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Core contents for a menopausal health literacy intervention for South Korean middle-aged women: an e-Delphi study

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Abstract

Background The attention on improving health literacy (HL) for self-management at the population level in many countries has been increasing. Although self-management among middle-aged women in the menopausal transition are important public health issues, few studies have developed the menopausal HL intervention reflecting the multidimensional aspects of HL. We aimed to generate consensus from an expert panel on the core contents of the menopausal HL intervention for middle-aged women based on the HL conceptual framework of the European Health Literacy Survey.

Methods The panel comprised 20 experts from multiple disciplines (nursing, medicine, public health, and food and nutrition). We conducted the e-Delphi process in three rounds, asking the panel to evaluate and prioritize the appropriateness of the core contents and provide open-ended responses to additional comments about the menopausal HL intervention. The e-Delphi questionnaire was developed based on the HL framework, integrating health and HL domains.

Results The experts reached a consensus on 38 components of the intervention. Among the 19 components of the four health domains, health topics in healthcare and disease prevention were more appropriate than those in health promotion. For the 19 HL competency components, strengthening the ability to access, appraise, and apply health information was more important than strengthening the ability to understand information. Finally, a consensus was achieved on the 12 priorities for intervention content by HL domains integrated with health domains. For example, contents included proper access to reliable information resources, understanding the definition and process of menopause, judging abnormal health symptoms, and performing the health checkups necessary for menopausal women.

Conclusions Our findings provide evidence for HL skills that nurses and other health professionals can consider when developing interventions to improve self-management among middle-aged women. Future research should focus on incorporating the core contents of multidimensional HL skills into menopausal HL interventions to improve self-management among middle-aged women.

Keywords Menopause, Women, Health literacy, Self-management, Delphi technique

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Background

Most middle-aged women naturally experience menopause, a female-specific chronic condition caused by the loss of ovarian function and a decline in estrogen levels [1]. During the menopausal transition period, women typically experience menopausal symptoms such as vasomotor and genitourinary symptoms, increased bone loss rate, sleep disorders, and mood changes [2]. Furthermore, these changes may be predisposed to economic burden due to healthcare resource use and work impairment [3], the high risk of chronic disease including cardiovascular and musculoskeletal diseases, and the decreased quality of life (QOL) in postmenopausal women [2, 4]. Given that the world's population is aging and that women spend more than a third of their lives in menopause [4], the importance of self-management during this period is growing. Previous studies have indicated that better self-management behaviors are associated with improved health outcomes and health-related quality of life (HRQOL) among middle-aged women [5–8].

Health literacy (HL) has emerged as an effective strategy for improving self-management and health outcomes [9]. Although there are many definitions of HL [10–12], it is commonly defined as the ability to acquire, process, understand, and apply health information to make appropriate health-related decisions. The literature has described HL as a multidimensional concept. For example, Nutbeam [13] classified HL into three literacy skills: functional literacy (basic abilities to read and write information), interactive literacy (advanced cognitive abilities to communicate, derive, and apply information), and critical literacy (more advanced cognitive abilities to critically analyze information). Baker [14] divided HL into health-related print literacy (understanding written health information) and oral literacy (orally communicating regarding health). In addition, the European Health Literacy Survey (HLS-EU) utilized a matrix of HL suggested by Sørensen et al. [11]. To integrate the health information processing competencies in the medical and public health perspectives, Sørensen et al. [11] proposed 12 dimensions that combine three health domains (healthcare, disease prevention, and health promotion) and four HL competencies (access, understand, appraise, and apply) in a conceptual model of HL.

HL is emphasized as a personal asset that enables individuals to manage their health and control determinants affecting their health [11, 15]. According to the integrated conceptual model proposed by Sørensen et al. [11], HL improves individual autonomy and empowerment, which has positive effects on self-management behaviors, healthcare utilization, health outcomes, and reduced healthcare costs. Additionally, Nutbeam [13] indicated that enhancing HL can improve the knowledge about health conditions and increase self-efficacy in using

that knowledge for managing health. Previous reviews and meta-analyses have identified that (a) those with HL strengths are more likely to have high levels of self-management behaviors, health outcomes, and QOL [9, 16–18] and (b) HL interventions are effective in improving self-management-related knowledge, attitudes, and behaviors [19–21]. Moreover, a recent systematic review of middle-aged women identified that HL levels were positively associated with disease-related perceptions, knowledge, self-efficacy, adherence to treatment, health-promoting behaviors, and HRQOL [22].

