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Path analysis of determinants of attitude toward exclusive breastfeeding among non-health college female students in Saudi Arabia

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Abstract

Background: Exploring the determinants of unmarried women's attitude towards Exclusive Breastfeeding (EBF) can help develop context-specific interventions that create a safe EBF culture among future mothers.

Objectives: Investigating the determinants of attitude toward EBF among non-health college female students in Saudi Arabia using path analysis.

Methods: A descriptive exploratory study was conducted at three randomly selected university campuses (Riyadh, Dammam, and Jeddah) in Saudi Arabia. Using multistage cluster random sampling, 500 unmarried female students were enrolled in the study. Data were collected from February to May 2022 using a digital survey of four sections: personal data and prior breastfeeding exposure, attitude toward EBF scale, knowledge scale, and perceived social support scale. The data were analyzed using multiple linear regression analysis and path analysis.

Results: The highest percentage of the participants had a positive attitude toward EBF (59.8%), average levels of knowledge (46.0%), prior breastfeeding exposure (60.8%), and positive perceived social support (54.0%). The path model fits the data perfectly [χ^2=0.000, DF=0, CIMN=0.000, GFI=0.999, NFI=0.999, CFI=0.999, PCFI =0.999]. Knowledge (β=0.301) perceived social support (β=0.227), and prior breastfeeding exposure (β=0.211) (P<0.001) directly and significantly predicted attitude toward EBF, with significant positive correlations with each other (P<0.001). The linear regression model predicted a 3.8% variance in attitude toward EBF, where increasing age (β=0.139, P=0.002) and income level (β=0.124, P=0.006) were significant predictors of positive attitude, however, the place of residence was not (β=0.016, P=0.724).

Conclusion: Unmarried Saudi female university students' knowledge of EBF was the strongest determinant of their attitude toward EBF followed by perceived social support, prior breastfeeding exposure, and increased age and income level. Thus, targeted educational interventions and mass campaigns on EBF are crucial to promote EBF among future generations.

Keywords: Breastfeeding, Attitude, Knowledge, Social Support.

Introduction

The World Health Organization (WHO) has emphasized that exclusive breastfeeding (EBF) is an optimal nutrition source during the first six months of an infant's life. It also endorsed that breastfeeding (BF) should be continued for up to two years, with the gradual insertion of age-appropriate complementary foods after six months.[1,2] Breast milk has been shown to promote the infants' sensory, cognitive, and physical development and to protect against many chronic and infectious diseases.[3,4] It also promotes women's psychological and physical health by decreasing the risk for many health problems, such as cancers and noncommunicable diseases. It also preserves family and national resources as a safe and free nutritional

source.[5,6] Despite the benefits, the BF rate is still astonishingly low. In 2021, the WHO reported that about 44% of infants under six months were exclusively breastfed globally.[2] The Centers for Disease Control and Prevention (CDC) has argued that although most infants receive some breast milk, only 24.9% are exclusively breastfed.[7]

Generally, the rates of EBF are also exceedingly low in the Arab world, including Saudi Arabia. In a recent meta-analysis, low rates were found for BF initiation (31.5%) and EBF (15.15%), with a positive attitude toward formula feeding. The key reasons for early EBF cessation were perceived low availability of breast milk, contraceptive use, and returning to work.[8] A study in Riyadh revealed a low rate of EBF (37.5%) during the first two weeks of life, which further dropped at two months (19.0%). The study also illustrated that early cessation of BF was associated with the mothers' health status, knowledge, and attitude, having latching difficulties, and introducing formula feeding before hospital discharge.[9] There is also a negative attitude toward BF, especially among educated and working mothers who lack the support of fathers.[10]

Attitudes are psychosocial tendencies to evaluate a definite object with a certain degree of either favor or disfavor. They comprise the individuals' abstract evaluations of things in their environment and any linked emotions or cognitions. The BF decision and attitude often originate in early life or even before pregnancy through the individual's cultural context, knowledge, and exposure.[11–13] A recent study in Lebanon depicted that the major BF-related challenges were inadequate support from peers and family, low EBF supportive policies, poor knowledge, and various socioeconomic factors.[14] Moreover, the presence of a network of breastfed women strongly influences the EBF practice,[15] and receiving social support from mothers and fathers increases the probability of early initiation of BF and avoiding pre-lacteal feeding.[16] Hence, future mothers should be provided with opportunities to shape and promote their attitudes toward EBF.

