



# The Effect of Decision Aid on Breast Cancer Screening Behaviors Based on Theory of Stage of Change: An Interventional Study

Zivar Akbari<sup>1</sup> , Esmat Mehrabi<sup>1\*</sup> , Mojgan Mirghafourvand<sup>2</sup>, Roghayeh Nourizadeh<sup>1</sup>

## Abstract

**Objectives:** The present study aimed to assess the effect of the decision-aid-based intervention on breast cancer screening behaviors in women based on the theory of change.

**Materials and Methods:** This interventional study was conducted among 40-69-year-old women who were randomly selected from the healthcare centers of Tabriz. The intervention group received a decision-aid booklet and an individual counseling session. In addition, the data were gathered before and eight weeks after the intervention using demographic and obstetric questionnaires and a checklist of behavior change stages. Finally, data were analyzed using SPSS24.

**Results:** According to the sequential logistic regression test, women who received the decision-aid-based consultation underwent breast control, breast clinical examination, and mammography significantly more than the control group ( $P < 0.001$ ).

**Conclusions:** In general, intervention programs with presenting decision-aid-based counseling could change women's screening behaviors because such programs increase their knowledge about the benefit and harms of a decision in relation to a choice such as doing mammography.

**Keywords:** Decision aid, Counseling, Breast cancer screening, Breast control, Mammography

## Introduction

Breast cancer is the most prevalent female cancer in the world (1) in both developed and developing countries with an increasing trend (2,3). According to the GLOBOCAN 2018 report, breast cancer ranks first in Iran among the common female cancers (4,5) and mammography is currently the most important screening method for this type of cancer (6,7) that can reduce mortality in 40-75-year-old women (8,9). In addition, its sensitivity is 80-85% (10) and sometimes might yield false-positive results so that patients would be forced to use other diagnostic methods to confirm the positive result of mammography, thus it may accompany with negative psychological effects on women (11). To help women to do screening tests, they should be provided with evidence-based information about the advantages and disadvantages of screening so that each person could weigh them based on her condition and therefore make an informed and autonomous decision regardless of the barriers (12-14). Some studies emphasize the use of decision aids to help people make informed decisions about their health (15-18). Therefore, there is a need to assess the advantage of decision aids about improving women's decision-related behaviors regarding doing screening. Considering the above-mentioned explanation, this study was conducted to assess the effect

of decision aids on breast cancer screening behaviors based on the stage of the change theory.

## Methods and Materials

This interventional study was conducted on 40-69-year-old women who referred to the healthcare centers of Tabriz.

### Inclusion Criteria

- Being within the age range of 40-69 years old;
- Having no history of mammography, ultrasound, and computed tomography in the last two years;
- Demonstrating no intention to perform the above-mentioned actions in the next 30 days;
- Having no history of breast clinical examination by a physician in the last year;
- Representing no intention to perform such an examination in the next 30 days;
- Having no history of breast cancer in the patient or first-degree relatives;
- Having speech and hearing ability.

### Exclusion Criteria

- Being pregnant
- Having galactorrhea

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<sup>1</sup>Faculty of Nursing and Midwifery, Tabriz University of Medical Sciences, Tabriz, Iran. <sup>2</sup>Department of Midwifery, Social Determinants of Health Research Center, Faculty of Nursing and Midwifery, Tabriz University of Medical Sciences, Tabriz, Iran.

\*Corresponding Author: Esmat Mehrabi, Tel: +989144142991, Email: Mehrabi@tbzmed.ac.ir



- Self-reporting a mental and motor disability.

The data were collected by using demographic and behavior change questionnaires. The demographic questionnaire measured age, education, job, income adequacy, and the number of children. Further, obstetric characteristics included the number of pregnancies, the age of the first menstruation and pregnancy, the age of menopause, and breastfeeding duration. The checklist of the stages of behavioral changes about doing breast control, breast clinical examination, and mammography were also used in this research (19).

The study procedure lasted from December 2018 to April 2019. Of 232 participants, 30 women did not meet the inclusion criteria and therefore were excluded from the study. Eventually, a total of 202 women within the age range of 40-69 years were included in this study (Figure 1).