Despite the close relationship between HL and self-management among middle-aged women, robust empirical evidence on the effectiveness of HL-based self-management interventions in this population is sparse [22]. An experimental study indicated the effect of HL intervention on improving menopause-related QOL in Iranian menopausal women [23]. However, few experimental studies of middle-aged women have examined the effectiveness of (a) interventions that strengthen the multidimensional aspects of HL competencies based on a theoretical framework, and (b) interventions developed based on systematic analyses of HL competencies tailored to this specific population [22, 24]. To establish effective intervention strategies and obtain robust scientific findings, developing interventions based on a firm theoretical or conceptual framework and identifying core competencies are essential [25, 26]. Thus, we aimed to develop a menopausal HL intervention. This intervention utilizes self-management strategies (e.g., weekly action plans, feedback, and problem solving) based on the self-efficacy theory [27, 28]. As a first step to develop this intervention, this study was conducted to reach a consensus on the core contents of the menopausal HL intervention based on the HL framework suggested by Sørensen et al. [11].

Methods

Design

We conducted an e-Delphi study to reach a consensus concerning the core contents of the menopausal HL intervention for middle-aged women. The Delphi technique is a widely accepted and used method for obtaining the convergence of expert panel opinions on specific topics [29–31]. A Delphi study typically conducts multiple rounds of questionnaires, wherein the expert panel receives feedback on their responses and subsequently re-evaluates the items based on this feedback [29]. Using this technique via e-mail (i.e., e-Delphi technique), experts evaluate items anonymously and independently online [31]. Prior to conducting this study, we obtained approval from the Ethics Committee of Daegu Catholic University (approval no.: CUIRB-2023-0028-01).

Participants

We used purposeful sampling to recruit a panel of multi-disciplinary experts. Experts were defined as those who (a) met one or more of the following criteria and (b) had at least five years of experience in their field: physicians or nurses who care for gynecological patients, nursing professors with education and research experience in middle-aged women's healthcare, public healthcare professionals in public healthcare centers, and researchers/professors with education and research experience in HL. The number of panel members required to obtain useful results is generally known to be approximately 15–20 [32]. Of the 30 experts invited via e-mail, 20 voluntarily agreed to participate and responded to all the rounds of the study. The demographic and work-related characteristics of the expert panel are presented in Table 1. The average age was 44.25 years and 85.0% were female. The experts included four physicians and five nurses working in hospitals or clinics, five public healthcare workers (four nurses and a nutritionist) in public healthcare centers, and six professors or researchers. The most common

specialty of the panel was nursing (13 experts), followed by medicine, public health, and food and nutrition. The average working period and research experience in women's health were 10.40 years.

Data collection and procedure

Our study used the e-Delphi technique with individual e-mails for efficient communication and faster feedback and responses from experts across South Korea [31]. After obtaining informed consent via email from the experts who agreed to participate in this study, we asked them to respond to Round 1 questionnaire. This study was conducted between October 2023 and January 2024. The response rate across all the rounds was 100%. To develop the initial e-Delphi questionnaires based on the HLS-EU conceptual model [11], authors reviewed the guidelines for menopausal healthcare and self-management [33–35], the national guidelines and workbooks for HL improvement [36–39], and previous studies of HL interventions based on this model [40, 41]. Additionally, the definition of HL used in empirical studies of middle-aged women was reviewed in our previous study [22].

Based on the results of a comprehensive literature review, we developed 94 intervention contents by 12 dimensions of the HLS-EU matrix [11]. The initial survey consisted of 33 items for accessing (21 for access-healthcare, 5 for access-disease prevention, and 7 for access-health promotion), 35 for understanding (22 for understand-healthcare, 6 for understand-disease prevention, and 7 for understand-health promotion), 15 for appraising (6 for appraise-healthcare, 5 for appraise-disease prevention, and 4 for appraise-health promotion), and 11 for applying (3 for apply-healthcare, 3 for apply-disease prevention, 5 for apply-health promotion). In Round 1, we aimed to preliminary explore the appropriate intervention contents according to the 12 dimensions [11]. The experts were asked to evaluate the appropriateness of the content and provide qualitative comments on the listed or additional contents that required further consideration. In Rounds 2 and 3, the experts' responses and a summary of comments from the previous rounds were provided (Fig. 1).

Data analysis

We collected data using a 5-point Likert scale ranging from 1 (very inappropriate) to 5 (very appropriate). To measure central tendency and dispersion and obtain the experts' consensus opinions from quantitative data [31], we calculated the mean, standard deviation, 25th and 75th percentiles, content validity ratio (CVR), and coefficient of variation (CV) using Stata version 17. The CVR is a linear transformation of a proportion of experts' agreement and implies the proportion of experts who rate a

Table 1 Characteristics of the Expert Panel (N=20)

