a hidden internal power; therefore, measuring it is a difficult undertaking. However, researchers can determine it through several dimensions^{10,11}.

The conceptual framework of the present study identifies three dimensions for women's empowerment, including personal, social

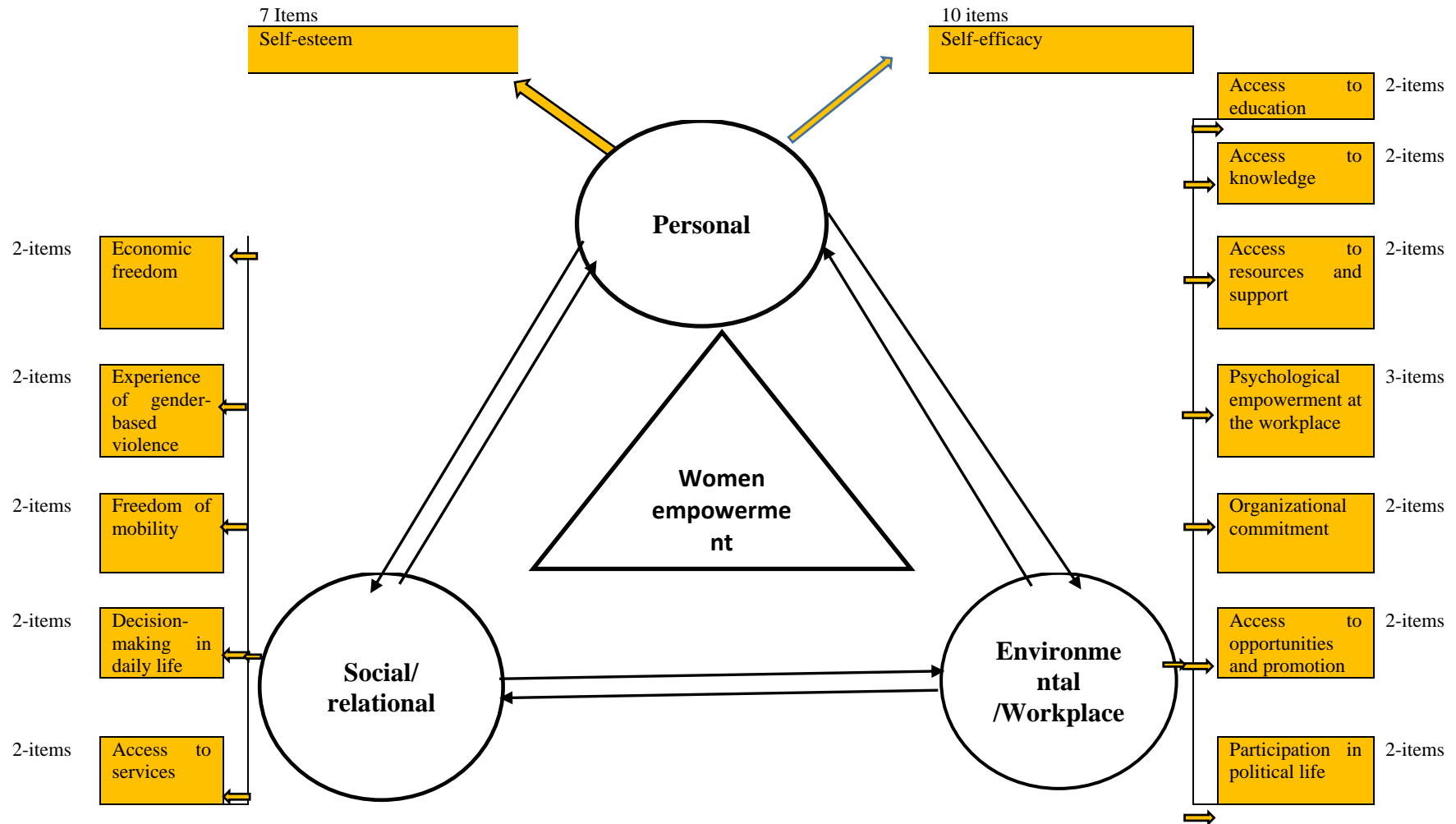


Figure 1: Women empowerment dimensions (developed by the researchers)

/relational, and environmental/workplace. Personal empowerment incorporates self-esteem and self-efficacy. Social/relational empowerment contains economic freedom, the prevention of gender-based violence, freedom of mobility, decision making in daily life, and access to services. Environmental/workplace empowerment includes access to education, knowledge, resources & support, psychological empowerment at the workplace, organizational commitment, access to opportunities and promotion, and participation in political life^{12,13}.