Decision-aid-based individual counseling was held by the researcher for the intervention group. The provided content included issues relating to the incidence of breast cancer among Iranian women and the risk of cancer development in terms of age, risk factors, early diagnosis techniques, breast control and mammography, as well as the advantages and disadvantages of screening tests. The intervention group was also asked to read a booklet and contact the researcher if they needed further information on breast cancer or decided to undergo screening. Eight weeks after the intervention, the researcher completed the checklist of change stages again through an interview and the collected data were analyzed in SPSS2 4 by means of the chi-square test and sequential logistic regression.

**Results**

The mean (standard deviation, SD) age of the participants

in the intervention and control groups was 48.5 (6.7) and 49.9 (7.7), respectively. The results of the independent *t* test did not show statically significant differences in the age between the two groups ( $P < 0.014$ ). Based on the results, the mean (SD) age of the marriage of the participants in the intervention and control groups was 19.2 (7.1) and 20.9 (7.3), respectively. Furthermore, most of the women were a housewife and had a middle school education. The income level of the majority of them was adequate as well. The results revealed no statically significant differences regarding obstetric characteristics between intervention and control groups ( $P > 0.05$ ).

However, according to the sequential logistic regression test, there was a statically significant difference between the two groups in terms of the stages of a change in breast control, breast clinical examination, and mammography implementation eight weeks after the decision-aid-based consultation and the women who received the decision aid underwent breast control, breast clinical examination, and mammography significantly more than the control group ( $P < 0.001$ , Tables 1-3).

**Discussion**

This paper explored the effect of decision-aid-based counseling on breast cancer screening behaviors in women in Tabriz, Iran. The findings of this study can be used to draw the following conclusions:

There were statistically significant differences between the two groups eight weeks after the intervention in terms of the stages of the change of mammography behavior, breast clinical examination, and breast control. Generally, in terms of frequency, the number of women in the intervention group, who entered the stage of action

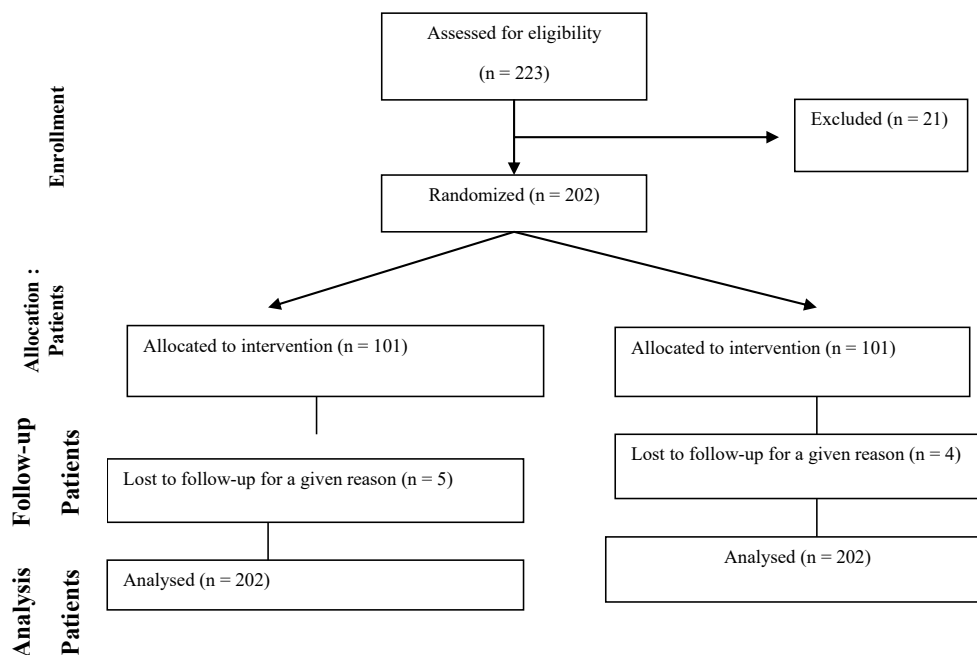


Figure 1. The Study Flow Diagram.