Variables	Frequency (%) or Mean \pm SD
Age (year) ^a	44.25 \pm 8.19
< 40	7 (35.0)
40–50	8 (40.0)
> 50	5 (25.0)
Gender	
Male	3 (15.0)
Female	17 (85.0)
Education	
Bachelor's degree	10 (50.0)
Master's degree	2 (10.0)
Doctorate degree	8 (40.0)
Type of institution	
Hospital/clinic	9 (45.0)
University	5 (25.0)
Public healthcare centers	5 (25.0)
Government research institution	1 (5.0)
Specialty area	
Nursing	13 (65.0)
Medicine	4 (20.0)
Public health	2 (10.0)
Food and nutrition	1 (5.0)
Job title	
Physician	4 (20.0)
Nurse	5 (25.0)
Public healthcare workers	5 (25.0)
Professor/Researcher	6 (30.0)
Work experience in healthcare (year) ^a	15.75 \pm 6.31
Work experience in women's healthcare (year) ^a	10.40 \pm 5.96

^aMean \pm SD

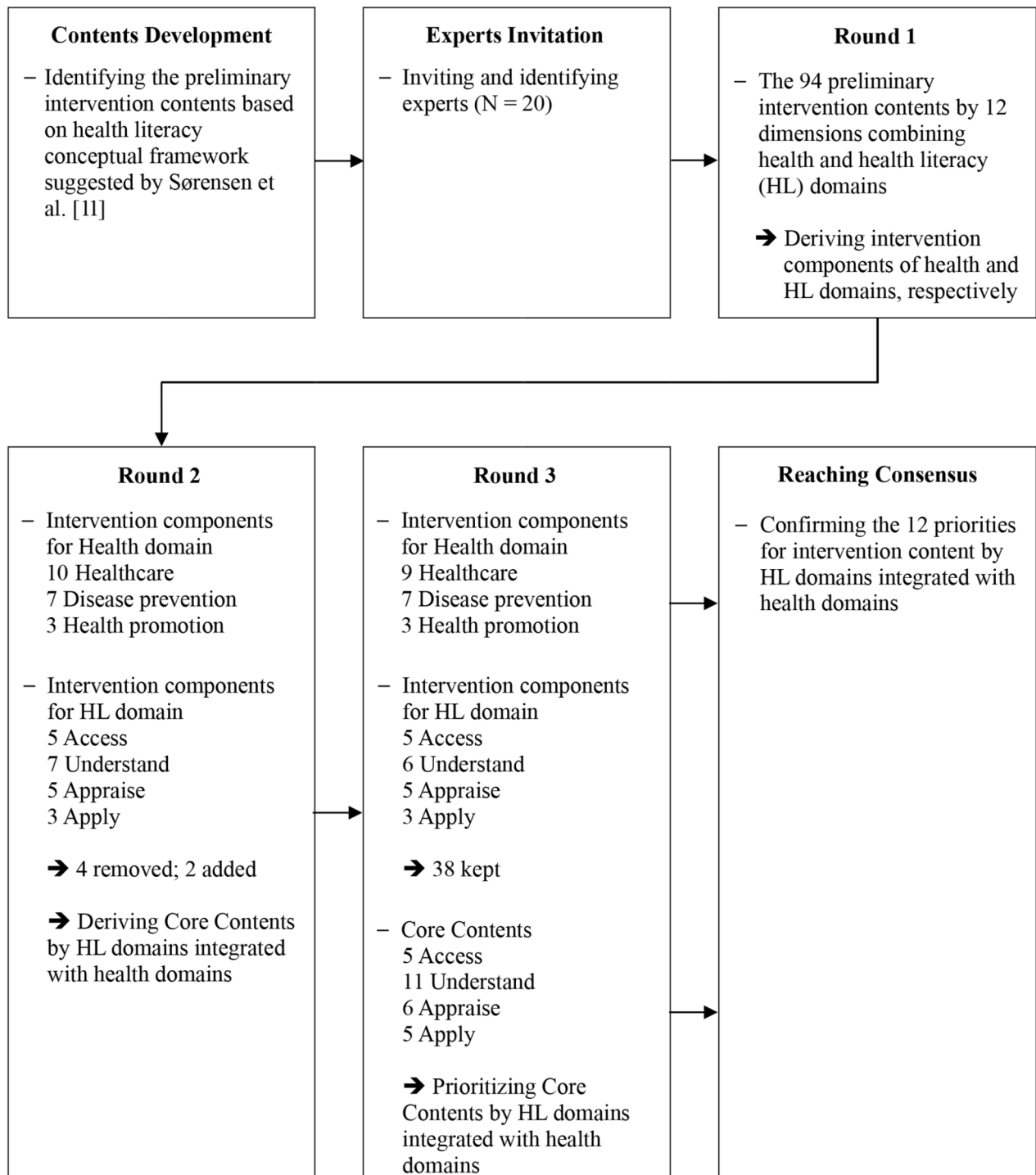


Fig. 1 Overview of the Delphi process

content as “appropriate” [42]. The CVR was calculated using the following formula:

