## **Supplemental Online Content**

Joshi S, Ramarajan L, Ramarajan N, et al. Effectiveness of a decision aid plus standard care in surgical decision-making among patients with early breast cancer: a randomized clinical trial. *JAMA Netw Open*. 2023;6(1):e2335941. doi:10.1001/jamanetworkopen.2023.35941

**eFigure.** Snapshot of the Navya-PPT a) pictorial depiction of breast conservation surgery and mastectomy as a part of the decision aid, b) snapshot of conjoint analysis tool, and c) Research Questionnaire (RQ)- subscale- 16-point questions related to the primary end point, Decisional Conflict Scale (DCS)

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This supplemental material has been provided by the authors to give readers additional information about their work.

Information About Breast Cance	Treatme	ant a	Considering the	option you	prefer, plea	se answer the	e following o	uestions: C
Mastectomy	Breast	Conservation Therapy (BCT)		Strongly Agree	Somewhat Agree	Neither Agree Nor Disagree	Somewhat Disagree	Strongly Disagree
OK CO	A	· · · · · ·	I know what options are available to me	$\bigcirc$	•	$\bigcirc$	$\bigcirc$	$\bigcirc$
0-1-71			I know the benefits of each option	$\bigcirc$	0	$\bigcirc$	$\bigcirc$	0
Pantaritha agessive Modified radical mastactomy	Langectan	yarfal nualisclaray Adlay lyngit node dasecter	I know the risks and side effects of each option	$\bigcirc$	$\bigcirc$	•	$\bigcirc$	0
MASTECTOMY: Removal of the whole breast and the BREAST CONSERVATION THERAPY: Removal of surrounding the tumour from all sides and lymph no	I am clear about which benefits matter most to me	0	0	•	0	0		
followed by radiation. Whole breast reconstruction is an option after mast duration of surgery, an additional cost and a scar in		Strongly Agree	Somewhat Agree	Neither Agree Nor Disagree	Somewhat Disagree	Strongly Disagree		
	-	100%	I am clear about which risks and side effects matter most to me	0	0	0	0	$\bigcirc$
I you did not have to worry about anything els Mastectomy side effects, which may include:	e and only n	eed to focus on two things, what do you prefer?	I am clear whether benefits matter more to me or the risks and side effects matter more				•	
<ol> <li>pain in the scar for a long period of time,</li> <li>numbness and tenderness along the scar, and</li> <li>acceleration of finite all stars (second black)</li> </ol>		Lumpectomy side effects, which may include: 1. less pain and scarring than Mastectomy	I have enough support from others to make a choice	0	0	0	0	0
chest. There is a 30% chance (i.e.1 out of 3, or small to medium chance) that you will need radiation	or	You will definitely need radiation therapy and experience radiation side effects, which may include: sore and painful skin in the treatment area, pigmentation in the skin	I am choosing without pressure from others	0		•		0
therapy and experience radiation side effects, which may include: sore and painful skin in the treatment area				Strongly Agree	Somewhat Agree	Neither Agree Nor Disagree	Somewhat Disagree	Strongly Disagree
High cost 50% higher than the cost of Mastectomy. 4-6 weeks of radiation therapy will be needed. There is a 70% chance i.e. 2 out of 3,		Low cost There is a 30% chance that 4-6 weeks of radiation therapy will be needed i.e. 1 out of 3, or small to medium chance, that your treatment	I have enough advice to make a choice	0	•	•	•	0
will take 4-6 weeks longer than Mastectomy		will take 4-6 weeks longer to end.	I am clear about the best choice for me	0	0	0	0	0
Strongly Somewhat Prefer Left	Indifferent	Somewhat Strongly Prefer Right Prefer Right	I feel sure about what to choose	0	0	0	0	0

### eFigure. Materials

Snapshot of the Navya-PPT a) pictorial depiction of breast conservation surgery and mastectomy as a part of the decision aid, b) snapshot of conjoint analysis tool, and c) Research Questionnaire (RQ)- subscale- 16-point questions related to the primary end point, Decisional Conflict Scale (DCS)

