

An Exploratory Investigation of Media Literacy Preferences Based on Profiling of Clients Attending Comprehensive Health Service Centers within the Framework of the Social Marketing P7 Model to Enhance Participation in Breast Cancer Screening

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Background and Objective: Breast cancer is the most common malignancy among women, and screening plays a vital role in reducing its mortality. This study aimed to conduct an exploratory investigation of media preferences among identified profiles based on the factors of the social marketing P7 model in women presenting for breast cancer screening.

Material and Methods: A cross-sectional exploratory-descriptive study was conducted on 393 women (aged 30–69 years) attending comprehensive health service centers for breast cancer screening at Iran University of Medical Sciences (Tehran), Mashhad University of Medical Sciences, and Abadan University of Medical Sciences. The data collection tool was a researcher-developed questionnaire whose factor structure was validated using Confirmatory Factor Analysis (CFA). Data analysis included the k-Means method to identify attitudinal-behavioral profiles of clients, and the Chi-square test with Cramer's V to examine the relationship between clusters and their media preferences. The optimal number of clusters was determined using the elbow method, sample size balance, and interpretability.

Results: Three distinct clusters were identified and labeled: "Pragmatic Critics" (23.7%), "Structural Critics" (41.2%), and "Satisfied Aware" (35.1%). Examination of 7Ps construct scores revealed that "Structural Critics" had the lowest score on the "product/service" construct (2.55) and the highest on "personnel" (4.18), while "Pragmatic Critics" had the lowest scores on "process" (2.86) and "personnel" (2.98), and "Satisfied Aware" achieved the highest scores on "personnel" (4.14) and "product/service" (3.89).

Differences in media preferences between clusters were not statistically significant ($P > 0.05$). In the overall sample, "telephone contact" (65.8%) was the most effective follow-up method, "pamphlets and brochures" (36.9%) the most suitable communication strategy, "physicians and healthcare center caregivers" (63.9%) the most appropriate awareness channel, and "pharmacies" (51.7%) the preferred message delivery location.

Conclusion: The "media co-preference" pattern observed in this study indicated that despite profound attitudinal differences, the overall sample preferred similar communication channels. Accordingly, a "channel-content separation" strategy appears more efficient than channel personalization. It is recommended that common and traditional communication channels (telephone contact, brochures, clinics, and pharmacies) be maintained as the core

infrastructure, while message content is customized for each profile. Definitive confirmation of this strategy requires future interventional research.

Keywords: Health Literacy, Breast Cancer Screening, Social Marketing, Media Co-preference, Cluster Analysis

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Introduction

Breast cancer is the most common malignancy among women worldwide, with over 2.3 million new cases diagnosed annually (1). According to the World Health Organization (WHO), the disease was responsible for 685,000 deaths in 2020, imposing a substantial socioeconomic burden on societies (2). In Iran, breast cancer, with an incidence rate of 35.2 per 100,000, is the most common cancer among women (3). Projections indicate that the number of cases

will double by 2040 (4). Regular screening through clinical breast examination and mammography enables early detection and reduces breast cancer mortality by approximately 20% (5). However, statistics show that participation rates among Iranian women (16.5%), particularly in the target age group (30–69 years), are significantly lower than global standards (over 70% in countries such as the United States and Germany)(6) (7).

One of the main barriers to increasing women's participation in screening is low levels of health literacy and media literacy. Health media literacy refers to an individual's ability to access, analyze, and evaluate health messages across various information platforms (8). This literacy empowers women to filter misinformation, rumors, and fear-inducing content in cyberspace and select credible information for informed screening decisions. Despite Iran's National Cancer Control Program, which encompasses education, screening, and infrastructure development, the program continues to face challenges including low health literacy (41%) and inadequate media literacy (9).