$$CVR = \frac{n_e - N/2}{N/2}$$

The n_e means the number of experts responding “appropriate” and N means the total number of the experts. The CVR value ranges from -1.0 to $+1.0$. A positive CVR indicated that more than half of the expert panelists evaluated the content as appropriate (four or five points), and a negative CVR indicated that less than half of the expert panelists rated the content as appropriate. A CVR value of zero indicated that half of the experts evaluated the item as appropriate and the other half did not. Since our expert panel consists of 20 members, content validity was achieved when the CVR was 0.42 or higher [42]. We calculated the CV (i.e., standard deviation divided by the mean) to establish the stability and consensus of the responses for each intervention content [43]. A CV value of 0.5 or less means that the level of consensus is good and no additional round is needed [43]. Furthermore, we attempted to reach a consensus on qualitative data by anonymously providing a summary of the qualitative opinions obtained in the previous rounds and then requesting opinions from the experts. Finally, we used a multiple response analysis to determine the core contents that needed to be prioritized for the menopausal HL intervention.

Results

Round 1

Among the 94 contents in Round 1, the CVRs of five contents for accessing, four for understanding, four for appraising, and three for applying were below 0.42. Consequently, the following five items were excluded: (a) access to or understanding of health policies for menopausal health promotion, (b) judgment regarding additional outpatient care and additional outpatient periods at tertiary general hospitals, and (c) judgment regarding the current level of information on healthcare methods obtained from the media. Four content items that did not reach a consensus owing to overlapping were excluded. The other seven contents with CVRs lower than 0.42 were not excluded from further discussion. For example, considering that middle-aged women have a low level of understanding of written medication instructions and nutrition labels, we included the content of understanding and applying this information in the second e-Delphi survey. Additionally, a decision based on disease prevention information obtained from the media was not excluded considering the impact of the media on health. The detailed contents of Round 1 are presented in Appendix 1.

Regarding the access-related dimensions, the experts proposed to provide training on appropriate access sources and methods of health-related information rather than topic-specific information because middle-aged women do not use different approaches depending on menopause-related health topics. Moreover, to ensure that interventions reflected the characteristics of each health and HL domain, some experts suggested evaluating the intervention components of the two domains separately rather than combining the two domains into 12 dimensions. Therefore, we modified and added the intervention components according to three health-related topics (i.e., ten topics for healthcare, seven for disease prevention, and three for health promotion) and four HL competencies (i.e., five competencies for access, seven for understand, five for appraise, and three for apply). Although the CV values were less than 0.5, a Round 2 survey was conducted to reach a consensus among experts on the modified and added intervention components by health and HL domains.

Round 2

The experts were asked to score the appropriateness of health-related topics for middle-aged women in the health domain and HL competencies for improving women's HL. In Round 2, except for the four components, the CVR values of health-related topics and HL competencies ranged from 0.50 to 1.00. Two of health-related topics (i.e., “1.1.10. Verbal medication instructions from physicians and pharmacists” for healthcare and “1.3.1. Nutrition facts labels” for health promotion) and two of HL competencies (i.e., “2.2.3. Accompanying relatives or family members to the medical appointment to increase understanding” for understanding and “2.3.1. Judging by personal values and preferences” for appraising) did not meet the CVR standards (Table 2). We excluded two components, 1.1.10 and 2.2.3. Regarding component 1.3.1, some experts emphasized the need for education on this topic, considering Korean women's low understanding of detailed professional information, such as nutritional fact information, while others suggested that education on the dietary regimen recommended for postmenopausal women would be more appropriate. Considering that nutritional information utilization is an important competency of HL, we decided to revise the component by teaching it along with dietary recommendations (component 1.3.4) and asked experts to re-evaluate it. Following the experts' suggestions, component 2.3.1 was replaced with component 2.3.6 by specifying personal values and preferences. All CVs in Round 2 were less than 0.5.

Table 2 Summary of responses from rounds 2 and 3 (N=20)

