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Canadian Women's Attitudes Toward Receiving Personalized Breast Cancer Risk Information: Insights From the PERSPECTIVE I&I Project

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Abstract

In a Canadian study of 3319 women aged 40 to 69, most responded positively to receiving personalized breast cancer risk categories and screening plans. While "easing worry" was commonly perceived as an advantage, higher-risk and marginalized groups reported more concerns. Findings highlight the need for clear communication and tailored support to ensure effective implementation of risk-stratified screening.

Background: Risk-stratified breast cancer screening has been proposed as an alternative to the age-based approach currently used by most screening programs. This study, part of the Canadian PERSPECTIVE I&I project, examined perceived advantages and disadvantages of learning your breast cancer risk category and associated screening plans. **Method:** Women aged 40 to 69 from Ontario and Quebec ($N = 3319$) had multifactorial risk assessments using the CanRisk tool. Risk categories (average [78.9%], higher than average [16.4%], high [4.6%]) were communicated along with screening plans. Participants completed questionnaires on attitudes toward learning their risk before, at the time of, and 1 year later risk communication. Participant characteristics associated with these attitudes were assessed using multinomial logistic regression. **Results:** At the time of risk communication, most participants (72.9%) perceived "Easing worry" as an advantage of learning their risk. However, participants at higher risk were more likely to report that it did not ease their worry. Visible minority participants (OR = 1.86, 95% CI, 1.16, 2.98) and those with lower education attainment were more likely to view "complicated information" as a disadvantage (College/Apprenticeship/Trades: OR = 1.54, 95% CI, 1.24, 1.92; High School or below: OR = 1.77, 95% CI, 1.29, 2.42). Ontario participants were more likely to view risk communication as "information I do not want to know" (OR = 0.44, 95% CI, 0.32, 0.59) compared to Quebec partici-

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pants. **Conclusion:** Most women responded positively to learning their breast cancer risk category and screening plan. Successful implementation of risk-stratified screening will require clear communication, healthcare provider support, and adaptation to regional resources.

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Keywords: Breast cancer risk-stratified screening, Breast screening, Personalized risk communication, Perceived risk, Risk prediction

Introduction

Breast screening with mammography can detect cancers early, reducing cancer treatment burden, morbidity and mortality.[1-3] All Canadian provinces/territories, except for Nunavut, have organized breast screening programs.[4,5] These programs vary in their approach, with start ages between 40 and 50 years old and some including designated programs for individuals at high-risk (eg, Ontario, Nova Scotia).[5]

Risk-stratified breast screening tailors screening initiation age, frequency, and modality based on multiple risk factors such as age, family history, mammographic density, and lifestyle factors.[6-10] It complements the age-based screening approach to improve the benefit-harm ratio of breast cancer screening by recommending earlier and more frequent screening for those at higher risk and reducing unnecessary interventions for those at lower risk.[11-15]

While few Canadian studies have described individuals' potential attitudes towards risk-stratified screening,[16,17] none have examined views on receiving actual personalized breast cancer risk level information. The Canadian PERSPECTIVE I&I project (Personalized Risk Assessment for Prevention and Early Detection of Breast Cancer: Integration and Implementation) aimed to improve personalized risk assessment and examine key factors for the successful implementation of risk-stratified screening in Canada.[18] This paper, focuses on perceived advantages and disadvantages of receiving personalized breast cancer risk information and a corresponding screening plan.

Materials and Methods

The objectives and recruitment methods of the PERSPECTIVE I&I project have been published previously.[18,19] Recruitment and data collection were completed at baseline (Questionnaire 1 [Q1], July 2019-December 2021), risk communication (Q2, March 2020-October 2022), and 1-year following risk communication (Q3, April 2021-August 2023).

Participants were eligible if they were female, between 40 and 69 years old, living in Ontario or Quebec, and had at least 1 mammogram. Individuals with a personal history of breast/ovarian/pancreatic cancer, prior mastectomy, known high risk of breast cancer, genetic testing or genetic counselling for breast cancer, were ineligible. Ontario individuals with breast implants are ineligible for the Ontario Breast Screening Program (OBSP) and thus were also excluded from this study. Since Quebec does not have a high risk program, all participants were required to have a primary healthcare provider (HCP) or nurse practitioner (NP) to discuss risk information in case they were identified as high risk.

Ontario participants aged 50 to 69 were recruited from 6 OBSP sites, while participants aged 40 to 49 in Ontario and participants aged 40 to 69 from Quebec were recruited through mammography centers, traditional media (eg, TV, radio), social media, and email listservs of affiliate organizations. Participants provided a saliva sample as a DNA source for a clinical-grade genetic test to estimate their breast cancer polygenic risk score (PRS),[20,21] and consented to the disclosure of breast density information from their medical record.

Age-specific 10-year breast cancer risk estimates were generated using the multifactorial CanRisk prediction tool[7,22] and risk categories based on remaining lifetime risk (RLT) anchored at age 30, as average (< 15%), higher than average (15%-< 25%) or high risk (≥ 25%).[19,23]

Participants received personalized risk letters containing their estimated risk and proposed screening action plans. Estimated breast cancer risk was communicated as a risk category (average, higher than average, and high). They were also told how many women in their risk category out of 1000 might get breast cancer in 10 years, and how their risk compared to other women their age. Ontario participants received this information by mail, while Quebec participants received it through their personal portal on the project's web platform. In Quebec, the individual's HCP or NP also received the risk letter and screening action plan. Ontario participants at high risk were provided genetic counselling and further follow-up through the High Risk OBSP. In Quebec, a study nurse called to review their risk category with them and was available to answer questions. Details on risk communication procedures according to risk categories have been published.[18]

Participants completed questionnaires at 3 time points (baseline, risk communication and 1-year after risk communication) assessing their attitudes toward learning about their risk. The questionnaire was adapted from previous research on women's attitudes towards receiving breast cancer risk information[24,25] using the Predisposing, Reinforcing, and Enabling Constructs in Educational Diagnosis and Evaluation (PRECEDE) model.[26] Questionnaires were pilot tested internally and within the Ontario and Quebec study populations.[19] For this study, participants were asked about how much they agreed with the perceived advantages (eg, "Informing family about breast cancer risk") and disadvantages (eg, "Getting information that could leave me feeling helpless") of receiving personalized risk information. These questions were used in previous research on the same topic.[24,25] Responses were captured on a 5-point Likert scale: (1) Very unlikely, (2) Unlikely, (3) Neither unlikely nor likely, (4) Likely, (5) Very likely, collapsed into 3 categories:(1) Very unlikely/unlikely,