Several studies have emphasized the deficiency of existing woman empowerment scales. However, the existing scale (proxy measures), as an example, does not permit the differentiation between empowerment causes and consequences effectively¹⁴. Some studies have shown that women may be empowered in one area of life and not in others^{15,16}. The objective of this study was to construct and validate a reliable novel scale for the empowerment of Saudi women employed in higher educational institutions.

Methods

Research design

This study is a methodological research to generate a validated measurement tool for assessing Saudi women's empowerment in higher education institutes.

Study participants

In step 2: A purposive sample of 40 experts in women empowerment was included in step 2 to assess the scale validity. The experts were purposively selected from different national and international universities and accessed through emails and Whatsapp.

In steps 3, 6, and 7: The study participants are Saudi women (academic and administrative staff) who agreed to participate in the study. Najran and Tabuk Universities were randomly selected to collect data. From each university, two colleges were randomly selected to be involved in the study; therefore, four colleges were included.

From each college, a convenience sample of 10 participants were picked in each step. In each step, 40 participants completed the scale. A total of

120 participants were included in the three steps from January 2020 to April 2020.

Data collection and analysis

This study conducted on seven main steps:

Step 1. Items generation: In this step, researchers reviewed current literature to create items that measure constructs related to women empowerment. The researchers followed the deductive approach; it began with the theoretical definition of all women empowerment dimensions and then generated the items that could measure it. Lombardini *et al.*¹⁷ guide to assess women's empowerment and other research papers and guides published in the same area of interest, e.g., Rosenberg self-esteem questionnaire¹⁸, decision-making index¹⁹, and Jerusalem Schwarzer standard questionnaire of perceived general self-efficacy²⁰ were considered as the primary sources of item generation. The scale was developed in the Arabic language to allow its easy adoption by other social studies later on. Islamic rules also were considered while designing the scale.

Step 2. Content adequacy assessment: This step aimed to delete items that may be conceptually inconsistent. A group of experts were included to assess the adequacy of the tools. The number of expertise as compared to the number of items was 10:1. Four versions of the instrument were developed; so, the total number of experts that assessed the scale was 40. The experts were purposively selected from different national and international universities and accessed through emails and Whatsapp. At this stage, the items used to assess constructs scored on a 5-point Likert scale. Responses choices ranged from one (not relevant at all) to five (completely relevant). Then necessary statistical analysis was done to ascertain content adequacy. This technique ensured that the elements represented a realistic measure of the examined construct and modified the need for consequential scale modifications.

Step 3. Scale administration: The remaining and modified elements from the previous step were administrated to a sample for Saudi women (administrative and teaching staff) with a ratio of 10 participants to one item. This step aimed to examine the degree to which the scale met the expectations regarding the developed scale's psychometric properties. Data extracted in this stage were used to

test the criterion-related validity; the statistics were used for the subsequent preliminary analysis of construct and criterion-related validity of the developed scale.

Step 4. Factor Analysis: This step aimed to confirm the statistical fitness of the developed scale. Different statistical measures were utilized to evaluate the factor structure quality by statistically analyzing total scale's significance. Also, items relation and the importance of the overall scale were tested.

Step 5. Internal Consistency Assessment: Internal consistency was evaluated through Cronbach's alpha. This test ensured scale consistency overtime. A significant coefficient alpha of at least 0.6 indicated strong element covariance/homogeneity. Furthermore, it confirmed that an adequate sample has taken. The remaining elements at this step were enough; therefore, the researchers eliminated the items that did not share in the common essential dimension by removing items that improved or did not improve the scale reliability.