In recent years, the "social marketing" approach has gained attention as an effective strategy for promoting health behaviors. This approach, by understanding the needs and desires of target audiences, seeks to design targeted interventions (10). The present study employed the extended services marketing model, namely the P7 model. First introduced by Booms and Bitner in 1981 and validated in numerous health studies, including in Iran 11, this model comprises seven key factors: Product (nature and quality of service), Price (indirect costs such as time, fear of diagnosis, and cultural costs), Place (physical accessibility and convenience), Promotion (communication and media channels), Process (service delivery procedures), Physical Evidence (environmental quality and equipment), and People (staff competence and interaction) (10). Profiling (clustering) clients based on these factors can increase intervention effectiveness by up to 35% 10. This approach enables policymakers to identify the latent needs of different groups and, rather than delivering a single message to all, design more targeted strategies based on each group's strengths and weaknesses (6) (7).

Numerous international and domestic studies have examined the relationship between media literacy and breast cancer screening using social marketing and clustering approaches. Kazemnejad et al. (2018) in Iran demonstrated that educational interventions based on health

profiles (e.g., using brochures for one group and in-person education for another) had a significant effect on increasing women's self-efficacy in undergoing mammography compared to conventional education (11). Globally, Slater et al. (2009) in the United States found that profiling before content production is critical, as different groups respond to different messages (fear-inducing versus hope-inducing), and a single message does not work for all (12). Furthermore, a study by Choi et al. (2021) showed that women with high eHealth literacy prefer to receive information from the internet, while groups with low literacy trust traditional media (television and physicians) more—a finding that highlights the importance of matching communication channels with literacy levels(13).

Despite this background, a significant knowledge gap exists: no study to date has simultaneously profiled women based on all seven factors of the P7 model and examined the media preferences of their attitudinal-behavioral profiles. Therefore, the primary objective of this research was to conduct an exploratory investigation of media literacy preferences across attitudinal-behavioral profiles identified based on the P7 social marketing model among women (30–69 years) attending comprehensive health service centers, in order to develop targeted communication strategies for enhancing participation in breast cancer screening.

Material and Method

Study Design and Population

This study employed a cross-sectional exploratory-descriptive design with a cluster analysis approach, conducted in the year 2025 (1404 SH). The study population comprised women aged 30 to 69 years attending comprehensive health service centers affiliated with three universities of medical sciences—Mashhad, Iran (Tehran), and Abadan—which had low breast cancer screening participation rates. Inclusion criteria were; Women eligible for breast cancer screening (according to the Iran National Cancer Control Protocol: women aged 30–69 years) who attended comprehensive health service centers at the three selected universities of medical sciences, during the study period, and informed consent to participate. Exclusion criteria included history of breast cancer diagnosis and severe cognitive or physical limitations that made questionnaire completion impossible.

Definition of Screening

In this study, based on the Iran National Cancer Control Program and the guidelines of the Breast Cancer Prevention and Early Detection Program approved by the Iranian Ministry of Health and Medical Education, the operational definition of “breast cancer screening” in comprehensive health service centers included: invitation and registration of women aged 30–69 years, monthly breast self-examination, annual clinical breast examination (CBE) by a trained midwife or physician, and screening mammography every two years for women aged 40–69 years (and from age 35 for high-risk women)(14).

Low Screening Rate

“Low screening participation rate” refers to the significant gap between the current status and national and international standards. Based on data from the SIB system (“Integrated Health System”) and reports from the Deputy of Health, the screening rate in selected centers of the three studied universities was estimated at less than 15% (and in some areas less than 10%). This figure, compared to the global standard of over 70% (3) and even the national average of 16.5% (6), indicates a “very low screening participation rate.”

Sampling Method and Sample Size Calculation

In accordance with most exploratory-descriptive health studies and given that the study population was accessible to the researcher on a daily basis, after identifying universities of medical sciences with low screening participation rates, non-probability consecutive sampling (convenience type) was conducted among eligible women attending comprehensive health service centers affiliated with these universities (15). Given the diversity of age groups (30–69 years) and differences in the type of screening action recommended by the national protocol, and since the study aimed to examine media preferences among all women attending for screening, the main analysis was performed on the total sample without age stratification. This approach is consistent with previous studies on communication preferences in breast cancer screening (16)(17).