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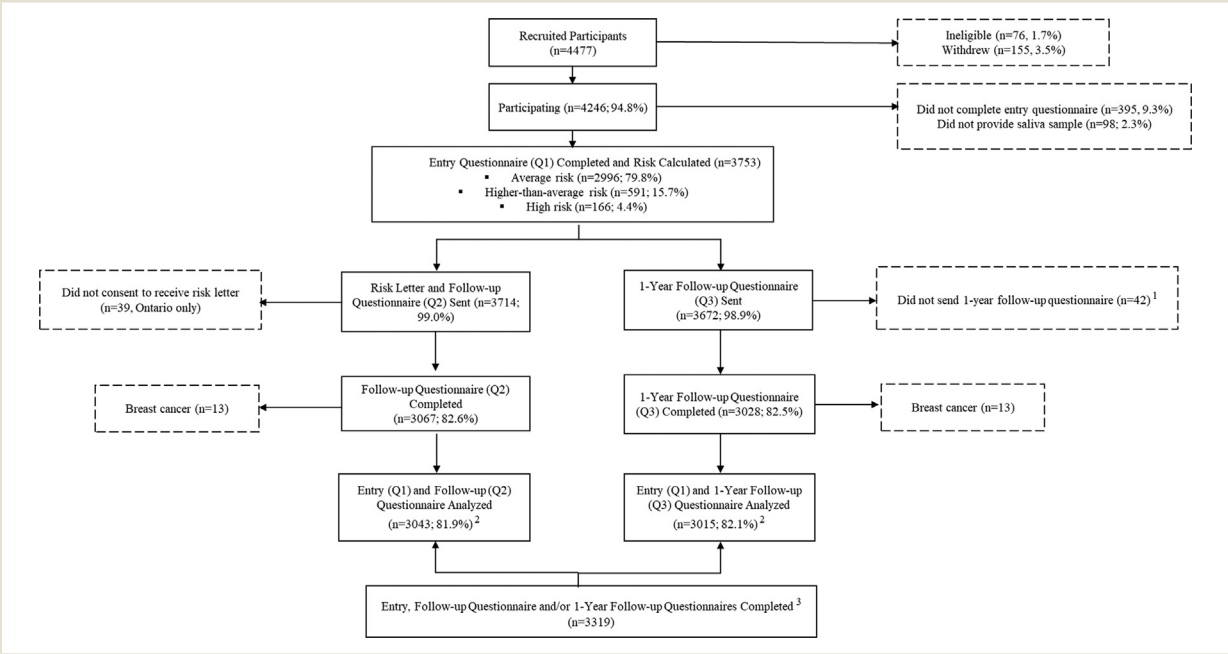
Figure 1 Recruitment, data collection and 1-year follow-up of Quebec and Ontario PERSPECTIVE I&I participants aged 40 to 69 years between July 2019 and August 2023. 1. One-Year Follow-up Questionnaire was not sent to $n = 42$ participants: those who withdrew at risk communication ($n = 22$), died ($n = 2$), moved out of province ($n = 3$), never consulted their risk level letter ($n = 2$) or were diagnosed with breast cancer before the 1-Year Follow-up Questionnaire ($n = 13$). 2. Participants who completed a follow-up questionnaire (Q2) and also reported a breast cancer diagnosis at risk communication ($n = 12$) or at 1-year follow-up ($n = 12$) were excluded. 3. Among participants who had their risk assessed ($n = 3753$), a total of $n = 434$ were excluded: those who only completed the entry questionnaire ($n = 340$); those diagnosed with breast cancer at the time of risk communication ($n = 13$) or at 1-year follow-up ($n = 13$); those who did not consent to receiving their risk letter (Ontario only, $n = 39$), those who were not sent the 1-year follow-up questionnaire due to withdrawal at Q2 ($n = 22$), death ($n = 2$), relocation to a different province ($n = 3$), or who never consulted their risk letter ($n = 2$), leaving $n = 3319$ eligible participants who completed the entry questionnaire and either one or both of the follow-up questionnaires.



(2) Neither unlikely nor likely and (3) Likely/very likely for clarity.

The distribution of characteristics of the study population were examined overall and by estimated risk category for those who completed Q1 and either one or both follow-up questionnaires (Figure 1). Changes in perceived advantages and disadvantages from Q1-Q2-Q3 were described using Sankey plots (Figure 2).

For advantages and disadvantages that showed greater variation and/or differences across the 3 timepoints, multinomial logistic regression (generalized logit) was used to estimate odds ratios (OR) and 95% confidence intervals (CI) identifying characteristics associated with these perceptions. For advantages, "Very likely/likely" was used as the reference category. For disadvantages, "Very unlikely/unlikely" was used as reference as these were the most common responses.

Analyses were conducted for 3 perceived advantages of receiving personalized risk category information: "Easing my worry about breast cancer risk," "Informing my family about breast cancer risk" and "Knowing how to plan for the future" and 5 perceived disadvantages: "Getting information that could cause worry about the future," "Getting information I don't want to know," "Getting information that could leave me feeling helpless," "Getting complicated information that I won't understand," "Getting information that could cause worry in my family."

Predictor variables included study site (Ontario and Quebec), estimated risk category, age, family history of breast and ovarian cancer, race or ethnicity, marital and employment status, and education. Only variables with a P-value $< .25$ in univariate analyses were included in multivariable models. Complete-case analyses ($N = 3043$) were performed using SAS software (RRID:SCR_008567), Version 9.4 of the SAS System for Windows (SAS Institute Inc. Cary, NC, USA), using 2-tailed tests with a 5% threshold for statistical significance. The Research Ethics Boards of the CHU de Québec-Université Laval and the University of Toronto approved this study.

Results

Out of 4477 recruited participants, 3753 completed Q1 questionnaire and had their breast cancer risk estimated (Figure 1). A total of 434 (11.6%) participants were excluded. Reasons for exclusion include, incomplete follow-up ($n = 340$), not consent-

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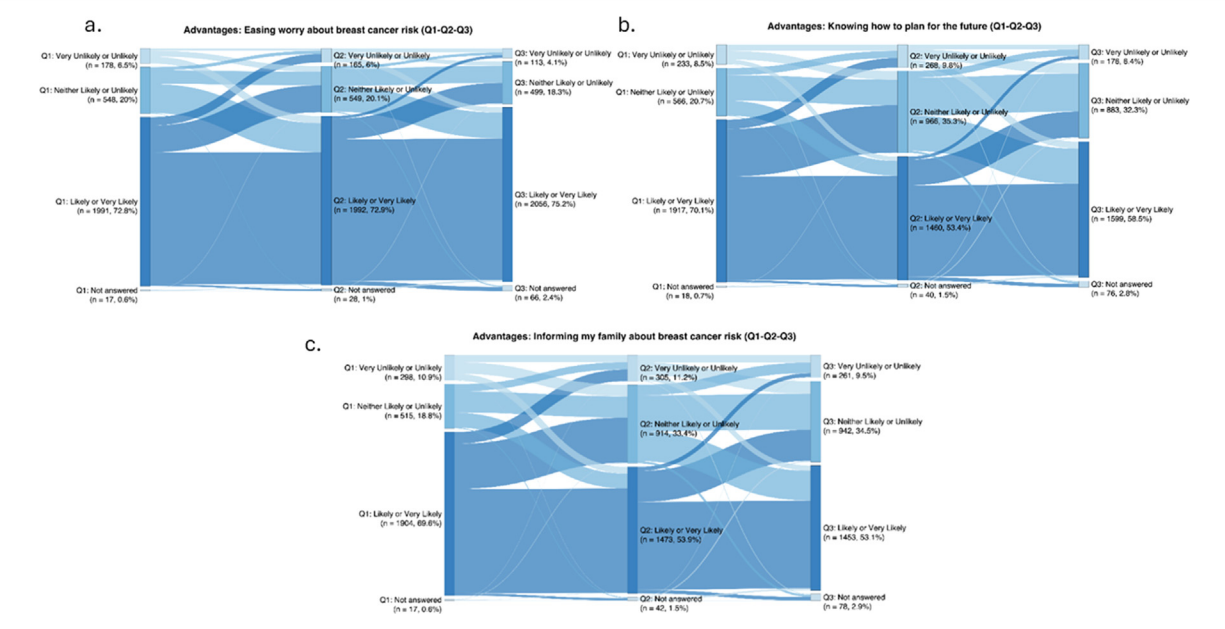
Figure 2 Sankey graphs of selected advantages of receiving personalized breast cancer risk information before (Q1), at the time of (Q2), and 1-year after risk communication (Q3).



ing to receive risk information (Ontario only, $n = 39$), breast cancer diagnosis at Q2 or Q3 ($n = 13$ and $n = 13$ respectively), withdrawal ($n = 22$), death ($n = 2$), relocation outside of Quebec and Ontario ($n = 3$), or not accessing their risk letter ($n = 2$). This left a final sample of 3319 participants in the final analysis who had completed the baseline questionnaire (Q1) and either one or both of the follow-up questionnaires (Q2 and Q3) (Figure 1).