Step 6. Construct Validation: In step six, the developed scale demonstrated content validity (2nd step) and internal consistency/reliability (5th step), both of which offered confirmation of construct validity. Another evidence was through testing convergent and discriminant validity. Criterion-related validity was evaluated by examining relationships between variables that were hypothesized to be the core dimensions. Data collected from a sample of the participants with a ratio of ten participants to one item were used to conduct statistical measures. Descriptive statistics, internal consistency reliability estimations, and correlations among the scale elements were used for the convergent and criterion-related validity analyses.

Step 7. Replication: In this step, the researchers collected data from another respondent to replicate the new scale testing—the sample took on the ratio of ten participants to one item. Data were collected from a new setting and different participants to avoid common source problems. The replication was included confirmatory factor analysis, internal consistency evaluation, reliability, and construct validity. These statistics provided the researchers with the confidence that the final scale has validity and reliability and would be used in future research.

Results

Table (1) shows that the mean age of studied participants at the first, second, and third measurement was 35.3 ± 6.4 , 32.7 ± 5.1 , and 36.2 ± 7.7 , respectively. Around one-half (47.5%) of the study participants were BSc educated in the first measurement compared to 40% and 32.5% in the second and third measurements. Regarding marital status, 65% were married at the first measurement while 67.5% and 62.5% at the second and third measurements. 57.5%, 55%, and 72.5% of studied participants were academic staff at first, second, and third measurements, respectively. The mean years of experience at the first, second, and third measurements were 8.4 ± 5.2 , 6.5 ± 5.3 and 10.5 ± 7.4 , respectively. Regarding residence, 95%, 100%, and 72.5% of the studied participants were urban area residents.

Table (2) second measurement revealed that the second item from the self-esteem dimension must be deleted to enhance the reliability test score to 0.850. The third measurement demonstrated that the ninth item from the self-esteem dimension must be deleted to improve the reliability test score to 0.912. The sixth item from the self-efficacy dimension must be deleted to improve the reliability test score to 0.897.

Table (3), the second measurement, revealed that the third item from the freedom of mobility dimension must be deleted to enhance the reliability test score to 0.921. Moreover, the second item from the access to services dimension must be deleted to improve the reliability score to 0.825. and third item from access to education and decision-making dimensions to enhance reliability score to 0.933 and 0.815, respectively. The third measurement demonstrated that the third item from the economic empowerment dimension must be deleted to improve the reliability test score to 0.679. The first item from the gender-based violence dimension must be deleted to improve the reliability test score to 0.702.

Table (4), the second measurement, revealed that the third item from the access to knowledge dimension must be deleted to enhance the reliability test score to 0.793. The second item from access to resources and support must be deleted to improve reliability score to 0.795 and

Table 1: Distribution of the studied participants according to their characteristics at steps 3, 6, and 7

Characteristics	1 st Measurement (N=40)		2 nd Measurement (N=40)		3 rd Measurement (N=40)	
	N	%	N	%	N	%
Education level						
BSc	19	47.5	16	40	13	32.5
MD	11	27.5	17	42.5	11	27.5
PHD	8	20.0	7	17.5	11	27.5
Post doctor	2	5.0	0	0	5	12.5
Marital Status						
Not Married	12	30.0	10	25	9	22.5
Married	26	65.0	27	67.5	25	62.5
Widow	2	5.0	0	0	1	2.5
Divorced	0	0.0	3	7.5	5	12.5
Occupation						
Academic staff	23	57.5	22	55	29	72.5
Administrative staff	17	42.5	18	45	11	27.5
Occupation level						
Head of department	7	17.5	6	15	8	20
Director of department	11	27.5	0	0	7	17.5
General director	6	15.0	2	5	4	10
Others	16	40.0	32	80	21	52.5
Mothers' nationality						
Saudi	35	87.5	36	90	32	80
Non-Saudi	5	12.5	4	10	8	20
Residence						
Urban	38	95.0	40	100	29	72.5
Rural	2	5.0	0	0	11	27.5
Age (mean ± SD)	35.3±6.4		32.7±5.1		36.2±7.7	
Years' experience (mean ± SD)	8.4±5.2		6.5±5.3		10.5±7.4	