Given the unknown population variance and with the aim of maximizing sample size, a frequency proportion of 0.5, estimation precision of 0.05, and 95% confidence level were considered. The initial sample size was calculated using Cochran’s formula for unknown populations(18):

$$n = (Z^2 \times p \times q) / d^2 = (1.96^2 \times 0.5 \times 0.5) / (0.05)^2 \approx 384$$

Considering a potential 10% attrition rate, the final sample size was determined to be 425 individuals. Ultimately, 393 completed questionnaires were analyzed as the final statistical sample. This calculation method follows standard sampling principles in health research (19).

Data Collection Instrument

The data collection instrument was a researcher-developed questionnaire designed in several stages, comprising three sections. Section one included demographic questions. Section two comprised 26 items organized into seven subscales corresponding to the P7 social marketing dimensions (Product=4 items, Price=4 items, Place=3 items, Promotion=3 items, People=5 items, Process=4 items, Physical Evidence=3 items) based on the Lee and Kotler model (10), with respondents indicating their agreement on a five-point Likert scale from “strongly disagree” (score 1) to “strongly agree” (score 5). Section three included four closed-ended questions assessing client preferences regarding: effective follow-up methods, communication strategies and message distribution channels, awareness channels, and appropriate locations for encouraging screening.

Validity and Reliability

For content validity, the questionnaire was presented to 10 stakeholders (4 clients, 2 midwives/healthcare workers, 2 center managers, and 2 academic experts). The Content Validity Ratio (CVR) for all items exceeded the critical value of 0.62, and the Content Validity Index (CVI) was above 0.79, indicating appropriate content validity. For reliability assessment, Cronbach’s alpha and Composite Reliability were used, both of which exceeded 0.9 for all scales, indicating very high instrument reliability. This reliability level is consistent with health research standards (20)(21).

Construct Validity

To examine the factor structure of the questionnaire and ensure that the 26 items appropriately measured the P7 model constructs, Confirmatory Factor Analysis (CFA) was performed on the data from 393 participants. Results showed that in the seven-factor model, the SRMR value for the saturated model was 0.034 and for the estimated model was 0.044. Both values were substantially below the threshold. The NFI value for both models was

approximately 0.86. Values above 0.80 to 0.90 are generally considered acceptable, although values above 0.90 are ideal. All items had significant factor loadings above 0.7 on their respective factors. In other words, the model demonstrated acceptable fit (22)(23).

Data Analysis Methods

Data were analyzed using SPSS version 26. For attitudinal-behavioral profiling of breast cancer screening clients based on the P7 social marketing model, the k-Means cluster analysis method was employed (22).

1. Cluster analysis method: Given the complexity of health behaviors and the simultaneous influence of multiple P7 model factors, traditional methods that examine variables separately cannot identify latent patterns and behavioral correlations. Therefore, to move beyond a “unidimensional” approach and achieve precise groupings, the k-Means cluster analysis method was used. The aim of this method was to create “within-group homogeneous” and “between-group heterogeneous” clusters to enable the identification of distinct behavioral profiles (21) and facilitate the design of “personalized” and targeted strategies for each group (10)(24).

2. Clustering process: Before cluster analysis, data were standardized. The suitability of data for cluster analysis was confirmed by calculating the KMO coefficient (above 0.6) and a significant Bartlett’s Test of Sphericity.

To determine the optimal number of clusters, a combination of three standard and accepted criteria in cluster analysis was used (25):

a) Elbow Method: Based on the guidelines of Hair et al. (2019), the optimal number of clusters was determined by identifying the point at which the rate of decrease in Within-Cluster Sum of Squares (WSS) changes sharply and the plot approaches a plateau (21). Analysis of the present data showed that from K=2 to K=3, the WSS decrease was approximately 10.1% (490



units), indicating a significant model improvement. However, from K=3 to K=4, this rate decreased to approximately 5.5% (238 units), and from K=4 to K=5 to 4.0% (166 units). This sudden change in the slope of the plot (Elbow) occurred at K=3, indicating that adding more clusters does not yield meaningful variance reduction. Therefore, based on this criterion, the three-cluster model was selected as optimal. Table 1 shows the sample sizes in clusters and WSS changes for K=2 to K=5 models.

b) Sample size balance: Based on methodological recommendations, clusters with volumes less than 15% of the total sample lack sufficient validity for subsequent analyses and may indicate random patterns or outliers (26). Examination of sample distribution across different clusters showed that in the three-cluster model (K=3), the sample distribution (93, 138, and 162 individuals) was more balanced compared to the four-cluster model (K=4), which had a cluster of 47 individuals (12% of the total sample), and the five-cluster model (K=5), which had two clusters of approximately 50 individuals each (less than 15% of the total sample).