**Table 1.** Frequency Distribution and Comparison of the Stages of Change in Breast Control Behavior in the Intervention and Control Groups Before and 8 Weeks After the Intervention

Stages of Change	Pre-intervention Intervention <sup>c</sup> n (%)	Control <sup>c</sup> No. (%)	P <sup>a</sup>	Post-intervention Intervention <sup>d</sup> No. (%)	Control <sup>e</sup> No. (%)	P <sup>b</sup>
Pre-contemplation	68 (67.3)	59 (58.4)	0.001	10 (10.3)	43 (44.3)	0.001
Contemplation	5 (5.0)	19 (18.8)		6 (6.2)	19 (20.6)	
Preparation	4 (4.0)	3 (3.0)		14 (14.4)	1 (1.0)	
Action	24 (23.8)	20 (19.8)		67 (69.1)	33 (34.0)	

<sup>a</sup> Mann-Whitney test; <sup>b</sup> Sequential logistic regression; <sup>c</sup> Pre-intervention in the intervention and control groups (n=101); <sup>d</sup> Post-intervention in the intervention group (n=97); <sup>e</sup> Post-intervention in the control group (n=96).

**Table 2.** Frequency Distribution and Comparison of Stages of Change in Breast Clinical Examination Behavior in the Intervention and Control Groups Before and 8 Weeks After the Intervention

Stages of Change	Pre-intervention Intervention <sup>c</sup> n (%)	Control <sup>c</sup> No. (%)	P <sup>a</sup>	Post-intervention Intervention <sup>d</sup> No. (%)	Control <sup>e</sup> No. (%)	P <sup>b</sup>
Pre-contemplation	83 (82.2)	(77.2) 78	0.484	19 (19.6)	58 (60.8)	0.001
Contemplation	(17.8) 18	(22.8) 23		23 (23.7)	28 (28.9)	
Preparation	-	-		34 (35.1)	4 (4.1)	
Action	-	-		21 (21.6)	6 (6.2)	

<sup>a</sup> Mann-Whitney test; <sup>b</sup> Sequential logistic regression; <sup>c</sup> Pre-intervention in the intervention and control groups (n=101); <sup>d</sup> Post-intervention in the intervention group (n=97); <sup>e</sup> Post-intervention in the control group (n=96).

**Table 3.** Frequency Distribution and Comparison of Stages of Change in Mammography Behavior in the Intervention and Control Groups Before and 8 Weeks After the Intervention

Stages of Change	Pre-intervention Intervention <sup>c</sup> n (%)	Control <sup>c</sup> No. (%)	P <sup>a</sup>	Post-intervention Intervention <sup>d</sup> No. (%)	Control <sup>e</sup> No. (%)	P <sup>b</sup>
Pre-contemplation	91 (90.1)	82 (81.2)	0.107	24 (25.0)	67 (70.1)	0.001
Contemplation	10 (9.98)	19 (18.8)		28 (28.1)	26 (26.8)	
Preparation	-	-		34 (35.4)	1 (1.0)	
Action	-	-		11 (11.5)	2 (2.1)	

<sup>a</sup> Mann-Whitney test; <sup>b</sup> Sequential logistic regression; <sup>c</sup> Pre-intervention in the intervention and control groups (n=101); <sup>d</sup> Post-intervention in the intervention group (n=96); <sup>e</sup> Post-intervention in the control group (n=97).

or decision to perform screening after the intervention, was significantly higher than that of the control group. Moreover, the number of women who decided to undergo mammography after the intervention was very high. This change of behavior has great importance in medical sciences because, according to the model of health behavior change, the decision to perform a behavior is an accepted index that is an influential factor regarding the adoption of a behavior and the future action (20).

Similar to the present findings regarding the behavior changes resulting from the decision aid, Miller et al showed that women who received the decision aid were more likely to enter the decision stage for undergoing a genetic test. They further pointed out that the reason behind this behavior change was the effect of the decision aid

increasing knowledge and the perception of risk by women (21). Van Agt et al also reached a similar conclusion that the decision to attend breast cancer screening programs was stronger in the group who received decision aids (13).