Table 2: Total reliability analysis of items of personal empowerment

Item	Measurement I	Measurement II	Alpha of item deleted	Measurement III	Alpha of item deleted
	Mean ± SD	Mean ± SD		Mean ± SD	
Self-esteem					
1. Generally, I am satisfied with myself	4.71±0.654	3.45±.90	.846	3.561±1.45	.839
2. ^a sometimes, I feel that I am not good at all.	2.99±1.220				
3. ^b I think that I have several useful talents.	3.61±0.961	3.59±.58	.850*		
4. I can do things as well as other people.	4.66±0.463	3.45±.58	.838	3.268±1.32	.827
5. I feel that I do not have many things to be proud of it.	4.32±1.06	1.56±1.46	.836	2.83±1.16	.811
6. Sometimes, I exactly feel useless.	3.79±1.84	1.13±1.30	.840	2.78±1.10	.799
7. I think that I am a worthy person, at least equal to others.	4.48±0.742	3.59±.72	.849	3.341±1.38	.816
8. * I hope if I have more respect for myself.	4.39±0.389	2.45±1.20	.844	3.51±1.38	.809
9. * Generally, I feel like a failure.	3.74±0.670	.818±1.24	.830	3.05±1.13	.799
10. ^b I feel good toward myself.	4.69±0.537	3.50±.50	.844	3.65±1.42	.912
Self-efficacy					
1. If I tried enough, I could solve problematic issues.	4.15±0.963	3.31±.63	.835	3.53±1.46	.846
2. I can get what I want, even if any person opposes me.	4.07±0.684	3.18±.65	.839	3.24±1.28	.789
3. I can easily stick to my goal and accomplish it.	4.41±0.430	3.36±.27	.841	3.34±1.44	.812
4. I am sure that I can deal with unexpected events efficiently.	4.41±0.659	3.18±.78	.838	3.02±1.32	.826
5. Because of my talents, I can deal with stressful situations.	4.15±1.087	3.22±.42	.836	3.31±1.40	.817
6. If I invested enough effort, I could solve most of the problems,	4.61±0.352	3.50±.50	.845	3.39±1.35	.897*
7. Because of my coping abilities, I can remain calm in stressful situations.	4.23±0.551	3.50±.50	.837	3.53±1.46	.808

8.	I can find several solutions when I confronted with a problem.	4.33±0.743	3.36±.36	.838	3.48±1.39	.830
9.	I can find solutions if I faced with troubles.	4.61±0.396	3.50±.50	.838	3.29±1.36	.789
10.	I can usually deal with any problem that occurs with me.	4.33±0.428	3.22±.50	.835	3.31±1.40	.830

a Items deleted if the item validity less than 3.5 (70%), b Items deleted for low reliability