Table 1 presents the evaluation indices for different clustering models.

Table 1. Evaluation indices for different clustering models (K=2 to K=5)

Clustering Model	Number of Clusters	Sample Size per Cluster	Within-Cluster Sum of Squares (WSS)	WSS Reduction Between Models (%)	Sample Size Balance
K=2	1	251	4847	—	Relatively unbalanced
	2	142			
K=3	1	93	4356.92	K=2 to K=3: 490.08 (10.1%)	Balanced (all clusters >20% of sample)
	2	162			
	3	138			
K=4	1	128	4118.51	K=3 to K=4: 238.41 (5.5%)	One cluster with low volume (47, 12%)
	2	120			
	3	98			
	4	47			
K=5	1	51	3952	K=4 to K=5: 166.51 (4.0%)	Two borderline clusters (50, 51; ~13% each)
	2	103			
	3	81			
	4	108			
	5	50			

c) Interpretability: Since the ultimate goal of the research was to develop communication strategies tailored to each profile, the selected model needed to have high interpretability to allow meaningful naming of each cluster based on its attitudinal-behavioral characteristics and the design of operational strategies. The three-cluster model, due to its balanced number

of clusters and alignment with the theoretical framework of the 7P social marketing model, demonstrated higher interpretability compared to the four- and five-cluster models (22)(25).

It should be noted that since cluster analysis is an exploratory and unsupervised method, unlike confirmatory methods, hypothesis tests such as ANOVA cannot be used for cluster validation; because the algorithm itself creates clusters based on maximizing between-cluster differences and minimizing within-cluster differences, and conducting hypothesis tests on them constitutes a tautology (22). Therefore, only the above criteria were used to determine the optimal number of clusters.

3. Naming and final analysis: After selecting the three-cluster model as optimal, a multi-stage approach common in social marketing and health behavior research was used for cluster naming (22)(25). In this approach, the mean scores of the seven 7P model constructs (Product, Price, Place, Promotion, Physical Evidence, Process, and People) were calculated and compared for each cluster. Then, based on the dominant pattern of scores in each cluster (as a supplementary exploratory analysis), the dominant attitudinal-behavioral pattern of that group was identified, and names appropriate to these characteristics were selected. Accordingly, the identified clusters were named “Pragmatic Critics,” “Structural Critics,” and “Satisfied Aware.” The main characteristic of Pragmatic Critics is having a critical attitude toward service processes but emphasizing practical and quick solutions. Structural Critics criticize the health system structure and emphasize process transparency. Satisfied Aware have a positive attitude and high awareness of screening services. To examine the relationship between the identified clusters and their media preferences, the Chi-square test was used, and Cramer’s V coefficient was employed to measure the strength of the relationship. The significance level for all tests was set at 0.05.

Results

Demographic Characteristics of the Sample

A total of 393 women participated in this study. The demographic characteristics of the statistical sample are presented in Table 2.

Table 2. Frequency distribution of demographic characteristics of the study sample

Variable	Categories	Frequency	Percentage
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Marital status	Married	352	89.5%
	Single	41	10.5%
Employment status	Employed	144	36.6%
	Homemaker	249	63.4%
Age group	30–35	108	27.5%
	36–40	112	28.5%
	41–45	74	18.8%
	46–50	55	14.0%
	51–55	26	6.6%
	56–60	10	2.5%
	>60	8	2.0%
Education level	Below diploma	136	34.6%
	Diploma	96	24.4%
	Associate degree	27	6.9%
	Bachelor's	101	25.7%
	Master's	29	7.4%
	Doctorate	4	1.0%
Geographic region	Mashhad UMS	148	37.6%
	Iran UMS (Tehran)	171	43.5%
	Abadan UMS	74	18.8%
Behavioral-attitudinal profiles	Pragmatic Critics	93	23.7%
	Structural Critics	162	41.2%
	Satisfied Aware	138	35.1%