Domains and Components	Round 2			Round 3		
	Mean ±SD	CVR	CV	Mean ±SD	CVR	CV
1. Health domain						
1.1. Healthcare						
1.1.1. Definition and process of menopause	4.50±0.61	0.90	0.13	4.85±0.37	1.00	0.08
1.1.2. Physical symptoms of menopause (e.g. vasomotor, musculoskeletal, and genitourinary symptoms)	4.45±0.76	0.70	0.17	4.70±0.47	1.00	0.10
1.1.3. Sexual symptoms of menopause	4.40±0.60	0.90	0.14	4.70±0.57	0.90	0.12
1.1.4. Psychosocial symptoms of menopause	4.75±0.55	0.90	0.12	4.85±0.37	1.00	0.08
1.1.5. Musculoskeletal diseases common in middle-aged women	4.55±0.60	0.90	0.13	4.75±0.44	1.00	0.09
1.1.6. Cardiovascular diseases common in middle-aged women	4.50±0.61	0.90	0.13	4.70±0.47	1.00	0.10
1.1.7. Cognitive decline in middle-aged women	4.35±0.75	0.70	0.17	4.60±0.60	0.90	0.13
1.1.8. Hormone therapy and its pros and cons	4.80±0.52	0.90	0.11	4.90±0.31	1.00	0.06
1.1.9. Written medication instructions	4.30±0.86	0.50	0.20	4.45±0.69	0.80	0.15
1.1.10. Verbal medication instructions from physicians and pharmacists	3.90±1.02	0.10	0.26	—	—	—
1.2. Disease prevention						
1.2.1. Menopausal health screening	4.60±0.50	1.00	0.11	4.85±0.37	1.00	0.08
1.2.2. Abnormal health symptoms in middle-aged women	4.55±0.60	0.90	0.13	4.80±0.41	1.00	0.09
1.2.3. Prevention of musculoskeletal diseases common in middle-aged women	4.60±0.60	0.90	0.13	4.75±0.44	1.00	0.09
1.2.4. Prevention of cardiovascular diseases common in middle-aged women	4.55±0.60	0.90	0.13	4.70±0.47	1.00	0.10
1.2.5. Prevention of psychosocial problems common in middle-aged women	4.40±0.75	0.70	0.17	4.70±0.57	0.90	0.12
1.2.6. Health risk behaviors	4.70±0.57	0.90	0.12	4.85±0.37	1.00	0.08
1.2.7. Health warning messages related to health risk behaviors	4.35±0.59	0.90	0.13	4.60±0.60	0.90	0.13
1.3. Health promotion						
1.3.1. Nutrition facts labels	3.80±0.83	0.10	0.22	—	—	—
1.3.2. Healthy behaviors	4.20±0.70	0.70	0.17	4.45±0.51	1.00	0.11
1.3.3. Living/working environment for a healthy lifestyle	4.20±0.83	0.50	0.20	4.20±0.52	0.90	0.12
1.3.4. Healthy eating in middle-aged women (e.g., dietary guidelines and nutrition facts labels)	—	—	—	4.55±0.69	0.80	0.15
2. Health literacy domain						
2.1. Access						
2.1.1. Hospitals/clinics for menopausal health management	4.30±0.86	0.50	0.20	4.70±0.47	1.00	0.10
2.1.2. Media messages about menopausal health management	4.30±0.73	0.70	0.17	4.55±0.51	1.00	0.11
2.1.3. Professional help for menopausal health management	4.65±0.59	0.90	0.13	4.95±0.22	1.00	0.05
2.1.4. Support groups for menopausal health management (e.g., family, relatives, and friends)	4.15±0.93	0.50	0.22	4.35±0.59	0.90	0.13
2.1.5. Community resources for menopausal health management	4.40±0.75	0.90	0.17	4.65±0.49	1.00	0.11
2.2. Understand						
2.2.1. Preparation prior to medical appointment	4.30±0.80	0.60	0.19	4.45±0.51	1.00	0.11
2.2.2. How to express menopausal health-related symptoms	4.25±0.79	0.60	0.19	4.35±0.49	1.00	0.11
2.2.3. Accompanying relatives or family members to the appointment	3.75±1.02	0.10	0.27	—	—	—
2.2.4. Questions to ask the doctor at the appointment	4.25±0.72	0.70	0.17	4.45±0.51	1.00	0.11
2.2.5. Confirmation of one's understanding by explaining them to the medical staff	4.20±0.83	0.50	0.20	4.30±0.57	0.90	0.13
2.2.6. What to do when one doesn't understand verbal instructions from medical staff	4.35±0.67	0.80	0.15	4.55±0.51	1.00	0.11
2.2.7. What to do when one doesn't understand written instructions from medical staff	4.35±0.75	0.70	0.17	4.55±0.60	0.90	0.13
2.3. Appraise						
2.3.1. Judging the personal values and preferences	4.05±0.83	0.40	0.20	—	—	—
2.3.2. Comparing the pros and cons of alternatives for healthcare	4.65±0.67	0.80	0.14	4.90±0.31	1.00	0.06
2.3.3. Judging the healthcare or treatment methods needed for oneself	4.60±0.60	0.90	0.13	4.80±0.52	0.90	0.11
2.3.4. Judging the reliability of information about healthcare methods based on advice from family or acquaintances	4.40±0.88	0.50	0.20	4.60±0.60	0.90	0.13
2.3.5. Judging the reliability of information about healthcare methods obtained through media	4.45±0.89	0.50	0.20	4.75±0.44	1.00	0.09
2.3.6. Judging the personal values or preferences for health management	—	—	—	4.50±0.51	1.00	0.11
2.4. Apply						