Table 3: Total reliability analysis of items of Social/relational empowerment

Item	Measurement I Mean ± SD	Measurement II Mean ± SD	Alpha of item deleted	Measurement III Mean ± SD	Alpha of item deleted	
Freedom of Mobility						
1.	^a I intend to learn to drive	2.53±0.669				
2.	I can travel inside the KSA to participate in conferences and events freely	4.66±0.438	2.95±1.07	.635	3.24±1.22	.715
3.	I can travel outside the KSA to participate in conferences and events without restrictions	4.56±0.931	2.59±1.04	.684	3.41±1.39	.728
4.	^b I can go out shopping or outing without restrictions	4.53±1.061	3.45±.72	.921*		
Access to services						
1.	I can benefit from various services in the community without restrictions.	4.74±0.773	2.90±.80	.579	3.63±1.37	.618
2.	^b When I feel sick, going to the hospital is a priority regardless of the circumstances of others.	4.23±0.318	2.90±.96	.825*		
3.	I can overcome any obstacles that may hinder my interest in myself	4.66±1.101	3.04±.83	.514	3.38±1.39	.644
4.	^a To take care of others, I must take care of myself first	2.96±0.940				
Access to education						
1.	I can travel freely to complete my studies anywhere in the KSA.	4.43±0.644	3.13±.92	.647	3.41±1.39	.715
2.	I can travel freely to complete my studies anywhere outside the KSA.	4.38±0.332	2.81±.94	.758	3.39±1.41	.709
3.	^b Opportunities for learning resources and scholarship are equal between men and women	4.64±0.475	2.86±1.15	.933*		
4.	^a I can enter public and private libraries freely	2.66±1.00				
5.	^a I have all of the resources necessary for self-learning	2.41±0.613				
Decisions making in daily life						
1.	I have the freedom to choose my husband	4.46±1.250	3.18±1.12	.440	3.48±1.39	.541
2.	I have the freedom to choose my work field	4.64±0.617	3.15±.86	.219	3.43±1.37	.306
3.	^b I can make a decision freely in my daily work problems	4.58±0.296	3.13±.76	.815*		
4.	^a My bosses respect my decisions	2.94±0.611				
Economic empowerment						
1.	I have decisions about my savings	4.48±1.315	3.54±.58	.388	3.24±1.33	.261
2.	I enjoy equality between men and women in accessing economic opportunities	4.51±0.564	3.04±.58	-.014	3.24±1.39	.141
3.	^b The barriers to women's participation in economic matters must be removed	4.38±0.413	3.09±.91	.370	3.63±1.39	.679*
4.	^a I can buy everything I want, including household and personal supplies	3.1±0.851				
Gender-based violence						
1.	^b Domestic violence is one of the significant obstacles for women empowerment.	4.64±0.458	3.409±.78	.445	3.02±1.21	.702*
2.	I could tolerate violence to keep my home intact.	4.15±0.991	1.454±1.45	.303	3.19±1.36	.462
3.	Violence against women has severe psychological, physical, economic and, social consequences.	4.53±0.611	3.681±.93	-.006	2.85±1.15	.134
4.	^a Almost all women experience violence at some point in their lives	3.11±0.343				
5.	^a I will never accept my exposure to violence again	2.88±0.417				

a Items deleted if the item validity less than 3.5 (70%), b Items deleted for low reliability

Table 4: Total reliability analysis of items of environmental / workplace empowerment

Item	Measurement I	Measurement II	Alpha of item deleted	Measurement III	Alpha of item deleted
	Mean ± SD	Mean ± SD		Mean ± SD	
Access to knowledge					
1. I have enough information about my achievements and in my work.	4.33±0.964	3.00±.80	.502	3.44±1.32	.430
2. My work keeps the employees up to date on matters that affect them.	4.38±0.436	2.45±.95	.562	3.02±1.21	.369
3. ^b I have sufficient knowledge about the performance evaluation process in my work	4.17±0.362	2.90±1.00	.793*		
4. ^a The information I need to do my job is easily available	2.68±0.214				
Access to resources and support					
1. My work provides me with all the needs, tools, equipment, and resources needed to effectively carry out my work.	4.30±0.166	2.50±1.04	.572	3.22±1.40	.514
2. ^b My work provides me with adequate support for study and internal and external scholarship	4.46±0.768	3.02±1.06	.795*		
3. My work provides me with good communication opportunities with other community agencies to benefit from their services	4.25±0.613	2.88±.92	.136	2.95±1.11	.231
Organizational commitment					
1. My work is making a concerted effort to keep talented employees and encourage them for innovative solutions to overcome work problems	4.43±0.134	2.45±1.04	.785	3.12±1.34	.694
2. I have a real belief in the institutional mission and goals	4.74±0.642	3.04±.88	.829	3.07±1.19	.718
3. My performance evaluated impartially.	4.38±0.863	2.90±.85	.766	3.27±1.20	.645
4. ^a My boss encourages innovative solutions to work-related problems.	3.14±0.876				
5. ^a My boss is always looking for better ways to develop services for beneficiaries	3.36±0.264				
Access to opportunities and promotion					
1. I have career development opportunities in my work.	4.46±0.810	2.86±.82	.453	3.07±1.25	.513
2. I have opportunities to learn new skills in my work.	4.74±0.629	2.79±.95	.641	3.05±1.26	.429
3. ^b I have opportunities to upgrade and hold managerial positions in my work field	4.51±0.230	2.81±.99	.737*		
Psychological empowerment at the workplace					
1. Meaning Dimension (My job activities are personally meaningful to me)	4.56±1.030	3.13±.63	.695	3.26±1.37	.565
2. Efficiency Dimension) I am confident about my ability to do my job)	4.63±0.321	3.22±.52	.764	3.24±1.39	.433
3. self-determination Dimension) I have considerable opportunities for independence and freedom in how I do my job)	4.43±0.163	3.15±.52	.811	2.80±1.10	.657
4. ^b Impact Dimension) I have a great deal of control over what happens in my department)	4.35±0.159	3.04±.71	.812	3.54±1.18	.919*
Participation in political life					
1. I intend to participate in civil society organizations	4.56±0.463	2.95±.83	.438	3.24±1.28	.366
2. I participate in voting in municipal council elections	4.41±0.369	2.38±1.16	.515	2.98±	.485
3. ^b I intend to participate in an important political or administrative position in the future	4.20±0.468	2.50±1.02	.660*		