According to Table 2, the highest frequencies in demographic variables were: education level—below diploma with 136 individuals (34.6%); marital status—married with 352 individuals (89.5%); employment status—homemakers with 249 individuals (63.4%). Age groups 30–35 years with 108 individuals (27.5%) and 36–40 years with 112 individuals (28.5%) had the highest frequencies. In other words, 56% of the study population were women aged 30–40 years. Regarding geographic region, the highest frequency belonged to Tehran with 171 individuals (43.5%), followed by Mashhad with 148 individuals (37.6%), and Abadan with 74 individuals (18.8%).

Cluster Analysis Results

The frequency distribution of behavioral-attitudinal clusters shows in Table 3.

Table 3. Frequency and mean scores of 7P constructs across three clusters

P7 Construct	Pragmatic Critics (n=93, 23.7%)	Structural Critics (n=162, 41.2%)	Satisfied Aware (n=138, 35.1%)
People	2.98	4.18	4.14
Product/Service	3.03	2.55	3.89
Place	3.04	3.05	2.98

Physical Evidence	2.83	2.71	2.93
Promotion	2.94	3.07	2.93
Process	2.86	2.99	2.89
Price	2.90	3.01	2.80

Findings show that the Structural Critics cluster with 162 individuals (41.2%) ranked first, followed by Satisfied Aware with 138 individuals (35.1%) and Pragmatic Critics with 93 individuals (23.7%). In other words, the highest frequencies belonged to clusters 2, 3, and 1, respectively. Examination of mean construct scores across clusters revealed that in the “Pragmatic Critics” cluster, the highest scores belonged to Place (3.04) and Product/Service (3.03), while the lowest scores belonged to Physical Evidence (2.83) and Process (2.86). In the “Structural Critics” cluster, the highest score belonged to People (4.18) and the lowest scores to Product/Service (2.55) and Physical Evidence (2.71). In the “Satisfied Aware” cluster, the highest scores belonged to People (4.14) and Product/Service (3.89), while the lowest score belonged to Price (2.80).

Media Preferences and Media Co-preference Pattern

The frequency distribution of media preferences across the three clusters is presented in Table 4.

Table 4. Frequency distribution of media literacy preferences across three clusters

Preference Variable	Options	Cluster 1: Pragmatic Critics n (%)	Cluster 2: Structural Critics n (%)	Cluster 3: Satisfied Aware n (%)	Total n (%)
Appropriate follow-up method	Telephone contact	61 (65.6%)	101 (62.3%)	96 (69.6%)	258 (65.8%)
	SMS/Text message	32 (34.4%)	61 (37.7%)	42 (30.4%)	135 (34.2%)
Communication strategies & message distribution channels	Brochures/pamphlets	40 (43.0%)	62 (38.3%)	43 (31.2%)	145 (36.9%)
	Educational sessions	28 (30.1%)	53 (32.7%)	51 (37.0%)	132 (33.6%)
	Posters/banners	12 (12.9%)	30 (18.5%)	27 (19.6%)	69 (17.6%)
	Short video clips	1 (1.1%)	4 (2.5%)	1 (0.7%)	6 (1.5%)
	Magazines	8 (8.6%)	9 (5.5%)	14 (10.1%)	31 (7.9%)
	TV documentaries	4 (4.3%)	4 (2.5%)	2 (1.4%)	10 (2.5%)
Appropriate awareness channel	Physician/midwife/health worker	61 (65.6%)	97 (59.9%)	93 (67.4%)	251 (63.9%)
	Television	18 (19.4%)	38 (23.5%)	30 (21.7%)	86 (21.9%)
	Radio	0 (0%)	1 (0.6%)	0 (0%)	1 (0.3%)
	Social media/online networks	14 (15.1%)	26 (16.0%)	15 (10.9%)	55 (14.0%)
Appropriate location for message delivery	Pharmacies	40 (43.0%)	92 (56.8%)	71 (51.4%)	203 (51.7%)
	Hospitals	5 (5.4%)	4 (2.5%)	9 (6.5%)	18 (4.6%)
	Health centers	3 (3.2%)	5 (3.1%)	5 (3.6%)	13 (3.3%)
	Specialist clinics	12 (12.9%)	16 (9.9%)	23 (16.7%)	51 (13.0%)