	Univariable	Multivariable
	Coefficient (St. Error)	Coefficient (St. Error)
Solo (Arm 2)	24 <sup>a</sup> (0.13)	57° (0.16)
Joint (Arm 3)	31 <sup>b</sup> (0.14)	66° (0.16)
Age (>50 years)	06 (0.13)	.00 (0.13)
Education (>12 <sup>th</sup> class)	05 (0.13)	21 (0.18)
KI (≥16)	00 (0.13)	.06 (0.18)
API-DM	09 (0.06)	06 (0.07)
TEGR	07 (0.06)	10 (0.08)
CG	13 (0.06)	10 (0.07)
PT Size	.16 (0.14)	.15 (0.14)
Solo/Arm 2 and Joint/Arm 3 v	vere measured as dummy varia	ables; the base category is the

eTable 1. Univariable and Multivariable Regression Analysis of Prediction of DCS

Control/Arm 1 condition. Age, Education, KI, and PT Size were measured as binary

variables.

<sup>a</sup> p < 0.10, <sup>b</sup> p < 0.01, <sup>c</sup> p < 0.001.

	М	SD	1	2	3	4	5	6	7	8	9	10
1. Patient's												
Age [%	.38	.49										
>50 years]												
2. Patient's												
Education	.54	.50	04									
[% > 12 <sup>th</sup> ]												
<b>3.</b> KI [% ≥	41	49	06	67ª								
16]		>	.00	.07								
4. PT Size	69	47	- 04	- 02	- 13	—						
[% > 2]	.07	/	04	02	15							
5.												
Husband's	1.63	.48	.11	.50ª	.38ª	.02						
Education												
6. Number												
of	1.96	.92	.19ª	26ª	20ª	.07	11	—				
Children												
7. DCS	1.43	.61	07	.11	.10	-	03	06	α = .94			
						.03						
8. API-DM	4.38	.78	03	19 <sup>a</sup>	23ª	.05	10	.10	09	$\alpha = .73$		
9. TEGR	3.45	1.18	.02	- 38ª	31ª	.06	-	.21ª	- 07	.37 <sup>a</sup>	a = .76	
							.26ª	.21				

eTable 2. Correlations of variables in the Research Questionnaire

10.00	1 12	Q1	01	15 <sup>b</sup>	1 <b>7</b> a	.04	11	11	12 <sup>b</sup>	76ª	<b>77</b> ª	α =
10. CG	4.42	.01	01	13	1/		11	.11	15	.20	.27	.66
<sup>a</sup> $p < .01$ , <sup>b</sup> $p < 0.05$ Pairwise correlations with binary variables (Variables 1 to 5) report Spearman's												
rho; all other pairings report Pearson's rho.												
Directionality of scales: API-DM-higher is less desire for autonomy; TEGR-higher is more												
traditional beliefs about gender roles; CG-higher is greater commitment to caregiving												
responsibiliti	es.											

eTable 3. Means and Standard Deviations of Secondary Endpoints by Experimental Arm

Variable	Control (Arm 1)		So (Arr	lo n 2)	Jo (Arı	int n 3)	Total	
	Μ	SD	Μ	SD	М	SD	Μ	SD
API-DM	4.48	0.75	4.28	0.84	4.39	0.75	4.38	0.78
TEGR	4.03	0.79	3.79	0.81	3.73	0.99	3.85	0.87
CG	4.41	0.78	4.47	0.73	4.37	0.91	4.42	0.81
Preference/Surgery Match	0.58 0.50		0.71	0.46	0.75	0.43	0.68	0.47

# eAppendix 1. Additional Psychological Scales assessed in the Research Questionnaire – API-DM, TEGR and CG

Examples of API-DM indicating less desire for autonomy were 6 items with higher scores; a sample item being 'your doctor should make important decisions and not you', TEGR – 6 items with higher scores indicating more traditional belief; a sample item being 'Ultimately, woman should submit to her husband's decision'; and CG – 4 items with high scores indicating stronger commitment to caregiving responsibilities; a sample item being 'I believe it is my duty as a wife to take care of my mother-in-law'. All items were measured on a 5-point Likert scale, where 1 = 'Strongly disagree' and 5 = 'Strongly agree, with mean score being calculated for each scale.

### eAppendix 2. Validation of Psychological Scales in the RQ

Quality of a scale is traditionally evaluated in terms of validity; the extent to which an instrument measures what it claims to measure, rather than something else and reliability; the extent to which an instrument can be expected to give the same measured outcome when measurements are repeated(38). We measured several constructs and examined their associations. We found a high internal reliability of the psychological scales in the study. Importantly, results suggest that DCS was correlated with other variables in theoretically expected ways, providing some external validation as well.