On the other hand, Mathieu et al reported that women who received counseling could make informed decisions about performing or not performing the screening while those in the control group were still undecided (22). Additionally, Bourmaud et al and Hersch et al demonstrated the declined participation in breast cancer screening programs (mammography) in the groups that received decision aids (6, 23). In addition, several studies argued that awareness, as well as culture-specific attitudes and beliefs of Asian women plays an essential role in deciding to participate in breast cancer screening

programs (24-26). Some other studies also confirmed the positive effect of consultation in improving women's awareness about breast cancer screening (27,28). In conclusion, attention to the beliefs of the participants and the provision of valid scientific evidence about the risk factors of breast cancer in the decision-aid-based counseling content of the present study were the strong points of this study that led to changes in the screening behavior of the intervention group.

### Conflict of Interests

The authors declare that they have no conflict of interests.

### Ethical Issues

This study was approved by the Ethics Committee of Tabriz University of Medical Sciences (ethic No. IR.TBZMED.REC.1397.816).

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### References

1. Torre LA, Bray F, Siegel RL, Ferlay J, Lortet-Tieulent J, Jemal A. Global cancer statistics, 2012. *CA Cancer J Clin.* 2015;65(2):87-108. doi:10.3322/caac.21262
2. World Health Organization (WHO). Breast Cancer: Prevention and Control. WHO; 2017. <http://www.who.int/cancer/detection/breastcancer/en/html> 2017.
3. Khakbazan Z, Taghipour A, Roudsari RL, Mohammadi E, Omranipour R. Delayed presentation of self-discovered breast cancer symptoms in Iranian women: a qualitative study. *Asian Pac J Cancer Prev.* 2014;15(21):9427-9432. doi:10.7314/apjcp.2014.15.21.9427
4. Etemad K. Report of Iran about cancer registries Ministry of Health and Medical Education. MOHME; 2009.
5. Jazayeri SB, Saadat S, Ramezani R, Kaviani A. Incidence of primary breast cancer in Iran: ten-year national cancer registry data report. *Cancer Epidemiol.* 2015;39(4):519-527. doi:10.1016/j.canep.2015.04.016
6. Hersch J, Barratt A, Jansen J, et al. Use of a decision aid including information on overdetection to support informed choice about breast cancer screening: a randomised controlled trial. *Lancet.* 2015;385(9978):1642-1652. doi:10.1016/s0140-6736(15)60123-4
7. Leung J, McKenzie S, Martin J, Dobson A, McLaughlin D. Longitudinal patterns of breast cancer screening: mammography, clinical, and breast self-examinations in a rural and urban setting. *Womens Health Issues.* 2014;24(1):e139-146. doi:10.1016/j.whi.2013.11.005
8. Weaver DL, Rosenberg RD, Barlow WE, et al. Pathologic findings from the Breast Cancer Surveillance Consortium: population-based outcomes in women undergoing biopsy after screening mammography. *Cancer.* 2006;106(4):732-742. doi:10.1002/cncr.21652
9. Paquette D, Snider J, Bouchard F, et al. Performance of screening mammography in organized programs in Canada in 1996. The Database Management Subcommittee to the National Committee for the Canadian Breast Cancer Screening Initiative. *CMAJ.* 2000;163(9):1133-1138.
10. Mousavi SM, Montazeri A, Mohagheghi MA, et al. Breast cancer in Iran: an epidemiological review. *Breast J.* 2007;13(4):383-391. doi:10.1111/j.1524-4741.2007.00446.x
11. Fuller MS, Lee CI, Elmore JG. Breast cancer screening: an evidence-based update. *Med Clin North Am.* 2015;99(3):451-468. doi:10.1016/j.mcna.2015.01.002
12. Martínez-Alonso M, Carles-Lavila M, Pérez-Lacasta MJ, Pons-Rodríguez A, Garcia M, Rué M. Assessment of the effects of decision aids about breast cancer screening: a systematic review and meta-analysis. *BMJ Open.* 2017;7(10):e016894. doi:10.1136/bmjopen-2017-016894
13. van Agt H, Fracheboud J, van der Steen A, de Koning H. Do women make an informed choice about participating in breast cancer screening? a survey among women invited for a first mammography screening examination. *Patient Educ Couns.* 2012;89(2):353-359. doi:10.1016/j.pec.2012.08.003
14. Geller BM, Zapka J, Hofvind SS, et al. Communicating with women about mammography. *J Cancer Educ.* 2007;22(1):25-31. doi:10.1007/bf03174371
15. Huang RC, Auvinen A, Hakama M, et al. Effect of intervention on decision making of treatment for disease progression, prostate-specific antigen biochemical failure and prostate cancer death. *Health Expect.* 2014;17(6):776-783. doi:10.1111/j.1369-7625.2012.00802.x
16. Khammarnia M, Eskandari M, Alinezhade Ranjbar A, Ansari-Moghadam A, Peyvand M. Participation rate of cancer patients in treatment decisions: a cross sectional study. *J Health Lit.* 2017;2(3):156-63.
17. Whelan T, Levine M, Willan A, et al. Effect of a decision aid on knowledge and treatment decision making for breast cancer surgery: a randomized trial. *JAMA.* 2004;292(4):435-441. doi:10.1001/jama.292.4.435
18. Bahrami M, Taymoori P, Bahrami A, Farazi E, Farhadifar F. The prevalence of breast and cervical cancer screening and related factors in woman who refereeing to health center of Sanandaj city in 2014. *Zanco J Med Sci.* 2015;16(50):1-12.
19. Prochaska JO, Velicer WF, Rossi JS, et al. Stages of change and decisional balance for 12 problem behaviors. *Health Psychol.* 1994;13(1):39-46. doi:10.1037//0278-6133.13.1.39
20. Frosch DL, Légaré F, Fishbein M, Elwyn G. Adjuncts or adversaries to shared decision-making? Applying the integrative model of behavior to the role and design of decision support interventions in healthcare interactions. *Implement Sci.* 2009;4:73. doi:10.1186/1748-5908-4-73
21. Miller SM, Fleisher L, Roussi P, et al. Facilitating informed decision making about breast cancer risk and genetic counseling among women calling the NCI's Cancer Information Service. *J Health Commun.* 2005;10 Suppl 1:119-136. doi:10.1080/07366290500265335
22. Mathieu E, Barratt AL, McGeechan K, Davey HM, Howard K, Houssami N. Helping women make choices about mammography screening: an online randomized trial of a