Few studies have examined future mothers' attitudes toward EBF, where the focus is directed to current mothers or pregnant women. There is a gap in EBF knowledge and prior exposure of female students, with controversial findings regarding their influence on EBF attitudes. Moreover, there is no evidence concerning the perceived social support for EBF.[11,17] Furthermore, no studies have modeled the relationship between the determinants of EBF attitudes in unmarried females, making this study pioneering evidence for this neglected group. The conceptual framework of the current study explains that many factors influence the formation and development of attitudes toward EBF.

Exposure can influence attitudes that emerge directly from personal exposure or observation. Social factors such as social roles (how people are supposed to behave) and social norms (society's rules for appropriate behavior) provide a framework for supporting or rejecting certain behaviors. Social learning also provides knowledge where attitude can be learned by observing other people's activities. The conditioning processes can also create negative or positive connotations and develop the individual's frame of reference for a particular behavior that may be turned into attitudes.[18] In the current study, these ideas were tested using a hypothetical path model to explain how future mothers' attitudes toward EBF develop [Figure 1].

Objectives

This study aimed to:

- Examine the EBF attitude among unmarried female students.
- Assess the levels of EBF knowledge, prior BF exposure, and perceived social support for EBF and the nature of the relationships between them.
- Explore the factors influencing EBF attitude.

The hypothesis of the study is that: Prior BF exposure, EBF Knowledge, and perceived social support for EBF have significant positive correlations with each other and positive effects on attitude toward EBF.

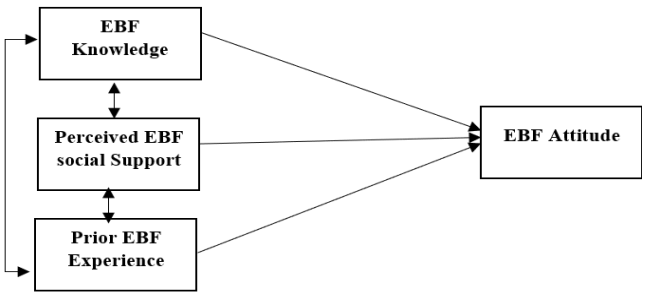

Figure 1. Hypothetical Path model for EBF knowledge, prior exposure, and perceived social support as determinants of attitude toward EBF.

Methods

Study design and participants

A descriptive exploratory study was conducted on non-health college female students. A multistage cluster random sampling technique was used by randomly selecting three cities: Riyadh, Jeddah, and Dammam in Saudi Arabia. Then, one university campus was randomly selected in each city. The convenience sampling technique was followed to pick the unmarried female students who

consented to participate in the study. A standardized formula estimated the sample size where n= sample size, Z (type I error) =1.96, P= proportion of EBF (51%), D= margin of error (0.05) [Formula 1]. The proportion of the positive attitude toward EBF was determined based on a recent study in Saudi Arabia, where 51% of mothers believed that infant formula is not as good as breast milk.[19] Thus, the minimum required sample size was 385 students, which was upgraded to 500, considering the impacts of cluster size, study design, and possible non-response.

Formula 1. $n = \frac{Z^2 P(1-P)}{d^2}$ mple size calculation

Data collection instruments

The researcher designed a digital survey containing four sections. Section I included the personal data and five items on prior BF exposures. Items on BF exposures are scored as either "yes: 2" or "no/unsure: 1," creating an overall score between 5 and 10. Scores 5-6, 7-8, and 9-10 reflect low, average, and high BF exposure, respectively.[11,20]