At baseline (Q1), 14.5% of participants were 40 to 49 years old, 40.6% were 50 to 59 and 44.9% were 60 to 69 (Table 1). Most participants (78.9%) were found to be at average risk and had no family history of breast/ovarian cancer (45.8%). Most identified as White (93.9%), held a bachelor's degree or above (51.7%), were employed (61.0%) and were married/common law (75.6%) (Table 1).

Perceived Advantages of Receiving Personalized Breast Cancer Risk Category Information

At the time of risk communication (Q2), most participants reported that "Gaining health knowledge" (95.6%), "Know what symptoms to take seriously," (94.6%), "Guide screening decisions" (92.0%), and "Informing lifestyle changes" (86.4%) were advantages of learning about their breast cancer risk category (Supplemental Figure 1A-D). Fewer participants viewed "Easing worry" (72.8%), "Planning for the future" (70.1%), and "Informing family" (69.6%) as advantages (Figure 2A-C) (Supplemental Tables 1 and 2).

Due to greater variability in how participants perceived "Easing worry," "Informing family," and "Planning for the future" as advantages (Figure 2A-C), multinomial logistic regression was used to examine factors associated with these differences (Table 2).

Advantage 1: "Easing My Worry About Breast Cancer Risk". Participants at higher than average (OR = 8.89, 95% CI, 6.09, 12.96) and high risk (OR = 21.11, 95% CI, 12.48, 35.71) were more likely than those at average risk to say that "Easing worry" was not an advantage. In contrast, participants with lower educational attainment were more likely to view "Easing worry" an advantage compared to those with a bachelor's degree or above (College/Registered Apprenticeship/Trades Certificate: OR = 0.66, 95% CI, 0.46, 0.94; High school diploma or below: OR = 0.52, 95% CI, 0.28, 0.94) (Table 2).

Advantage 2: "Informing My Family About Breast Cancer Risk". Quebec participants were twice as likely as those from Ontario to report that "Informing family" was not an advantage (OR = 2.06, 95% CI, 1.58, 2.66) (Table 2). Additionally, participants at higher than average risk, but not high risk, were twice as likely as those at average risk to say that knowing their risk did not help inform their family about breast cancer risk (OR = 1.96, 95% CI, 1.44, 2.65). Widowed/divorced/single participants were less likely than married/common law participants to view "Informing family" as an advantage (OR = 1.87, 95% CI, 1.43, 2.45) (Table 2).

As with Advantage 1 (Easing worry), participants with lower educational attainment were more likely than those with a bachelor's degree or above to view "Informing family" as an advantage (College/Registered Apprenticeship/Trades Certificate: OR = 0.62, 95% CI, 0.47, 0.82; High school diploma or below: OR = 0.51, 95% CI, 0.33, 0.80) (Table 2). Participants who identified as visible minorities were also more likely to perceive "Informing family" as an advantage than those who did not identify as such (OR = 0.35, 95% CI, 0.15, 0.82) (Table 2).

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Table 1 Sociodemographic and Health Characteristics of PERSPECTIVE I&I Participants Aged 40 to 69 Who Had Their Breast Cancer Risk Assessed and Who Completed the Baseline Questionnaire (Q1) and at Least 1 Follow-Up Questionnaires (Q2 and/or Q3) Overall and by Risk Category ($N = 3319$)

Characteristics	Total $N = 3319$		Average Risk $N = 2620$ (78.9%)		Higher Than Average Risk $N = 545$ (16.4%)		High Risk $N = 154$ (4.6%)	
	N	%	N	%	N	%	N	%
Study site								
Quebec	1578	47.5	1178	45.0	286	52.5	114	74.0
Ontario	1741	52.5	1442	55.0	259	47.5	40	26.0
Age group at risk assessment (years)								
40-49	480	14.5	320	12.2	102	18.7	58	37.7
50-59	1349	40.6	1044	39.9	237	43.5	68	44.2
60-69	1490	44.9	1256	47.9	206	37.8	28	18.2
Family history of breast and/or ovarian cancer								
First- and second-degree	377	11.4	192	7.3	120	22.0	65	42.2
First-degree only	529	15.9	376	14.4	117	21.5	36	23.4
Second-degree only	894	26.9	705	26.9	155	28.4	34	22.1
None	1519	45.8	1347	51.4	153	28.1	19	12.3
Born in Canada								
Yes	2878	87.2	2279	87.5	467	86.0	132	86.3
No	424	12.8	327	12.5	76	14.0	21	13.7
Missing[a]	17		14		2		1	
Visible minority group membership								
Not a visible minority[b]	3056	93.9	2431	94.6	487	90.9	138	91.4
Visible minority	200	6.1	138	5.4	49	9.1	13	8.6
Missing[a]	63		51		9		3	
Highest level of education								
University bachelor's degree or above	1706	51.7	1314	50.5	293	53.9	99	65.1
College/registered apprenticeship/trades certificate	1178	35.7	942	36.2	196	36.0	40	26.3
high school diploma or below	413	12.5	345	13.3	55	10.1	13	8.6
Missing[a]	22		19		1		2	
Employment status								
Employed	2017	61.0	1545	59.2	352	64.9	120	77.9
Not employed	221	6.7	165	6.3	43	7.9	13	8.4
Retired	1068	32.3	900	34.5	147	27.1	21	13.6
Missing[a]	13		10		3		0	
Marital status								
Married/common law	2491	75.6	1975	75.9	402	74.7	114	74.5
Single/widowed/ divorced/separated	803	24.4	628	24.1	136	25.3	39	25.5
Missing[a]	25		17		7		1	
Overall health								
Excellent/very good/good	3161	95.5	2496	95.5	517	95.2	148	96.1
Fair/poor	149	4.5	117	4.5	26	4.8	6	3.9
Missing[a]	9		7		2		0	

[a] Missing category includes "Prefer not to answer" and "Do not know" responses.
[b] Not a visible minority category includes participants who identified as White, Indigenous, Indigenous and White, White and Arab, White and Latin American, White and West Asian.

Advantage 3: "Planning for the Future". Participants from Quebec were 3.5 times more likely than Ontario participants to say that knowing their risk category did not help them "Plan for the future" (OR = 3.55, 95% CI, 2.59, 4.88) (Table 2). Widowed/divorced/single participants were also less likely to view this as an advantage, compared to individuals who were married/common law (OR = 1.67, 95% CI, 1.25, 2.23).

Again, participants with lower educational attainment (OR = 0.67, 95% CI, 0.50, 0.90) or who were visible minorities (OR = 0.22, 95% CI, 0.06, 0.76) were more likely to perceive "Planning for the future" as an advantage (Table 2).