	Sports facilities	2 (2.2%)	9 (5.6%)	5 (3.6%)	16 (4.1%)
	Mosques	17 (18.3%)	16 (9.9%)	7 (5.1%)	40 (10.2%)
	Municipal cultural centers	3 (3.2%)	6 (3.7%)	1 (0.7%)	10 (2.5%)
	Other locations	11 (11.8%)	14 (8.6%)	17 (12.3%)	42 (10.7%)

Table 4 shows that regarding the appropriate follow-up method, telephone contact was selected as the most effective method in the total sample with 65.8% (258 individuals). This preference was highest in the “Satisfied Aware” cluster at 69.6% (96 individuals). Regarding communication strategies and message distribution channels, brochures/pamphlets with 36.9% (145 individuals), educational sessions with 33.6% (132 individuals), and posters/banners with 17.6% (69 individuals) had the highest selection frequencies, respectively, while magazines with 7.9% (31 individuals), TV documentaries with 2.5% (10 individuals), and short video clips with 1.5% (6 individuals) had the lowest frequencies in the total sample. However, within-cluster examination revealed that only in the “Satisfied Aware” cluster did educational sessions with 37% (51 individuals) take precedence over brochures/pamphlets with 31.2% (43 individuals). Regarding appropriate awareness channels in the total sample, physicians, midwives, and health workers with 63.9% (251 individuals), followed by television with 21.9% (86 individuals), had the highest preference frequencies across all clusters, while radio with 0.3% (1 individual) had the lowest preference. Regarding appropriate locations for delivering messages encouraging breast cancer screening, pharmacies with 51.7% (203 individuals) were selected as the best location. Specialist clinics with 13% (51 individuals) and mosques with 10.2% (40 individuals) ranked next. “Municipal cultural centers” with 2.5% (10 individuals) had the lowest preference. The response pattern across all three clusters indicates that despite attitudinal differences, media preferences were similar across all clusters, and this co-preference was observed across all four domains, although a minor difference in the order of priorities was observed within one cluster.

To provide a summary picture of the media co-preference pattern in the total sample, **Table 5** was prepared.

Table 5. Media co-preference pattern in the total sample

Preference Indicator	Top Choice	Percentage of Total Sample	P-value	Cramer's V
Follow-up method	Telephone contact	65.8%	0.423	0.066
Communication strategy	Brochures/pamphlets	36.9%	0.428	0.114
Awareness channel	Physician/midwife/health worker	63.9%	0.660	0.072
Message delivery location	Pharmacies	51.7%	0.061	0.061

This table shows that in the total sample, telephone contact with 65.8% was the most preferred follow-up method, brochures/pamphlets with 36.9% as the most suitable communication strategy, physicians, midwives, and health workers with 63.9% as the main awareness channel, and pharmacies with 51.7% as the best location for delivering breast cancer screening-related messages. The Chi-square test showed no significant difference in media preferences among the three clusters ($P>0.05$), and the strength of association was weak in all cases (Cramer's $V<0.2$).

Discussion

1. Linking Findings with Objectives and Theoretical Model

Cluster analysis based on the P7 model identified three distinct attitudinal profiles among the target population: "Structural Critics," "Pragmatic Critics," and "Satisfied Aware." Examination of mean construct scores across these clusters (Table 3) reveals notable differences in attitudinal patterns. These differences formed the basis for cluster labeling and suggest that the P7 model can effectively differentiate audience segments in health communication contexts. However, given the descriptive nature of cluster analysis, confirmation of these patterns requires further research.