Table 2 (continued)

Domains and Components	Round 2			Round 3		
	Mean \pm SD	CVR	CV	Mean \pm SD	CVR	CV
2.4.1. Making healthcare decisions based on advice from family or friends	4.35 \pm 0.88	0.50	0.20	4.45 \pm 0.69	0.80	0.15
2.4.2. Making healthcare decisions based on information obtained from the media	4.50 \pm 0.76	0.70	0.17	4.70 \pm 0.57	0.90	0.12
2.4.3. Making healthcare/treatment decisions based on information obtained from medical staff	4.75 \pm 0.44	1.00	0.09	4.95 \pm 0.22	1.00	0.05

Round 3

For Round 3, the experts were provided with the modified questionnaire, individual responses, and summary results of Round 2 (i.e., mean, 25th and 75th percentiles, and comments for each health domain- and HL domain-specific component), allowing them to compare their answers with those of the entire panel. Moreover, after deriving intervention contents that combined health- and HL-specific components with high CVRs in Round 2, we asked experts to evaluate the appropriateness of the contents and designate three contents that needed to be prioritized for improving HL-based self-management among middle-aged women.

In Round 3, all health-related topics and HL competencies were appropriate as menopausal HL intervention contents, considering the CVR and CV values. Overall, the mean range of “healthcare (4.45–4.90)” and “disease prevention (4.60–4.85)” items was higher than that of “health promotion (4.20–4.55)” items. Regarding HL domains, the mean range of “access (4.35–4.95),” “appraise (4.50–4.90),” and “apply (4.45–4.95)” items was higher than that of “understand (4.30–4.55)” items (Table 2).

Finally, all the CVR and CV values of the derived intervention content questions were satisfactory, reaching an expert consensus. The final 12 high-priority content items by HL domains integrated with health domains are listed in Table 3.

Discussion

In this study, the expert panel reached a consensus on the core contents of a menopausal HL intervention for middle-aged women based on the HL conceptual framework [11]. They identified 38 possible intervention components (19 for health domains and 19 for HL domains) and 12 priority intervention contents according to the four HL domains integrated with health domains.

For the health domains, the components of “healthcare” and “disease prevention” were more appropriate as menopausal HL intervention contents than those of “health promotion.” For example, to improve HL skills in self-management interventions, the following health topics need to be prioritized: (a) definition and process of menopause, psychosocial symptoms, and hormone therapy (HT) and its pros and cons for healthcare and (b) menopausal health screening and health risk behaviors

for disease prevention. These findings might have resulted from the developmental stage characteristics of middle-aged women. As they experience menopausal symptoms and are at an increased risk of disease [2, 4], health promotion efforts within the community may be a relatively low priority.

For the HL domains, it was noteworthy that the “access,” “appraise,” and “apply” components were more suitable as the intervention contents than those of “understand.” These findings are supported by the evolving concept of HL [13, 15]. HL is not limited to the basic HL concept of functioning in everyday situations but also refers to more advanced abilities to (a) actively engage in specific activities and apply information appropriate to a specific situation (interactive HL), and (b) critically analyze and apply information (critical HL) [15]. The literature indicates that improving the latter two types of HL is worthwhile for the successful self-management of the chronic conditions [21, 44, 45]. A systematic review reported that interventions that strengthen interactive or critical HL skills are effective in improving motivation, empowerment, and self-management [21]. Similarly, an empirical study of Dutch patients found that higher levels of communicative HL (e.g., collecting information from diverse sources, extracting information and applying specific information) and critical HL (e.g., judging the applicability, validity, and reliability of information) were strongly associated with active participation in treatment, confidence in medical situations, and overall self-management [45]. Therefore, the contents of the menopausal HL interventions should integrate multiple components of HL such as “access,” “appraisal,” and “application,” rather than focusing on health information comprehension.

By identifying the most important intervention contents, we identified the top 12 core contents by HL domains integrated with health domains. First, the core contents for the “access” dimension included “proper access to various information sources such as hospitals/clinics, media, and professional help for menopausal health management.” For menopausal health management, it is important to educate middle-aged women on how to use reliable information sources (e.g., professional help) rather than non-professional resources (e.g., support groups). Additionally, considering that middle-aged women use the Internet to seek menopause-related

Table 3 Summary of responses regarding derived intervention contents by the Health Literacy Domains (*N* = 20)