Perceived Disadvantages of Receiving Personalized Breast Cancer Risk Category Information. At the time of risk communication

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Table 2 Multinominal Logistic Regression Models Examining the Relationship Between Sociodemographic and Health Characteristics and Perceived Advantages of Receiving Personalized Risk Category Information at the Time of Risk Communication (Q2)

Characteristic	Easing My Worry About Breast Cancer Risk ($N = 2880$)			Informing Family About Breast Cancer Risk ($N = 2814$)			Planning for the Future ($N = 2780$)		
	Odds Ratio (95% CI)			Odds Ratio (95% CI)			Odds Ratio (95% CI)		
	Very Likely/Likely[a] ($n = 2108$)	Neither Likely Nor Unlikely ($n = 590$)	Very Unlikely/Unlikely ($n = 182$)	Very Likely/Likely[a] ($n = 1544$)	Neither Likely Nor Unlikely ($n = 956$)	Very Unlikely/Unlikely ($n = 314$)	Very Likely/Likely[a] ($n = 1505$)	Neither Likely Nor Unlikely ($n = 992$)	Very Unlikely/Unlikely ($n = 283$)
Study site									
Quebec vs. Ontario	1.00	1.26 (1.02, 1.55)[b]	1.36 (0.94, 1.99)	1.00	1.62 (1.37, 1.92)[b]	2.06 (1.58, 2.66)[b]	1.00	2.12 (1.75, 2.56)[b]	3.55 (2.59, 4.88)[b]
Risk category									
Higher than average risk vs. average risk	1.00	3.29 (2.59, 4.18)[b]	8.89 (6.09, 12.96)[b]	1.00	1.35 (1.08, 1.68)[b]	1.96 (1.44, 2.65)[b]	1.00	0.76 (0.60, 0.96)[b]	1.07 (0.76, 1.50)
High risk vs. average risk	1.00	3.77 (2.42, 5.89)[b]	21.11 (12.48, 35.71)[b]	1.00	0.83 (0.56, 1.23)	1.31 (0.79, 2.19)	1.00	0.65 (0.43, 0.97)[b]	0.57 (0.30, 1.08)
Age (years)									
40-49 vs. 50-59	1.00	0.69 (0.50, 0.94)[b]	1.02 (0.63, 1.63)	—	—	—	1.00	0.83 (0.63, 1.08)	0.92 (0.63, 1.34)
60-69 vs. 50-59	1.00	0.92 (0.73, 1.17)	1.22 (0.79, 1.89)	—	—	—	1.00	0.91 (0.74, 1.13)	0.91 (0.64, 1.30)
Family history of breast and/or ovarian cancer									
First- and second-degree vs. none	1.00	0.71 (0.51, 0.99)[b]	0.70 (0.42, 1.19)	—	—	—	1.00	1.13 (0.85, 1.51)	1.12 (0.72, 1.76)
First-degree only vs. none	1.00	0.69 (0.51, 0.92[b]	0.78 (0.48, 1.28)	—	—	—	1.00	0.96 (0.75, 1.23)	0.99 (0.66, 1.48)
Second-degree only vs. none	1.00	0.92 (0.73, 1.15)	1.19 (0.79, 1.79)	—	—	—	1.00	1.05 (0.86, 1.29)	1.25 (0.91, 1.71)
Marital status									
Widowed/divorced/single vs. married/common law	—	—	—	1.00	1.26 (1.04, 1.52)[b]	1.87 (1.43, 2.45)[b]	1.00	1.06 (0.87, 1.29)	1.67 (1.25, 2.23)[b]
Visible minority group membership									
Visible minority vs. not a visible minority[c]	—	—	—	1.00	0.89 (0.61, 1.30)	0.35 (0.15, 0.82)[b]	1.00	0.53 (0.33, 0.85)[b]	0.22 (0.06, 0.76)[b]
Born in Canada									
Born outside of Canada vs. born in Canada	—	—	—	—	—	—	1.00	1.08 (0.80, 1.47)	0.97 (0.56, 1.70)
Highest level of education									
College/registered Apprenticeship/trades certificate vs. university bachelor's degree or above	1.00	0.90 (0.73, 1.10)	0.66 (0.46, 0.94)[b]	1.00	0.83 (0.69, 0.99)[b]	0.62 (0.47, 0.82)[b]	1.00	1.00 (0.84, 1.20)	0.67 (0.50, 0.90)[b]
High school diploma or below vs. university bachelor's degree or above	1.00	0.83 (0.61, 1.13)	0.52 (0.28, 0.94)[b]	1.00	0.82 (0.63, 1.07)	0.51 (0.33, 0.80)[b]	1.00	0.83 (0.63, 1.09)	0.65 (0.41, 1.02)

[a] Reference category.
[b] Significant odds ratio at $P < .05$. The model also included employment status, overall health at baseline (Q1) and health at the time of risk communication (Q2) (results not shown).
[c] Not a visible minority category includes participants who identified as White, Indigenous, Indigenous and White, White and Arab, White and Latin American, White and West Asian.

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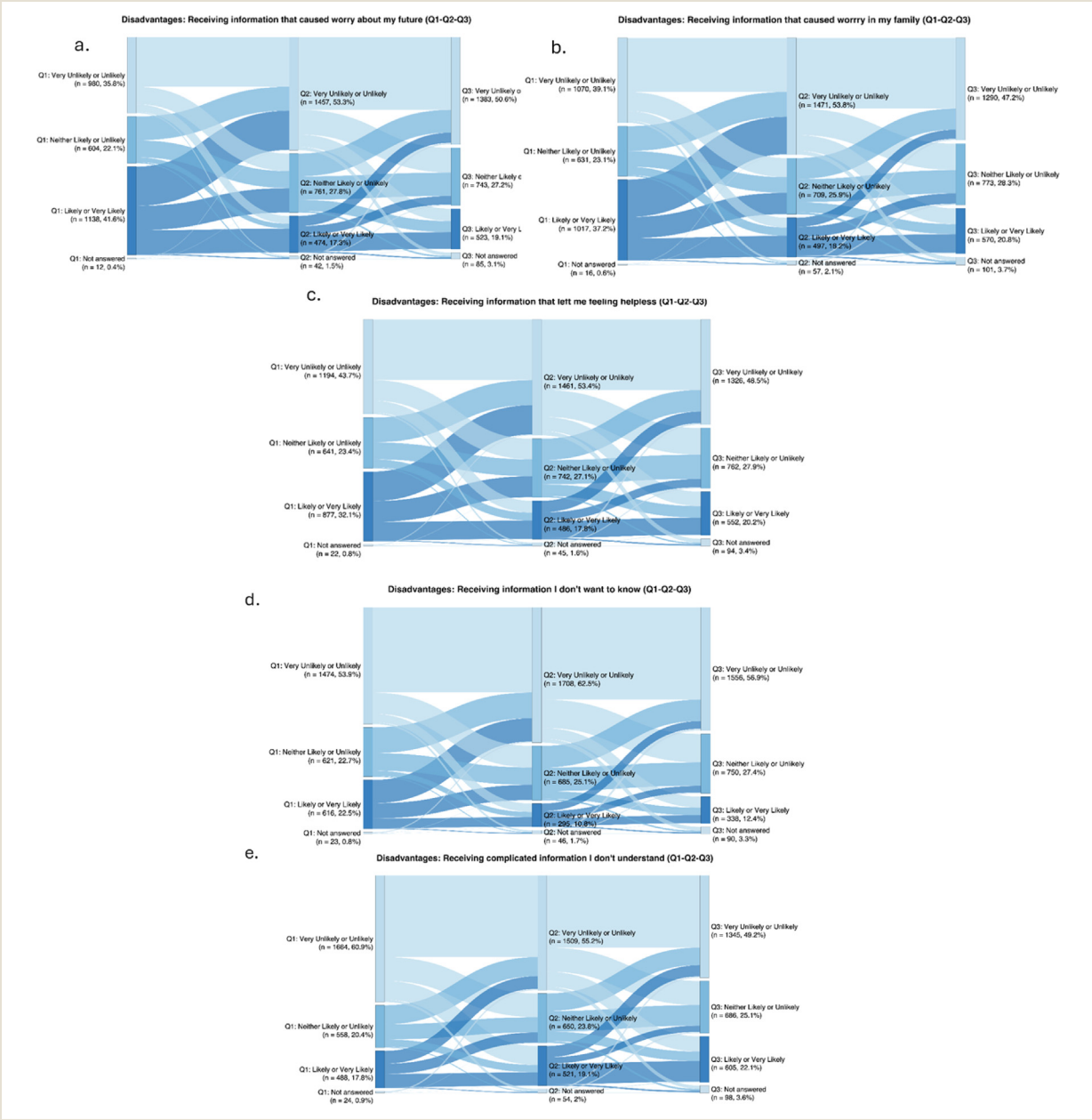
Figure 3 Sankey graphs of perceived disadvantages of receiving personalized breast cancer risk information before (Q1), at the time of (Q2), and 1-year after risk communication (Q3).