a Items deleted if the item validity less than 3.5 (70%), b Items deleted for low reliability

the third item from access to opportunities and promotion dimension and participation in political life to enhance reliability score to 0.737 and 0.660, respectively. The third measurement demonstrated

that the fourth item from psychological empowerment at the workplace dimension must be deleted to improve the reliability test score to 0.919. Table (5) The second measurement showed that

Table 5: Empowerment scale subdomain reliability analysis

Domains	Measurement II				Measurement III			
	No. of items	Alpha Cronbach	F	P-value	No. of items	Alpha Cronbach	F	P-value
1 Self-esteem	9	0.738	75.48	.000	7	0.912	34.62	.000
2 Self-efficacy	10	0.876	63.41	.000	9	0.897	27.19	.000
3 Freedom of Mobility	3	0.841	24.71	.000	2	0.920	18.15	.000
4 Access to services	3	0.729	0.687	.506	2	0.819	3.647	.011
5 Access to education	3	0.841	3.495	.035	2	0.903	5.142	.004
6 Decisions making in daily life	3	0.650	1.958	0.043	2	0.846	2.310	.023
7 Economic empowerment	3	0.613	5.43	0.006	2	0.679	4.134	.009
8 Gender-based violence	3	0.653	63.859	.000	2	0.702	24.67	.000
9 Access to knowledge	3	0.711	7.982	.001	2	0.826	6.916	.001
1 Access to resources and support	3	0.631	4.952	.009	2	0.768	4.352	.009
1 Organizational commitment	3	0.853	14.161	.000	3	0.864	9.641	.000
1 Access to opportunities and promotion	3	0.702	.114	0.892	2	0.764	2.697	.027
1 Psychological empowerment at work	4	0.824	1.454	0.230	3	0.919	3.160	.012
1 Participation in political life	3	0.637	6.103	0.003	2	0.718	4.163	.009

**sub-domains <0.6 “must deleted”

Table 6: Total reliability analysis of each domain of the empowerment scale

Domains	Validity	Measurement II				Measurement III			
		No. of items	Alpha Cronbach	F	P-value	No. of items	Alpha Cronbach	F	P-value
Personal empowerment	83.95±19.1	19	0.847	63.08	.000	16	0.879	38.97	.000
Social/relational empowerment	110.08±17.6	18	0.884	15.45	.000	12	0.912	25.16	.000
Environmental/workplace empowerment	95.97±19.8	19	0.925	6.231	.000	14	0.932	14.37	.000
Empowerment scale	290±36.9	56	0.949	25.00	.000	42	0.955	26.84	.000

Table 7: Inter-rater reliability of empowerment domains and empowerment tool

Items		Measurement II	Measurement III
		X ²	X ²
Intraclass Correlation (ICCs) At confidence interval 95%	Personal empowerment	0.799	0.814
	Social/relational empowerment	0.823	0.843
	Environmental/workplace empowerment	0.899	0.910
	Empowerment tool	0.923	0.936

self-esteem, self-efficacy, freedom of mobility, access to services, access to education, access to knowledge, organizational commitment, access to opportunities and promotion, psychological empowerment at workplace dimensions had good internal consistency (7 – 9). Decisions making in daily life, economic empowerment, gender-based violence, and participation in political life had acceptable internal consistency (6 – 7). The third

measurement indicated that self-esteem, freedom of mobility, access to education, and psychological empowerment at workplace dimensions had excellent internal consistency (>9).