Section II was the scale for Attitude toward EBF**,** which researchers adopted from the Iowa Infant Feeding Attitude Scale after removing two items about the effect of EBF on "sexual life" and "effect of alcohol use." The scale for attitude toward EBF consists of 15 items responded on a five-point Likert scale ranging from "1: strongly disagree" to "5: strongly agree" with a reversed score for the seven negatively stated items. The overall score ranges between 15 and 75, and the higher the score, the more positive the attitude toward EBF. Scores 57-75, 36-56, and 15-35 indicate positive, neutral, and negative attitudes toward EBF, respectively.[21]

Section III entailed the EBF Knowledge Scale, which the researchers developed based on the WHO guidelines and recommendations for EBF. It assessed EBF-related knowledge such as the definition of EBF, the importance of EBF for the baby and mother, criteria for successful EBF, myths about BF, and the proper weaning time. It incorporates eleven items that are scored as either "2: yes" or "1: no/do not know." This scale has seven incorrect items that are scored reversely. The total score ranges between 11 and 22, categorized as low (11-14), average (15-18), or high (19-22). Higher scores signify better EBF knowledge.[1,11]

Section IV contained the scale for Perceived Social Support for the EBF, which the researchers designed to estimate the extent of perceived social support and social norms or acceptance of EBF and supportive public policies (e.g., worksites and universities). This scale includes seven items on a five-point Likert scale ranging from "extremely unlikely: 1" to "extremely likely: 5," creating a total score between 7 and 35, with higher scores indicating higher perceived social support. Scores 7-16, 17-26, and 27-35 indicate low, average, and high perceived social support for EBF, respectively.[22–24]

The instrument was translated into Arabic and back-translated by several researchers to ensure its accuracy. Six experts evaluated the content validity of the instrument, and the content validity index (CVI) of the items ranged between 0.8 and 0.9, with the overall scale CVR being 0.92.

A pilot study was conducted on 50 female students who were excluded from the final sample to examine the simplicity, accuracy, and readability of the instrument, and to estimate its average filling time. Minimal words were modified based on the students' feedback. Pearson's correlation coefficient of the items and their corresponding subscales evaluated the discriminatory power of the instrument. The internal consistency of the instrument was verified using Cronbach's α coefficient. The Cronbach's alpha coefficients were 0.810, 0.812, 0.787, and 0.798 for the knowledge, prior BF exposure, attitude, and perceived social support scales, respectively. Construct validity was investigated by exploratory and confirmatory factor analysis, which revealed good factor loading (high correlation coefficients >30 and significant P-value <0.05), and only one item was deleted at this stage.[24]

Procedures

The survey was conducted using the Survey Monkey program. Official permission was obtained for data collection from the selected university campus in each city. Then, the survey's link was made available for the students through the students' affairs in the nominated campuses through their official emails. Questions were asked at the beginning of the survey to ensure that students were eligible for the survey. The required sample size was attained within four months (February to May 2022). The average survey completion time was 8-10 minutes.

Ethical considerations

The Institutional Review Board of the Saudi Electronic University [IRB number: SEUREC22006] ethically approved this study on February 13, 2022. The purpose of the study and the essential directions for filling in the survey were elaborated on the initial cover page of the survey for all respondents. Informed digital consent was gained from all respondents to ensure voluntary

participation, where they have the full right to decline participation at any time. All answers were kept anonymous and confidential and used solely for the study's purpose.

Data analysis

The raw data was entered and analyzed using IBM SPSS 26.0 software (SPSS, Inc., Chicago, IL, USA). Frequency, percentage, mean, standard deviation, and confidence interval were deployed to summarize data. The path analysis investigated the direct and indirect relationships between the observed variables. Besides, exploring the predictors of EBF attitude through estimating and testing the direct and indirect effects using the regression equations was performed. The Analysis of Moment Structure Software (AMOS) was used for specification, estimation, testing, and modification of the model using the maximum likelihood estimation method. Various indices guaranteed model fit the absolute fit measures, including the Chi-square value/degrees of freedom ratio ($\chi 2/df<5$) and Goodness of Fit Index (GFI>0.90). Incremental fit measures include the Normed Fit Index (NFI >0.90) and the Comparative Fit Index (CFI>0.90). Moreover, the Parsimony Comparative Fit Index (PCFI >0.50). The multiple linear regression analysis assessed other personal factors affecting EBF attitude. It was evaluated for possible multicollinearity through the Variance Inflation Factor (VIF<10). The model's goodness of fit was judged using an adjusted R^2 value, and the effect of each predictor was estimated using a regression coefficient (β).[25]