(Q2), some participants reported that information that "would cause worry about the future" (17.3%), "would cause worry in my family" (18.2%), "would leave me feeling helpless" (17.8%), "I don't want to know" (10.8%), and "complicated information" (19.1%) would be disadvantages of learning about their breast cancer risk category (Figure 3A-3E).

Disadvantage 1: "Getting Information That Could Cause Worry About the Future". Compared to Ontario participants, participants from Quebec were less likely to view this as a disadvantage (OR = 0.41, 95% CI, 0.32, 0.54; Table 3), as were participants aged 60 to 69, compared to those aged 50 to 59 (OR = 0.69, 95% 0.55, 0.87). Conversely, participants at higher than average (OR = 2.27, 95% CI, 1.74, 2.96) and high risk (OR = 1.98, 95% 1.23, 3.18) were more likely to perceive knowing their risk as "Information that could cause worry in the future," compared to those at average risk (Table 3).

Disadvantages 2 and 3: "Getting Information I don't Want to Know" and "Getting Information That Could Leave me Feeling Helpless".

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Table 3 Multivariate Logistic Regression Model Examining the Relationship Between Sociodemographic and Health Characteristics and Perceived Disadvantages of Receiving Personalized Risk Category Information at the Time of Risk Communication (Q2)

Characteristic	Getting Information That Could Cause Worry About the Future ($n = 2811$)			Getting Information I don't Want to Know ($n = 2796$)			Getting Information That Could Leave Me Feeling Helpless ($n = 2793$)		
	Odds Ratio (95% CI)			Odds Ratio (95% CI)			Odds Ratio (95% CI)		
	Very Likely/ Likely ($n = 507$)	Neither Likely Nor Unlikely ($n = 789$)	Very Unlikely/ Unlikely[a] ($n = 1515$)	Very Likely/ Likely ($n = 313$)	Neither Likely Nor Unlikely ($n = 709$)	Very Unlikely/ Unlikely[a] ($n = 1774$)	Very Likely/ Likely ($n = 512$)	Neither Likely Nor Unlikely ($n = 766$)	Very Unlikely/ Unlikely[a] ($n = 1515$)
Study site									
Quebec vs. Ontario	0.41 (0.32, 0.54)[b]	1.11 (0.91, 1.35)	1.00	0.44 (0.32, 0.59)[b]	1.09 (0.89, 1.33)	1.00	0.56 (0.44, 0.71)[b]	1.18 (0.97, 1.45)	1.00
Risk category									
Higher than average risk vs. average risk	2.27 (1.74, 2.96)[b]	1.30 (1.02, 1.66)[b]	1.00	0.74 (0.52, 1.07)	1.19 (0.94, 1.51)	1.00	—	—	—
High risk vs. average risk	1.98 (1.23, 3.18)[b]	1.09 (0.70 1.69)	1.00	0.86 (0.45, 1.64)	0.95 (0.61, 1.47)	1.00	—	—	—
Age (years)									
40-49 vs. 50-59	1.25 (0.89, 1.77)	0.89 (0.67, 1.17)	1.00	0.99 (0.63, 1.55)	0.78 (0.59, 1.03)	1.00	0.97 (0.68, 1.38)	0.83 (0.63, 1.09)	1.00
60-69 vs. 50-59	0.69 (0.55 0.87)[b]	0.94 (0.77, 1.13)	1.00	0.79 (0.60, 1.03)	0.77 (0.63, 0.93)[b]	1.00	0.85 (0.68, 1.06)	0.92 (0.76, 1.12)	1.00
Family history of breast and/or ovarian cancer									
First- and second-degree vs. none	0.71 (0.49, 1.03)	0.84 (0.62, 1.14)	1.00	0.89 (0.57, 1.39)	0.72 (0.52, 0.98)[b]	1.00	—	—	—
First-degree only vs. none	1.03 (0.76, 1.39)	1.04 (0.80, 1.35)	1.00	1.23 (0.87, 1.75)	1.05 (0.80, 1.36)	1.00	—	—	—
Second-degree only vs. none	1.14 (0.88, 1.47)	1.25 (1.01, 1.54)[b]	1.00	0.87 (0.64, 1.17)	0.93 (0.75, 1.14)	1.00	—	—	—
Marital status									
Widowed/divorced/single vs. married/common law	—	—	—	0.88 (0.66, 1.17)	0.80 (0.65, 0.98)[b]	1.00	0.83 (0.65, 1.06)	0.80 (0.65 0.98)[b]	1.00
Visible minority group membership									
Visible minority vs. not a visible minority[c]	1.43 (0.87, 2.35)	1.43 (0.89, 2.28)	1.00	1.46 (0.84, 2.55)	1.24 (0.78, 1.98)	1.00	1.59 (0.99, 2.54)	1.43 (0.88, 2.31)	1.00
Born in Canada									
Born outside of Canada vs. born in Canada	0.82 (0.57, 1.18)	0.93 (0.67, 1.29)	1.00	1.04 (0.69, 1.57)	1.04 (0.75, 1.44)	1.00	1.06 (0.75, 1.50)	0.87 (0.62, 1.22)	1.00
Highest level of education									
College/registered apprenticeship/trades certificate vs. University bachelor's degree or above	0.98 (0.78, 1.23)	1.25 (1.04, 1.51)[b]	1.00	1.23 (0.94, 1.61)	1.32 (1.09, 1.60)[b]	1.00	1.11 (0.89, 1.38)	1.25 (1.03, 1.51)[b]	1.00
High school diploma or below vs. University bachelor's degree or above	1.07 (0.76, 1.51)	1.47 (1.11, 1.94)[b]	1.00	1.30 (0.88, 1.92)	1.23 (0.95, 1.61)	1.00	1.02 (0.72, 1.43)	1.50 (1.14, 1.98)[b]	1.00

[a] Reference category.
[b] Significant odds ratio at $P < .05$. The model also included employment status, overall health at baseline (Q1) and health at the time of risk communication (Q2) (results not shown).
[c] Not a visible minority category includes participants who identified as White, Indigenous, Indigenous and White, White and Arab, White and Latin American, White and West Asian.