Also, decisions making in daily life, economic empowerment, gender-based violence, access to knowledge, access to resources and support, organizational commitment, access to opportunities, and promotion had good internal

Table 8: Interterm correlation between subdomains of empowerment scale: Measurement III

Items	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 R														
Sig.														
2 r	.399													
Sig.	.010*													
3 r	.378	.326												
Sig.	.019*	.032*												
4 r	.455	.399	.567											
Sig.	.002**	.028*	.000**											
5 r	.402	.356	.713	.684										
Sig.	.009**	.042*	.000**	.000**										
6 r	.365	.298	.689	.613	.712									
Sig.	.023*	.041*	.000**	.000**	.000**									
7 r	.376	.638	.546	.568	.399	.468								
Sig.	.028*	.000**	.009**	.002**	.031*	.016*								
8 r	.689	.364	.415	.566	.469	.452	.526							
Sig.	.000**	.021*	.011*	.000**	.003**	.018*	.001**							
9 r	.611	.486	.396	.584	.396	.396	.619	.564						
Sig.	.000**	.006**	.022*	.000**	.035*	.024*	.000**	.000**						
10 r	.479	.521	.487	.667	.426	.684	.428	.416	.668					
Sig.	.002**	.003**	.001**	.000**	.009**	.000**	.010*	.011*	.000**					
11 r	.516	.357	.589	.594	.648	.699	.394	.635	.510	.626				
Sig.	.001**	.030*	.000**	.002**	.000**	.000**	.021*	.003**	.002**	.000**				
12 r	.468	.299	.613	.496	.579	.784	.416	.569	.810	.799	.799			
Sig.	.006**	.043*	.000**	.002**	.001**	.000**	.009**	.009**	.003**	.000**	.000**			
13 r	.568	.465	.457	.616	.694	.648	.513	.497	.589	.516	.810	.691		
Sig.	.000**	.003**	.003**	.000**	.000**	.000**	.002**	.002**	.000**	.000**	.000**	.000**		
14 r	.629	.488	.497	.589	.749	.761	.468	.568	.526	.636	.729	.736	.775	
Sig.	.000**	.002**	.001**	.000**	.000**	.000**	.000**	.009**	.001**	.000**	.000**	.000**	.000**	.000**

*significant <0.05 ** high significant <0.01

Table 9: Correlation between total domains of empowerment

Items	Personal Measurement II	Measurement III	Social/relational Measurement II	Measurement III	Environmental/workplace Measurement II	Measurement III
Personal						
Social/relational	r. 0.617	r. 0.720				
	p. .000**	p. .000**				
Environmental/Workplace	r. 0.834	r. 0.809	r. 0.714	r. 0.812		
	p. .000**	p. .000**	p. .000**	p. .000**		

consistency (7 – 8). Table (6). The second measurement demonstrated that personal empowerment and social/relational empowerment had good internal consistency (8 – 9). Also, environmental/workplace empowerment and total empowerment scale had excellent internal consistency (>9). The third measurement clarified that personal empowerment had good internal consistency (8 – 9). Moreover, social/relational empowerment, environmental/workplace empowerment and total empowerment scale had excellent internal consistency (>9). Table (7)

revealed that the three domains of the scale and total woman empowerment scale had a score close to one indicated high Intraclass Correlation Coefficient and had high similarity between values at second and third measurement. Table (8) revealed a slight significant correlation between self-esteem and self-efficacy, self-esteem and freedom of mobility, self-efficacy and freedom of mobility. Also, between self-efficacy and access to services, economic empowerment and access to resources, gender-based violence and access to resources at p-value <0.01. While there is significant

correlation between self-esteem and psychological empowerment, self-efficacy and access to knowledge, access to resources and organizational commitment, access to opportunities and psychological empowerment, decision making in daily life and organizational commitment at p-value <0.01. Table (9) demonstrated a highly significant positive correlation between total empowerment scale domains at p-value <0.01.