- decision aid for 40-year-old women. *Patient Educ Couns*. 2010;81(1):63-72. doi:10.1016/j.pec.2010.01.001
23. Bourmaud A, Soler-Michel P, Oriol M, et al. Decision aid on breast cancer screening reduces attendance rate: results of a large-scale, randomized, controlled study by the DECIDEO group. *Oncotarget*. 2016;7(11):12885-12892. doi:10.18632/oncotarget.7332
  24. Montazeri A, Vahdaninia M, Harirchi I, et al. Breast cancer in Iran: need for greater women awareness of warning signs and effective screening methods. *Asia Pac Fam Med*. 2008;7(1):6. doi:10.1186/1447-056x-7-6
  25. Parsa P, Kandiah M, Abdul Rahman H, Zulkefli NM. Barriers for breast cancer screening among Asian women: a mini literature review. *Asian Pac J Cancer Prev*. 2006;7(4):509-514.
  26. Reder M, Kolip P. Does a decision aid improve informed choice in mammography screening? study protocol for a randomized controlled trial. *BMC Womens Health*. 2015;15:53. doi:10.1186/s12905-015-0210-5
  27. Stacey D, Légaré F, Lewis K, et al. Decision aids for people facing health treatment or screening decisions. *Cochrane Database Syst Rev*. 2017;4:CD001431. doi:10.1002/14651858.CD001431.pub5
  28. Alizadeh Sabeg P, Mehrabi E, Nourizadeh R, Poursharifi H, Mousavi S. The Effect of Counseling on Breast Cancer Awareness in Rural Iranian Women: a Randomized Controlled Clinical Trial. *J Cancer Educ*. 2019;34(6):1083-1091. doi:10.1007/s13187-018-1411-z

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