Results

The mean age of the students was 22.41±1.627 years, most of them (50.8%) were between 20 and 22 years old, 61.2% had average income, and 34% resided in Dammam. Most of them were breastfed during infancy (77.4%), knew a breastfed woman (93.2%), and watched a woman breastfeeding her baby (96.6%). However, 63.6% had never received BF education and 58.4% watched no educational video about BF [Table 1].

Most female students had a positive attitude toward EBF (59.8%), average EBF knowledge (44%), average prior BF exposure (60.8%), and average perceived social support for EBF (54%) [Table 2].

The path model examined the effect of EBF knowledge, prior BF exposure, and perceived social support on attitude toward EBF. The default model fits the study data perfectly, where it was a just identified model with zero degrees of freedom through the following indices [$\chi 2=0.000$, CIMN=0.000, GFI=0.999, NFI=0.999, CFI=0.999, PCFI =0.999].

The EBF knowledge (β=0.300), perceived social support (β=0.230), and prior BF exposure (β=0.210) (P<0.001) were significant positive and direct predictors of the attitude toward EBF with no indirect effects (β=0.000). Moreover, significant positive correlations (P<0.001) were revealed between knowledge and both prior BF exposure (r=0.120) and perceived social support (r=0.040) and between perceived social support and prior BF exposure (r=0.060) [Table 3 and Figure 2].

The linear regression model significantly predicted attitude toward EBF (F= 6.526, R^2 =0.038, P<0.001). There was no multicollinearity between the predictors (VIF<10). The model explained 3.8% of the variance in attitude toward EBF where increasing age (β=0.139, P=0.002) and income level (β=0.124, P=0.006) positively affected attitude toward EBF. However, the place of residence had no significant effect on it (β=0.016, P=0.724) [Table 4].

Table 1. Participants' basic data and prior BF exposure (n=500)

Variables	Frequency (%)
Age (years)	
20– 22	254 (50.8)
23 –25	246 (49.2)
Mean ± SD	22.41±1.62
Residence	
Riyadh	161 (32.2)
Jeddah	169 (33.8)
Dammam	170 (34)
Perceived income	
Poor	93 (18.6)
Average	306 (61.2)
Good	101 (20.2)
Breastfed in infancy	
Yes	487 (97.4)
No/Unsure	13 (2.6)
Know a breastfed woman	
Yes	466 (93.2)
No	34 (6.8)
Watching a breastfeeding	
Yes	483 (96.6)
No	17 (3.4)
Attending BF educational	
Yes	182 (36.4)
No	318 (63.6)
Watching BF educational	
Yes	208 (41.6)
No	292 (58.4)

Table 2. Total scores of the studied variables

Variables		**Frequency** (%)	**Total score** (Min-Max)	**Mean±SD** (95% CI)
EBF attitude				
	Positive	299 (59.8)	15-75	57.29 ±5.496
	Neutral	156 (31.2)		(56.81–58.77)
	Negative	45 (9)		
EBF knowledge				
	Low	106 (21.2)	11-22	17.53± 2.173
	Average	220 (44)		(17.34–17.72)
	High	174 (34.8)		
Prior BF exposure				
	Low	35 (7)	5-10	8.35 ± 1.052
	Average	304 (60.8)		(8.26–8.44)
	High	161 (32.2)		
Perceived social support				
	Low	76 (15.2)	7-35	26.13±4.423
	Average	270 (54)		(25.75–26.51)
	High	154 (30.8)		

CI: Confidence Interval

Table 3. The standardized total, direct, and indirect effects of the path model

Pathway	**Total effect**	**Direct effect**	**Indirect effect**
EBF Knowledge ⟶ EBF Attitude	0.300	0.300[a]	0.000
Prior BF Exposure ⟶ EBF Attitude	0.210	0.210[a]	0.000
Perceived Social Support ⟶ EBF Attitude	0.230	0.230[a]	0.000