Intervention contents	Mean ± SD	CVR	CV	High-priority contents	
				Frequency	(%)
1. Access					
1.1. Proper access to the hospitals/clinics available for menopausal health management	4.70 ± 0.47	1.00	0.10	13	(21.7)
1.2. Proper access to the media information available for menopausal health management	4.80 ± 0.41	1.00	0.09	17	(28.3)
1.3. Proper access to the professional help available for menopausal health management	4.95 ± 0.22	1.00	0.05	15	(25.0)
1.4. Support groups for menopausal healthcare	4.35 ± 0.59	1.00	0.13	7	(11.7)
1.5. Community resources for menopausal healthcare	4.60 ± 0.60	1.00	0.13	8	(13.3)
2. Understand					
2.1. Information on the definition and process of menopause	4.95 ± 0.22	1.00	0.05	16	(26.7)
2.2. Information on the physical symptoms of menopause	4.90 ± 0.31	1.00	0.06	17	(28.3)
2.3. Information on the sexual symptoms of menopause	4.70 ± 0.57	0.90	0.12	1	(1.7)
2.4. Information on the psychosocial symptoms of menopause	4.85 ± 0.37	1.00	0.08	9	(15.0)
2.5. Information on the musculoskeletal diseases common in middle-aged women	4.80 ± 0.41	1.00	0.09	1	(1.7)
2.6. Information on the cardiovascular diseases common in middle-aged women	4.80 ± 0.41	1.00	0.09	2	(3.3)
2.7. Information on the cognitive decline in middle-aged women	4.60 ± 0.60	0.90	0.13	0	(0.0)
2.8. Information on the hormone therapy and its pros and cons	4.90 ± 0.31	1.00	0.06	12	(20.0)
2.9. Information on the written medication instructions	4.40 ± 0.60	0.90	0.14	1	(1.7)
2.10. Healthy eating in middle-aged women (e.g., dietary guidelines and nutrition facts labels)	4.55 ± 0.51	1.00	0.11	0	(0.0)
2.11. Communication strategies with medical staff to improve understanding	4.60 ± 0.50	1.00	0.11	1	(1.7)
3. Appraise					
3.1. Detecting the abnormal health symptoms in middle-aged women	4.90 ± 0.31	1.00	0.06	18	(30.0)
3.2. Judging the risk factors of diseases common in middle-aged women	4.90 ± 0.31	1.00	0.06	13	(21.7)
3.3. Judging the pros and cons of various alternatives for menopausal healthcare and treatment	4.90 ± 0.31	1.00	0.06	15	(25.0)
3.4. Determination of personal values or preferences for healthcare or treatment methods	4.45 ± 0.60	0.90	0.14	4	(6.7)
3.5. Judging the reliability of information about healthcare methods based on advice from family or acquaintances	4.55 ± 0.69	0.80	0.15	0	(0.0)
3.6. Judging the reliability of information about healthcare methods based on media messages	4.75 ± 0.44	1.00	0.09	10	(16.7)
4. Apply					
4.1. Performing the necessary health checkups	4.95 ± 0.22	1.00	0.05	20	(33.3)
4.2. Performing the required medical appointment	4.90 ± 0.31	1.00	0.06	13	(21.7)
4.3. Practicing health behaviors to improve menopausal health	4.85 ± 0.49	0.90	0.10	13	(21.7)
4.4. Healthcare using smart medical devices	4.55 ± 0.51	1.00	0.11	5	(8.3)
4.5. Taking medications appropriately based on information obtained from medical staff	4.75 ± 0.44	1.00	0.09	9	(15.0)

Note. Bold values indicate the high-priority contents.

information for various purposes (e.g., to look for menopausal symptom advice, pharmaceutical advice, and emotional support) [46], training to appropriately access reliable Internet information will be needed.

Second, the core contents for the “understand” dimension were comprehending “the information on the definition and process of menopause, physical symptoms of menopause, and HT and its pros and cons.” Similarly, in previous studies, the information on menopausal diagnosis, menopausal symptoms, and HT were common contents that middle-aged women had consumed [46, 47]. Moreover, despite the effectiveness of HT in managing menopausal symptoms [48], women are eager to seek information regarding HT and advice from health professionals and each other using online boards [46]. The literature has also shown that women have been concerned about HT since the publication of the Women’s Health

Initiative trial report, a widely publicized misinterpretation that the risks of breast cancer and cardiovascular disease from HT outweigh its benefits [48, 49]. Therefore, health professionals should consider strategies to improve women’s understanding of the benefits and risks of HT as well as the definition and course of menopause.

Third, the experts reached a consensus that interventions should include training judgment processes in the context of making decisions regarding specific actions based on health information or knowledge analysis: “detecting the abnormal health symptoms,” “judging the risk factors of diseases common in post-menopausal women,” and “judging the pros and cons of various alternatives for menopausal healthcare and treatment.” Women in the menopausal transition period are at an increased risk of various diseases and have many healthcare options available for menopausal symptom

management [2]. A systematic review established that providing information regarding treatment options for menopausal management and possible positive and negative outcomes and helping middle-aged women's judgment of their contexts and values regarding their treatment had positive impacts on menopausal management and related decisions [50, 51].