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Differences in perceived disadvantages of receiving breast cancer risk information between the provinces were also observed for "Information I don't want to know" and "Information that could leave me feeling helpless." At the time of risk communication, Quebec participants were less likely to perceive these as a disadvantage, compared to Ontario participants (OR = 0.44, 95% CI, 0.32, 0.59 and OR = 0.56, 95% CI, 0.44, 0.71, respectively) (Table 3).

Disadvantage 4: Getting Complicated Information That I Won't Understand. As before, participants from Quebec (OR = 0.43, 95% CI, 0.33, 0.54), were less likely to report receiving complicated information as a disadvantage. The same was true for participants in the higher risk categories (higher than average risk: OR = 0.66, 95% CI, 0.49, 0.89; high risk: OR = 0.38, 95% CI, 0.19, 0.75). Notably, respondents who identified as visible minorities (OR = 1.86, 95% CI, 1.16, 2.98) and those with lower education attainment (College/Registered Apprenticeship/Trades Certificate: OR = 1.54, 95% CI, 1.24, 1.92; High School Diploma or Below: OR = 1.77, 95% CI, 1.29, 2.42) were more likely to view "Complicated information that I won't understand" as a disadvantage of learning their breasts cancer risk (Table 4).

Disadvantage 5: Getting Information That Could Cause Worry in My Family. Again, Quebec participants (OR = 0.42, 95% CI, 0.33, 0.54) were less likely to indicate that receiving risk information "that could cause worry in their family" was a disadvantage. The same was true for those who were not married (OR = 0.75, 95% CI, 0.59, 0.96). As with Disadvantage 4 (getting complicated information), participants with a lower educational attainment were more likely to perceive "Getting information that would cause worry in my family" as a disadvantage, compared to participants with a Bachelor's degree or above (College/Registered Apprenticeship/Trades: OR = 1.31, 95% CI, 1.05, 1.63; High School Diploma or Below: OR = 1.48, 95% 1.07, 2.04) (Table 4).

Discussion

As part of the PERSPECTIVE I&I project, this study examined the perceived advantages and disadvantages of receiving personalized breast cancer risk information among women with a previous mammogram in Ontario and Quebec. Overall, most participants viewed learning their breast cancer risk category as advantageous. This was especially true for participants with lower educational attainment and those who identified as visible minorities who considered "Easing worry," "Informing family," and "Planning for the future," as advantages of learning their personalized risk category. However, while these participants saw the overall benefit of learning their risk, they were also more likely to view "getting complicated information that I won't understand" as a potential disadvantage. This highlights the benefits of personalized breast cancer risk information and the need for clear, actionable communication.

Communicating medical information to the public is complicated by factors including, variable health literacy, education and language barriers.[27–29] To improve comprehension, risk communication materials need to meet formal standards,[30,31] using plain language and simple visuals.[28,32] Combining numerical and visual descriptions also helps ensure risk information is interpreted more accurately than when using either format alone.[33]

Intuitively, individuals informed they were at higher than average or high risk did not view receiving breast cancer risk information as "Easing worry." They were also more likely to view "information that could cause worry about the future" as a disadvantage. Prior work found that individuals at higher risk for breast cancer reported greater cancer worry than those at lower risk, though this worry did not reach a clinical level.[34–37] A UK study comparing those who received standard age-based breast screening with those who received risk-stratified screening (BC-Predict) found no difference in cancer worry or anxiety between the 2 groups.[35] Other studies show that pairing risk communication with counseling on preventive actions can ease worry by giving individuals a sense of control and information on how to manage their risk.[37,38] These findings highlight the importance of presenting risk information alongside a clear action plan to support those learning about their risk for the first time.

Participants from Quebec were less likely than those form Ontario to indicate that learning their risk category came with the disadvantage of "learning information they did not want to know or found upsetting." This observation may reflect differences in recruitment and mode of risk communication. Ontario participants were recruited through an OBSP invitation letter, while Quebec participants self-selected into the study after hearing about it through the media or email blast. This could make it so that individuals from Quebec were more interested in learning about their breast cancer risk, and therefore less likely to find this information upsetting. There were also differences in risk communication strategies between the 2 provinces. Both Ontario and Quebec participants received a letter with their personalized risk category, screening action plan, and follow-up procedures (details published in Brooks et al.)[18] Additionally, in Quebec, the risk letter was sent to participants' family physician, while Ontario participants were encouraged to discuss their risk with their HCP at their preference. While we did not follow up on whether Quebec participants engaged in more discussions about their risks with their HCPs than Ontario participants, it is possible that the additional support of having their HCP also receive the risk letter and screening action plan could have contributed to the observed provincial differences. While we noted this as a limitation of this study, these results also suggest the need for strong involvement of HCPs and NP in risk communication, especially in provinces without high-risk programs (eg, Quebec).[39,40] Importantly, a recent survey by our group[41] and others[25] found HCPs felt underprepared to discuss breast cancer risk results and their implications with their patients. This underscores the need for training and resources to support effective risk communication.

The strengths of this study included a large sample size with detailed sociodemographic and health information collected at 3 time points, providing insights into how women viewed learning their breast cancer risk over time. The inclusion of participants from Ontario and Quebec allowed for comparison of different health systems and implementation approaches. However, the sample did not include participants from other Canadian provinces/territories. There was also a lack of diversity in the study population. Most participants identified as white, highly educated, employed, and

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Table 4 Multivariate Logistic Regression Model Examining the Relationship Between Sociodemographic and Health Characteristics and Perceived Disadvantages of Receiving Personalized Risk Category Information at the Time of Risk Communication (Q2)

Characteristic	Getting Complicated Information That I Won't Understand ($n = 2789$) Odds Ratio (95% CI)			Getting Information That Could Cause Worry in My Family ($n = 2775$) Odds Ratio (95% CI)		
	Very Likely/ Likely ($n = 558$)	Neither Likely Nor Unlikely ($n = 661$)	Very Unlikely/ Unlikely[a] ($n = 1570$)	Very Likely/ Likely ($n = 534$)	Neither Likely Nor Unlikely ($n = 723$)	Very Unlikely/ Unlikely[a] ($n = 1518$)
Study site						
Quebec vs. Ontario	0.43 (0.33, 0.54)[b]	0.94 (0.76, 1.16)	1.00	0.42 (0.33, 0.54)[b]	0.89 (0.72, 1.09)	1.00
Risk category						
Higher than average risk vs. Average risk	0.66 (0.49, 0.89)[b]	1.11 (0.87, 1.41)	1.00	—	—	—
High risk vs. average risk	0.38 (0.19, 0.75)[b]	0.73 (0.46, 1.16)	1.00	—	—	—
Age (years)						
40-49 vs. 50-59	0.83 (0.57, 1.21)	0.79 (0.59, 1.06)	1.00	0.98 (0.69, 1.39)	0.84 (0.63, 1.11)	1.00
60-69 vs. 50-59	0.97 (0.75, 1.24)	0.83 (0.65, 1.05)	1.00	0.81 (0.65 1.01)	0.82 (0.67, 1.00)	1.00
Family history of breast and/or ovarian cancer						
First- and second-degree vs. none	0.81 (0.56, 1.17)	0.75 (0.54, 1.04)	1.00	—	—	—
First-degree only vs. none	0.86 (0.63, 1.15)	0.90 (0.68, 1.18)	1.00	—	—	—
Second-degree only vs. none	0.88 (0.69, 1.12)	0.93 (0.74, 1.15)	1.00	—	—	—
Marital status						
Widowed/divorced/single vs. married/common law	—	—	—	0.75 (0.59, 0.96)[b]	0.88 (0.71, 1.08)	1.00
Visible minority group membership						
Visible minority vs. not a visible minority[c]	1.86 (1.16, 2.98)[b]	1.23 (0.74, 2.03)	1.00	1.56 (0.97, 2.51)	1.13 (0.69, 1.86)	1.00
Born in Canada						
Born outside of Canada vs. born in Canada	1.07 (0.76, 1.51)	1.07 (0.76, 1.51)	1.00	1.10 (0.78, 1.55)	1.08 (0.78, 1.51)	1.00
Highest level of education						
College/registered apprenticeship/trades certificate vs. university bachelor's degree or above	1.54 (1.24 1.92)[b]	1.31 (1.07, 1.61)[b]	1.00	1.31 (1.05, 1.63)[b]	1.34 (1.10, 1.63)[b]	1.00
High school diploma or below vs. university bachelor's degree or above	1.77 (1.29, 2.42)[b]	1.77 (1.32, 2.37)[b]	1.00	1.48 (1.07, 2.04)[b]	1.75 (1.31, 2.32)[b]	1.00