[a] P< 0.001

Table 4. Multiple linear regression of personal factors affecting attitude toward EBF

Variables	**Unstandardized Coefficients**	**Standard Error**	**Standardized Coefficients**	**B - 95% CI** [a]		**t-test**	**P value**
	B	**S. E**	**β**	**LL**	**UL**		
Constant	25.365	3.469		18.549	32.181	7.312	<0.001
Age	0.469	0.150	0.139	0.174	0.763	3.129	0.002
Residence	0.107	0.301	0.016	-0.486	0.699	0.354	0.724
Income level	1.094	0.39	0.124	0.316	1.871	2.763	0.006

[a] Confidence Interval

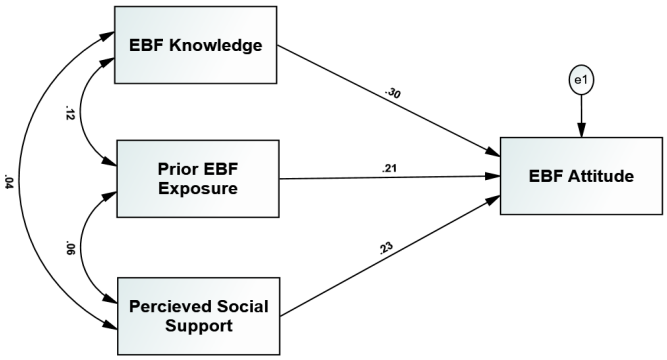

Figure 2. A path analysis of the effects of EBF knowledge, prior exposure, and perceived social support on attitude toward EBF

Discussion

The current study accepted the research hypothesis that EBF knowledge, perceived social support, and prior BF exposure were positive and direct predictors of attitude toward EBF with significant positive correlations with each other. Moreover, increasing income and age were significant positive predictors of attitude toward EBF, whereas place of residence was not. It was also found that the majority of the students studied had a positive attitude toward EBF. In addition, most of the students had average knowledge, prior exposure, and perceived social support about EBF. These findings reflect that non-health college female students are a priority group to intervene with by creating a supportive EBF culture and enhancing their EBF knowledge and attitude to promote future behavior.

Two recent Saudi studies consistently have portrayed good prior BF exposure, adequate knowledge, and positive attitudes among female undergraduates.[11,26] A study in Nigeria also found that young females had fair EBF knowledge and positive attitude, but with many misconceptions regarding the insufficiency of BF, the necessity of introducing water to babies before six months, the unnecessity of colostrum, BF in public areas, perceiving it as a painful procedure, and causing many restrictions on mothers' life.[27] Controversial findings were depicted by a Nigerian study where most female nursing students had adequate BF knowledge but a negative attitude. Such discrepancy in attitude may be related to the different social background and cultural context of the present study.[28] However, an Egyptian study of undergraduate nursing students illustrated that most students had inadequate EBF knowledge with a negative attitude. This discrepancy may be attributed to the mixed-gender sample in this contradictory study.[29]

Unfortunately, there is no evidence assessing the perceived EBF social support by nonmothers females. Thus, this study is the pioneer in this regard. A recent study from Saudi Arabia explored that social acceptance is a distinctive predictor for women's success in EBF, where most of the studied women agreed that Saudi society promotes and supports EBF. However, they agreed that the lack of an appropriate place for BF could result in its discontinuation.[22] Moreover, a phenomenological study in Saudi Arabia explored the essential role of creating a supportive and empowering environment in promoting EBF and enhancing positive attitudes toward it. It addressed the role of peer and professional support and improving workplace and college circumstances in fostering EBF and emphasized that national policies should be taken to support EBF decisions through effective and coordinated efforts.[23] An Indonesian study proved that most female college students perceived subjective norms for EBF as supportive, which doubled their intention for its future practice.[30]