Finally, the top 3 core contents of the "apply" dimension were "performing the necessary health checkups, the required medical appointment, and healthy behaviors to improve menopausal health." Healthcare-seeking behaviors among middle-aged women are critical for managing menopausal symptoms and improving their QOL [52]. However, compared to middle-aged Western women who seek help through healthcare services and take medication for menopausal health management, Asian counterparts tend to endure menopausal symptoms and do not seek treatment [53–55]. Previous studies have shown that healthy lifestyle habits are associated with alleviating menopausal symptoms, improving QOL, and reducing the risk of chronic diseases [56–58]. Therefore, the menopausal HL interventions for middle-aged women should focus on empowering them to participate in menopausal health management by utilizing healthcare services and performing health-promoting behaviors based on information appropriate to their situations.

Practical implications

Nurses play an important role in helping individuals improve their HL and change health behaviors [59]. Improving HL is a critical nursing strategy in tackling middle-aged women with HL challenges. To the best of our knowledge, this is the first study to reveal the core content of the menopausal HL interventions targeting middle-aged women using a comprehensive HL conceptual framework. Considering the findings from our study and previous studies [21, 22], in addition to training middle-aged women to function effectively with an understanding of menopausal health-related information, nurses and other health professionals should consider improving women's HL skills to acquire, critically analyze, judge, and use the necessary information. Additionally, they should selectively consider core strategies for menopausal HL interventions tailored to the individual health contexts of middle-aged women. For example, not only is it necessary to provide correct information regarding alternative medical treatments, such as hormonal and non-hormonal therapies, but also to empower women to make appropriate health decisions based on judgment that considers their circumstances and values. To do so, it can be effective to incorporate strategies to improve self-management such as goal setting, weekly planning, health log recording, and feedback based on self-efficacy theory [27, 28]. Considering the growing

interest in interventions for populations with HL challenges in many countries (e.g., the United States, Australia, and South Korea) [36, 39, 60, 61], efforts should be made to develop menopausal HL interventions for middle-aged women with HL challenges in communities and hospitals.

Furthermore, reflecting actively these multidimensional aspects of HL in evaluating the effectiveness of interventions as well as designing interventions is necessary [11, 61]. However, few HL intervention studies of middle-aged women have evaluated the four HL dimensions as intervention outcomes [22]. Thus, our findings provide a basis for the development of HL measurements to evaluate HL skills across multiple aspects.

Strengths and limitations

This study has several strengths. First, we recruited expert panels with heterogeneous backgrounds and sufficient relevant experience to provide meaningful input for the e-Delphi process. Second, the experts who participated in Round 1 participated in all the rounds, thereby increasing the validity of the study. To increase the response rate, we sent e-mails reminding panelists to complete the survey. Third, we derived the intervention content based on the HLS-EU conceptual framework to reflect the multidimensionality of the concept.

Despite these strengths, our findings have some limitations. First, since purposive sampling was implemented, the participants' representativeness was low. Second, when we derived intervention components by health and HL domains based on the results of Round 1, there was no in-depth discussion among the experts. However, the experts had the opportunities to evaluate each component and reflect their opinions through the remaining two rounds, eventually reaching a consensus.

Conclusions

This study obtained expert agreement on the core contents of a menopausal HL intervention for middle-aged women using an e-Delphi survey. Across the HL domains, experts from multiple disciplines identified 12 prioritized intervention contents that health professionals could use as resources in developing self-management interventions. Moreover, our results may guide the development of HL measurements that reflecting the multidimensionality of HL. Based on our results, future research is needed to develop and examine the effectiveness of menopausal HL interventions. Prior to conducting this study, further studies should investigate the following three issues: (a) whether the core contents of menopausal HL interventions from the expert panel are replicated in other countries; (b) the insight into the intervention contents desired by middle-aged women; and (c) the development of the HL instruments measuring the multiple

aspects of HL based on the theoretical and conceptual framework.

Abbreviations

HL	Health literacy
QOL	Quality of life
HRQOL	Health-related quality of life
HLS-EU	European Health Literacy Survey
CVR	Content validity ratio
CV	Coefficient of variation
HT	Hormone therapy

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12912-024-02179-2>.

Supplementary Material 1

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Not applicable.

Author contributions

HL conceived the study. HL and JK analyzed the data, interpreted the results, wrote the manuscript, and reviewed the manuscript.

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Data availability

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

Declarations

Ethics approval and consent to participate

Before conducting this study, we obtained approval from the Institutional Review Board (Approval Number: CUIRB-2023-0028-01). All methods were carried out in accordance with relevant guidelines and regulations. Each participant completed the informed consent form before answering the questionnaires. Any identifying data was not included in the manuscript.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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