[a] Reference category.
[b] Significant odds ratio at $P < .05$. The model also included employment status, overall health at baseline (Q1) and health at the time of risk communication (Q2) (results not shown).
[c] Not a visible minority category includes participants who identified as White, Indigenous, Indigenous and White, White and Arab, White and Latin American, White and West Asian.

born in Canada. Previous studies suggest that individuals from underserved communities, visible minorities and those with lower education levels, or health literacy, face more significant challenges including difficulty understanding health information, barriers to access care, and lower screening uptake.[33,42,43] Future work must consider how to support diverse populations to avoid exacerbating existing health disparities. We also observed that, participants found to be at higher risk were less likely to report that learning their risk "eased their worry." While this intuitively makes sense, we did not probe further for mechanisms underlying the worry seen in these individuals. As such, we cannot determine the psychosocial processes underlying these patterns (eg, increased perceived threat or lower perceived control). This is an important avenue for future investigations.

Beyond PERSPECTIVE I&I, global projects on risk-stratified breast cancer screening include the WISDOM (U.S.),[44] BC-Predict,[45,46] MyPeBS,[47] and PROCAS (U.K.)[45] studies. A 2023 review found that the public generally accepts risk-stratified screening, especially when early detection is emphasized.[48] The review recommended that risk communication be clear and actionable, with HCP support, and attention to accessibility challenges like health and computer literacy (ie, receiving risk information

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online).[48] Our study provides real-world evidence in support of these recommendations.

Overall, we found that most women responded positively to receiving their personalized breast cancer risk category and screening plan. Successful implementation of risk-stratified screening will require clear risk communication, support from HCPs, and adaptation to regional screening programs and resources.

Clinical Practice Points

- Tailored messaging around risk communication is crucial for diverse populations
- Regional differences require localized implementation
- Risk communication can support informed decision making around breast cancer screening
- Most women responded favorably to receiving individualized breast cancer risk categories and screening plans.
- Use culturally sensitive, accessible communication strategies to ensure understanding and comfort.
- Encourage shared decision-making and patient-centered care.

CRediT authorship contribution statement

Jennifer D. Brooks: Writing – review & editing, Writing – original draft, Methodology, Conceptualization. **Kristina M. Blackmore:** Writing – review & editing, Writing – original draft, Visualization, Formal analysis, Conceptualization. **Nguyet N.M. Ngo:** Writing – review & editing, Writing – original draft, Project administration. **Meghan J. Walker:** Writing – review & editing, Methodology. **Amy Chang:** Writing – review & editing, Writing – original draft, Visualization, Methodology, Data curation. **Laurence Lambert-Côté:** Writing – review & editing, Visualization, Formal analysis, Data curation. **Annie Turgeon:** Writing – review & editing, Visualization, Formal analysis, Data curation. **Aisha K. Lofters:** Writing – review & editing, Methodology, Conceptualization. **Hermann Nabi:** Writing – review & editing, Methodology, Conceptualization. **Antonis C. Antoniou:** Writing – review & editing, Resources, Conceptualization. **Kathleen A. Bell:** Writing – review & editing, Resources, Methodology. **Mireille J.M. Broeders:** Writing – review & editing, Methodology. **Tim Carver:** Writing – review & editing, Software, Resources. **Jocelyne Chiquette:** Writing – review & editing, Methodology, Conceptualization. **Philippe Després:** Writing – review & editing, Software, Resources. **Douglas F. Easton:** Writing – review & editing, Resources, Methodology. **Andrea Eisen:** Writing – review & editing, Methodology, Conceptualization. **Laurence Eloy:** Writing – review & editing, Methodology, Conceptualization. **D. Gareth Evans:** Writing – review & editing, Methodology. **Samantha Fienberg:** Writing – review & editing, Resources, Methodology. **Yann Joly:** Writing – review & editing, Methodology. **Raymond H. Kim:** Writing – review & editing, Methodology. **Shana J. Kim:** Writing – review & editing, Formal analysis. **Bartha M. Knoppers:** Writing – review & editing, Methodology, Conceptualization. **Jean-Sebastien Paquette:** Writing – review & editing, Resources. **Nora Pashayan:** Writing – review & editing, Methodology, Conceptualization. **Amanda J. Sheppard:** Writing – review & editing, Methodology. **Tracy L. Stockley:** Writing – review & editing, Resources, Methodology. **Michel Dorval:** Writing – review & editing, Supervision, Methodology, Conceptualization. **Jacques Simard:** Writing – review & editing, Supervision, Project administration, Methodology, Funding acquisition, Conceptualization. **Anna M. Chiarelli:** Writing – review & editing, Supervision, Project administration, Methodology, Funding acquisition, Conceptualization.

Data Availability Statement

Parts of the material underlying this article are based on data and information provided by Ontario Health (Cancer Care Ontario). Ontario Health is prohibited from making the data used in this research publicly accessible if it includes potentially identifiable personal health information and/or personal information as defined in Ontario law, specifically the Personal Health Information Protection Act (PHIPA) and the Freedom of Information and Protection of Privacy Act (FIPPA). Upon request, data de-identified to a level suitable for public release may be provided.

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Disclosure

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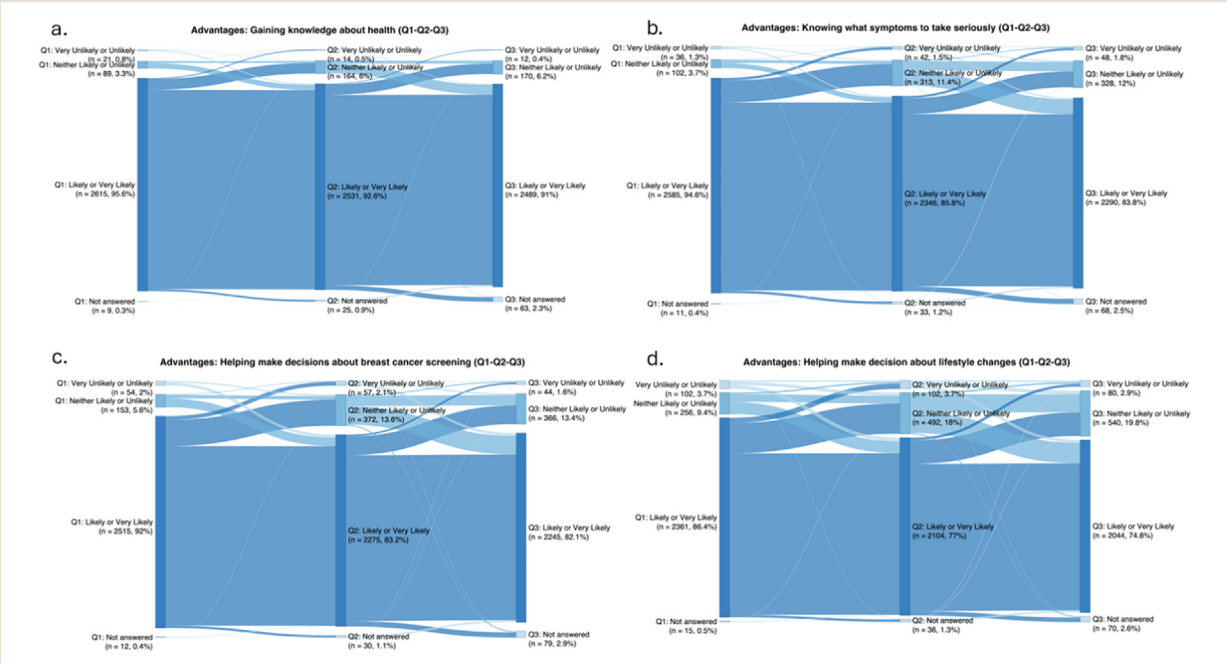
Supplementary Materials