The path analysis used in the present study proved that EBF knowledge was the strongest positive and direct predictor of EBF attitude, followed by perceived social support and prior BF exposure. It also depicted significant positive correlations between them. These findings reflect the role of EBF knowledge in shaping future mothers' attitudes toward EBF. Besides, the role of a supportive culture for EBF, such as significant others' attitudes and public acceptance of EBF behavior. Consequently, there is an urgent need to develop targeted EBF interventions for college students to prepare them for their future roles with precise knowledge and positive attitudes towards EBF.[11,13,31]

A Chinese study also found that knowledge and family support were determinants of attitudes toward EBF, while place of residence was insignificant.[18] A study in Ethiopia found that increased EBF knowledge positively predicted attitude toward EBF.[32] A Saudi study demonstrated significant relationships between attitudes toward EBF, prior exposure, and knowledge, where BF knowledge and attitude were independent positive predictors of future EBF behavior.[11] A recent study across 21 countries verified that social support of EBF directly affects women's attitudes toward EBF.[33] An Indian study proved that a positive attitude toward EBF was significantly associated with higher EBF knowledge and seeing a breastfed woman among adolescents.[34] Conversely, a study of Nigerian nursing students reported an insignificant correlation between BF knowledge and attitude, while it was significantly associated with future intention. This contradiction can be attributed to the scientific background of the participants, as evidenced by the adequate knowledge level among most of them.[28] Furthermore, a study of pregnant women in Iraq found that a positive attitude toward EBF did not necessarily reflect good EBF knowledge. This conflicting finding might be attributed to the difference in the target group characteristics as the pregnant women had a lower educational level than the current study.[35]

In the current study, the linear regression model significantly explained 3.8% of the variance in attitude toward EBF by increasing age (13.9%) and income level (12.4%). Higher age means higher background information and exposure; higher income means higher life opportunities, a wider social network, and more time devoted to self-development activities. Consistently, some studies reported that increased women's age[32] and a higher socioeconomic status were associated with positive attitudes toward EBF.[34] Otherwise, a study among Egyptian undergraduates showed no significant associations between attitude toward EBF and the participants' demographic features. This conflict may be ascribed to the conduction of this conflicting study in only one Egyptian university, which makes the sample more homogenous with a mixed-gender sample.[29]

To the investigators' knowledge, this is a pioneer study in Saudi Arabia to examine the determinants of attitude toward EBF among a neglected group like unmarried females. The possible limitations of the present study include using an online self-reported survey, which may bias the responses. However, the digital survey is more

suitable for reaching a more representative sample from different geographic areas in Saudi Arabia. The current study did not focus on structural equation modeling of the relationship between latent and observed variables. Thus, replicable studies are recommended to look more deeply into this issue.

Conclusions

In this study, most students had positive attitudes toward EBF and average levels of EBF knowledge, prior BF exposure, and perceived social support. The study's hypothesis was accepted where EBF knowledge, perceived level of social support, and prior BF exposure were positive and direct predictors of attitude toward EBF with significant positive correlations to each other. Moreover, increasing income and age were significant predictors of attitude toward EBF. Consequently, it is recommended to equip future mothers with accurate EBF knowledge and foster a supportive EBF culture, develop targeted EBF educational programs, integrate BF curricula in non-health colleges, and establish social media-based EBF campaigns. Further research is needed to gain in-depth knowledge about female students' EBF attitudes in Saudi Arabia.

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Competing interests

The authors declare that they have no competing interests.

Abbreviations

Exclusive Breastfeeding: EBF;
Breastfeeding: BF.

Authors' contributions

All authors read and approved the final manuscript. All authors take responsibility for the integrity of the data and the accuracy of the data analysis.

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None.

Availability of data and materials

The data used in this study are available from the corresponding author on request.

Ethics approval and consent to participate

The current study was guided by the Declaration of Helsinki. It was ethically approved by the Institutional Review Board of the Saudi Electronic University [IRB number: SEUREC22006] on February 13, 2022.

Consent for publication

By submitting this document, the authors declare their consent for the final accepted version of the manuscript to be considered for publication.

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