Internal reliability of all scales was appropriate, as measured with Cronbach's alpha: Autonomy Preference Index—Decision-Making (API-DM) subscale ( $\alpha = 0.73$ ), Traditional-Egalitarian Gender Role (TEGR) ( $\alpha = 0.76$ ), and Caregiving (CG) ( $\alpha = 0.66$ ). Correlations in the dataset were consistent with prior research and trends expected in the real world. As shown in **eTable 2**, higher educational level of the patient was negatively associated with API-DM (higher is less desire for decision-making) (r=-0.19, p<0.01), as was higher SES (r=-0.23, p<0.001), suggesting more desire for involvement in DM. Higher TEGR scores (more traditional) were associated with less education (r=-0.38, p<0.01), lower SES (r=-0.31, p<0.01), less education of the patient's husband (r=-0.26, p<0.01) and having more children (r=0.21, p<0.01). CG was associated with less education of the participant (r=-0.15, p<0.05) and lower SES (r=-0.17, p<0.01).

Examining the correlations between the scales, TEGR (higher is more traditional) is significantly associated with API-DM (higher is less desire for decision-making) (r=0.37, p<0.01), suggesting more traditional beliefs about gender roles are associated with less desire for participation in DM. Greater CG were also positively associated with API-DM (r=0.26, p<0.01) and TEGR (r=0.27, p<0.001), suggesting less desire for involvement in DM and more traditional gender role beliefs. DCS was negatively correlated with CG (r=-0.13, p<0.05), and was not significantly correlated with API-DM nor TEGR. There was no significant interaction between TEGR and treatment arm. CG had a marginally significant interaction with Arm 2 (Solo) (B = -.22, p = .06). As a robustness check of experimental condition on DCS, we conducted ANCOVAs to control for other variables. In an ANCOVA with both demographic and scale variables (F(10, 199) = 2.92, p < .01), treatment arm remains a significant predictor of DCS (F(2,199) = 9.17, p < .001).

We also examined an exploratory hypothesis specifically about API-DM, to examine whether patients with lower autonomy preference may have experienced lower decisional conflict when in the joint condition and found a marginally significant interaction with Arm 3 (Joint) in predicting DCS (B = -.21, p = .09). These findings suggest potential role of SDM (Arm 3 conditions) in patients with lower preference for autonomy.

#### eAppendix 3. Preference surgery match

Of the 242 patients who expressed their preferences for type of surgery, 70% patients said they want lumpectomy, 15% said they want mastectomy, and 15% said they were unsure (**eTable 3**). Overall, 202 patients received BCS, and 30 patients received MRM. However, a chi square analysis of patient's preferences (overall  $X^2(4, N=242) = 6.67$ , p = .15) indicated that a greater proportion of patients reported being unsure of their preference in Arm 1 (Control) (22.8%) compared to those in Arm 2 (Solo) (9.6%), a difference significant at the *p*<0.05 level. This result is consistent with the higher decisional conflict scores in Arm 1 (Control). Though Arm 3 (Joint) (12.5%) trended similarly as Arm 2 (Solo), the proportion of unsure patients in Arm 1 (Control) and Arm 3 (Joint) were not significantly different from each other.

Furthermore, 82.4% ( $\pm$  6%) of patients underwent surgery of choice as determined by Navya-PPT. As shown in **eTable 3**, we conducted a chi square analysis to determine if proportions of preference/surgery match differed between the three conditions ( $X^2(2, N=229)=5.77, p=0.056$ ); results indicated that patients in Arm 3 (Joint) were more likely to receive surgery that matched their preference (75%) than patients in Arm 1 (Control) (58%). Patients in Arm 2 (Solo) followed a similar pattern (71% match in Arm 2 vs. 58% match in Arm 1), although this was not significantly different at the 5% level.

We further conducted exploratory analyses to understand the relationship between the experimental conditions, DCS and matching of surgery with patient's preferences. We found that those who experienced surgery that matched their preference also reported significantly lower DCS ( $M_{match} = 1.32 < M_{mismatch} = 1.71$ , F(1,227) = 22.12, p<0.001).