2. Score Patterns of Constructs across Clusters: In the "Structural Critics" cluster, the highest score belongs to People (4.18) and the lowest to Product/Service (2.55) and Physical Evidence (2.71). This pattern may indicate dissatisfaction with the system structure and health infrastructure rather than with staff interactions. In the "Pragmatic Critics" cluster, despite a relatively higher score in Place (3.04), lower scores are observed in Process (2.86) and People (2.98), likely reflecting criticism of operational performance. The "Satisfied Aware" cluster, with the highest scores in People (4.14) and Product (3.89), scored lower in Process (2.89). These differences in score patterns could inform the design of tailored messages for each cluster.

3. Examination of Media Preferences and Similar Response Pattern

The findings suggest a "Media Co-Preference" pattern among the three clusters; despite attitudinal differences, shared media preferences were observed across the overall sample: telephone contact, brochures/pamphlets, physicians/healthcare providers, and pharmacies

were the most preferred channels. This pattern suggests that psychological heterogeneity does not necessarily lead to fragmented media behavior. It should be noted that the concept of “Media Co-Preference” here is based on a combination of three types of evidence: (a) lack of statistically significant differences in media preferences between the three clusters ($P < 0.05$; Cramer’s V , 0.2), (b) similarity in percentage of responses across the sample, and (c) alignment with the theoretical concepts of media co-preference (27), the Optimal Matching Model (28), and the principles of social marketing (10). This concept differs fundamentally from “media convergence,” which refers to channel integration by an individual (30), and merely indicates shared channel selection across different groups consistent with segmentation approaches in social marketing (10) (22). However, given the descriptive nature of this analysis and the limitations of the chi-square test in statistically proving shared preferences, these findings require confirmation in future research.

4. Proposed Strategy: Channel-Content Separation

Based on the media co-preference pattern observed in this study, the “channel-content separation” strategy may be more effective than channel personalization in the Iranian cultural context. In other words, shared traditional communication channels (telephone, brochures, clinics, and pharmacies) can be maintained as the main infrastructure, while message content is customized for each profile (Table 6). This strategy aligns with the Optimal Matching Model (29), though its practical effectiveness requires evaluation in interventional studies.

Table 6. Proposed content strategies based on profiles

Profile Name	high-score factors	Low-score factors	Core Need	Appropriate Message Type	Proposed Content Strategy
Satisfied Aware	People (4.14), Product (3.89)	Process (2.89), Price (2.80)	knowledge enhancement and self-efficacy for more active participation	Empowering	Advanced scientific content, interactive and empowering, focused on enhancing specialized knowledge, self-efficacy, and social role-playing
Structural Critics	People (4.18), Process (2.99)	Product (2.55), Physical Evidence (2.71)	Tangible, transparent, and traceable actions	Transparency-building and action-oriented	Reassuring and transparency-building evidence-based content showing the system’s commitment to addressing structural problems and clarifying the service quality improvement path
Pragmatic Critics	Place (3.04),	Process (2.86),	Practical and quick guides	Operational and time-oriented	Emphasis on step-by-step and operational content

Comparison with Existing Literature

The findings of this study are comparable with existing literature at three levels:

1. Attitudinal differences and profiling based on the P7 model: The similar pattern in media preferences is consistent with findings from some previous studies on communication preferences in the health domain. The study by Kazemnejad et al. (2018) in Iran showed that educational programs based on health profiles had a significant effect on increasing women's self-efficacy in performing breast examination compared to conventional education 11. The present study extends this approach by identifying three distinct profiles based on all seven factors of the P7 model.

2. Media co-preference and shared channel selection: The media co-preference pattern in the present study is consistent with findings by Choi et al. (2021), who showed that women trust traditional channels more, and also with the study by Bonfill et al. (2020), which identified telephone contact as the most effective reminder method [13,26]. However, contrary to some Western studies that emphasize the necessity of personalizing communication channels based on demographic characteristics (12), the findings of the present study indicate that in the Iranian cultural context, communication channels can be shared and identical for all groups. Furthermore, at the level of awareness channels, trust in "physicians, midwives, and health workers" had the highest priority, with "television" in second place, while digital media and social networks occupied a very low position. The central role of physicians in encouraging screening has been confirmed in numerous studies, including Sarfati et al. (2019) (29). Regarding preferences for message delivery locations, clients preferred to receive screening encouragement messages in "healthcare spaces" such as clinics and pharmacies, rather than public spaces such as mosques or sports facilities. Pharmacies, due to easy access, and clinics, due to scientific credibility, were identified as primary hubs. This finding aligns with results from Mesquita et al. (2021) regarding the importance of pharmacies as health access points (30).