Discussion

Women empowerment is a dynamic process that has been measured and described in various ways, with lack of a validated and reliable women's empowerment scale reported in the Arab region. Therefore, the current research aims to bridge this gap by developing a scale to assess Saudi women's empowerment in higher educational institutions. Initially, the scale designed, consisting of 69 items. Several statistical analysis stages were performed to evaluate the effectiveness of the scale. The first stage relates to the validity test, which discovered the mean score for each item of the developed scale. The results indicated that there were apparent differences in the average score of the scale items. Therefore, the items with a mean score of less than 70% (3.5) were excluded from the scale, totaling 13 items. Thus, the number of the scale elements became 56 by the end of the last stage. Numerous researchers have used the same statistical approach, and their values are consistent with the current findings. The first Borghei *et al.* developed validated tools to assess Iranian pregnant women's empowerment²¹. The second Kameda and Shimada also developed an empowerment scale for pregnant women²².

The Cronbach α coefficient test was used to evaluate the internal consistency of all scale items and subscales. The present findings revealed that the total reliability analysis of the empowerment scale was 0.955. The personal empowerment subscale reliability was 0.847, social/relational empowerment reliability was 0.884, and environmental/workplace empowerment reliability was 0.925, which indicates the instrument's high reliability. In this regard, Mohebbi *et al.* tested psychometric properties of the health-care empowerment scale among Iranian women using the Cronbach α coefficient test. They reported good internal consistency of the empowerment scale²³.

Moreover, Tol *et al.* had developed a valid and reliable diabetes empowerment scale. Found the reliability of total scale subscales was satisfactory²⁴. Furthermore, Gagnon *et al.* used Cronbach's alpha coefficient of internal consistency and found overall internal consistency was 0.83²⁵. This Findings showed that a highly significant positive correlation between all domains of empowerment. These findings supported by the previously mentioned Mohebbi *et al.* study found a high positive relationship between all women's empowerment domains²³.

Current results have shown that the self-esteem and self-efficacy subscale are the most important indicators of women's empowerment. Most studies also show that these two factors are the most important indicators of women's empowerment. The present study finding revealed that three domains of scale and total empowerment scale had a score close to one, which indicated high Intraclass correlation coefficient and had high similarity between values at second and third measurement. The test result revealed high cohesion between the subscales.

The present study finding revealed a slight significant correlation between self-esteem and self-efficacy, self-esteem & freedom of mobility, self-efficacy & freedom of mobility, self-efficacy and access to services, economic empowerment and access to resources, gender-based violence and access to resources at p-value <0.01. While there was a significant correlation between self-esteem and psychological empowerment, self-efficacy and access to knowledge, access to resources and organizational commitment, access to opportunities and psychological empowerment, Decision making in daily life and organizational commitment at p-value <0.01. This indicates a correlation and cohesion between the scale and all subscales.

Although the scale's application is easy, its generalization will depend on the sample's size and the population included in the study. To measure the extent of women's empowerment, we must have a valid and reliable scale that provides appropriate data. It can be useful to determine the degree of total empowerment and related areas to provide the information necessary for decision-makers and to allocate appropriate interventions to enhance women's empowerment in higher education institutions.

Ethical Considerations

The ministry of education at KAS approved the project; then, the included universities gave formal approvals through legal authority lines. Each participant provided informed consent before data collection. All data were confidential and were used only for the research purpose.

Conclusion

Based on this study's overall findings, we can conclude that the scale is a reliable and valid measure of women's empowerment. The practical application of measuring women's empowerment of Saudi women in higher education institutions can be approved.

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Consent for Publications

The authors have read and approved the publication of the manuscript in its current form.

Competing Interests

The authors declared they have no conflict of interest.

Contribution of Authors

Al-Qahtani conceived the initial idea, and completed necessary approvals. *Elgzar* participated in data collection and wrote the initial stage of the manuscript. *Ibrahim* reviewed literature, contributed intellectually, and discussed findings. *El Sayed* made statistical analysis and wrote the initial draft. All authors participated in data collection and agree on the current version of the manuscript.

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