3. The “channel-content separation” strategy in the Iranian cultural context: The findings of this study are fully consistent with the concept of the Optimal Matching Model, which emphasizes matching messages with the psychological characteristics of the audience (28).

Limitations: Despite efforts to provide an accurate interpretation of the findings, several fundamental limitations should be acknowledged:

1. **Statistical uncertainty in preference sharing:** The chi-square test only indicates the absence of significant differences; this does not constitute statistical proof of shared preferences. Therefore, the conclusion regarding shared preferences is based on the descriptive pattern of similar responses.
2. **Cross-sectional nature of data:** The data in this study were collected at a single point in time and cannot reflect attitudinal and behavioral changes over time.
3. **Self-reporting:** Data on media preferences and attitudes were collected based on women’s self-reporting, which may differ from their actual behavior in practical settings.
4. **Generalizability:** The study was conducted at three universities of medical sciences (Tehran, Mashhad, Abadan), and the results may not be generalizable to other regions of the country with different cultural contexts and access levels.

Despite these limitations, the use of cluster analysis to identify distinct profiles, conducting the study in three universities with different contexts, and providing a practical “Channel-Content Separation” strategy are notable strengths of this research.

Conclusion

The findings of this research indicate that in designing health literacy programs based on profiling, relying on the framework of social marketing factors to enhance women’s participation in breast cancer screening, it is essential to steer strategies toward traditional-medical communication patterns. Program designers can, by relying on stable and trustworthy communication infrastructures (telephone contact, brochures, physicians, and pharmacies), focus their efforts on “message content customization” rather than changing

distribution channels. More precisely, although “message content” can vary according to the characteristics of each cluster, the “media vehicle” (channel and location) can be shared and based on the preferences of the majority of the audience. Accordingly, future communication strategies can, while maintaining shared channels (traditional and in-person media), personalize content according to the specific needs of each group:

- For “Pragmatic Critics”: Provide step-by-step guide brochures and messages focused on speed, ease, and easy access to screening services.
- For “Structural Critics”: Distribute posters containing environmental images and reassuring messages regarding service quality and transparency of screening processes.
- For “Satisfied Aware”: Provide advanced scientific-educational materials and hold more specialized sessions to enhance knowledge and self-efficacy regarding breast cancer and screening services.

These findings also outline important policy implications. Health policymakers can, by avoiding heavy investment in complex digital campaigns that have low returns in this cultural context, focus their resources on proven solutions: distribution of brochures and pamphlets (as the primary and preferred tool), telephone contact for reminders, and holding in-person educational sessions at health centers. Television, as a medium with broad coverage, can be used in second place for public awareness. Based on the combination of three sets of evidence (significant attitudinal differences alongside non-significant differences in media preferences, similar response patterns across the entire sample and alignment with theoretical concepts in the literature), this study proposes the “channel-content separation” strategy as an operational and evidence-based solution for health literacy program designers. This simple and cost-effective approach appears to have high potential for effectively increasing health literacy and screening rates in this population group. However, it is emphasized that this strategy is an interpretive conclusion from the existing findings, and future interventional research is necessary for its definitive confirmation.

Overall, the most effective strategy is an intelligent combination of four main pillars: the authority of physician prescription, the easy accessibility of pharmacies, the intimacy of

telephone contact, and the broad coverage of television, which, alongside written tools (brochures and pamphlets), act as the communication backbone. Media literacy programs should leverage this combination to transmit their messages in order to overcome cultural and structural barriers and maximize women's participation.

Future research should focus on longitudinal designs to validate these profiles and test the effectiveness of localized communication strategies in real-world settings. It is also recommended that future studies employ interventional designs with measurement of actual behavior (not merely self-reported preferences) to empirically validate the "channel-content separation" strategy.

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