Supplemental Figure 1 Sankey graphs of additional perceived advantages of receiving personalized breast cancer risk category information ("Gaining knowledge about health" (A), "Knowing what symptoms to take seriously" (B), "Helping make decisions about breast cancer screening" (C), "Helping make decisions about lifestyle changes" (D)) before (Q1), at the time of (Q2), and 1-year after risk communication (Q3).



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Supplemental Table 1 Multinominal Logistic Regression Model for "Easing My Worry About Breast Cancer Risk," "Informing Family About Breast Cancer Risk" and "Planning for the Future" as Advantages of Receiving Personalized Risk Category Information 1-Year After Risk Communication (Q3) by Sociodemographic and Health Characteristics

Characteristic	Easing My Worry About Breast Cancer Risk ($N = 2778$)			Informing Family About Breast Cancer Risk ($N = 2768$)			Planning for the Future ($N = 2752$)		
	Odds Ratio (95% CI)			Odds Ratio (95% CI)			Odds Ratio (95% CI)		
	Very Likely/Likely[a] ($n = 2157$)	Neither Likely Nor Unlikely ($n = 503$)	Very Unlikely/Unlikely ($n = 118$)	Very Likely/Likely[a] ($n = 1518$)	Neither Likely Nor Unlikely ($n = 979$)	Very Unlikely/Unlikely ($n = 271$)	Very Likely/Likely[a] ($n = 1648$)	Neither Likely Nor Unlikely ($n = 918$)	Very Unlikely/Unlikely ($n = 186$)
Study site									
Quebec vs. Ontario	1.00	1.23 (0.99, 1.54)	0.80 (0.50, 1.28)	1.00	1.43 (1.20, 1.69)[b]	2.20 (1.65, 2.93)[b]	1.00	2.50 (2.07, 3.03)[b]	4.17 (2.83, 6.15)[b]
Risk category									
Higher than average risk vs. average risk	1.00	3.20 (2.47, 4.13)[b]	10.0 (6.28, 15.93)[b]	1.00	1.42 (1.13, 1.80)[b]	2.08 (1.48, 2.91)	1.00	1.02 (0.81, 1.29)	1.29 (0.86, 1.94)
High risk vs. average risk	1.00	6.47 (4.18, 10.0)[b]	26.21 (14.02, 49.0)[b]	1.00	1.07 (0.72, 1.60)	1.40 (0.79, 2.46)	1.00	1.34 (0.90, 1.98)	1.28 (0.65, 2.54)
Age (years)									
40-49 vs. 50-59	1.00	0.72 (0.52, 0.99)[b]	1.10 (0.62, 1.95)	—	—	—	1.00	0.68 (0.52, 0.88)[b]	0.80 (0.52, 1.23)
60-69 vs. 50-59	1.00	1.10 (0.88, 1.38)	1.15 (0.73, 1.82)	—	—	—	1.00	0.96 (0.74, 1.14)	0.89 (0.58, 1.37)
Family history of breast and/or ovarian cancer									
First- and second-degree vs. none	1.00	0.66 (0.50, 0.94)[b]	1.30 (0.72, 2.36)	1.00	0.71 (0.53, 0.96)[b]	0.97 (0.64, 1.49)	1.00	1.19 (0.89, 1.58)	0.95 (0.56, 1.61)
First-degree only vs. none	1.00	0.87 (0.65, 1.18)	0.84 (0.44, 1.61)	1.00	0.75 (0.59, 0.96)[b]	0.78 (0.52, 1.17)	1.00	1.19 (0.93, 1.52)	1.01 (0.63, 1.61)
Second-degree only vs. none	1.00	0.97 (0.76, 1.24)	1.45 (0.87, 2.43)	1.00	0.99 (0.82, 1.21)	0.97 (0.70, 1.34)	1.00	1.03 (0.84, 1.27)	1.01 (0.69, 1.46)
Marital status									
Widowed/divorced/single vs. married/common law	1.00	1.28 (1.01, 1.61)[b]	1.63 (1.06, 2.50)[b]	1.00	1.63 (1.34, 1.98)[b]	2.24 (1.68, 2.99)[b]	1.00	1.22 (1.01, 1.49)[b]	1.28 (0.90, 1.82)
Visible minority group membership									
Visible minority vs. not a visible minority[c]	1.00	0.36 (0.19, 0.68)[b]	0.26 (0.08, 0.86)[b]	1.00	0.92 (0.63, 1.35)	0.54 (0.24, 1.22)	1.00	0.52 (0.31, 0.88)[b]	0.82 (0.31, 2.18)
Born in Canada									
Born outside of Canada vs. born in Canada	—	—	—	—	—	—	1.00	0.97 (0.71, 1.34)	0.92 (0.47, 1.79)

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Supplemental Table 1 (*continued*)

Characteristic	Easing My Worry About Breast Cancer Risk ($N = 2778$)			Informing Family About Breast Cancer Risk ($N = 2768$)			Planning for the Future ($N = 2752$)		
	Odds Ratio (95% CI)			Odds Ratio (95% CI)			Odds Ratio (95% CI)		
	Very Likely/Likely[a] ($n = 2157$)	Neither Likely Nor Unlikely ($n = 503$)	Very Unlikely/Unlikely ($n = 118$)	Very Likely/Likely[a] ($n = 1518$)	Neither Likely Nor Unlikely ($n = 979$)	Very Unlikely/Unlikely ($n = 271$)	Very Likely/Likely[a] ($n = 1648$)	Neither Likely Nor Unlikely ($n = 918$)	Very Unlikely/Unlikely ($n = 186$)
Highest level of education									
College/registered apprenticeship/trades certificate vs. university bachelor's degree or above	1.00	0.88 (0.71, 1.10)	0.65 (0.42, 1.02)	1.00	0.84 (0.70, 0.99)[b]	0.60 (0.44, 0.81)[b]	1.00	0.90 (0.75, 1.08)	0.64 (0.45, 0.90)[b]
High school diploma or below vs. university bachelor's degree or above	1.00	1.05 (0.77, 1.44)	0.65 (0.32, 1.32)	1.00	0.71 (0.54, 0.93)[b]	0.82 (0.55, 1.24)	1.00	0.95 (0.73, 1.24)	0.63 (0.36, 1.10)
Employment status									
Not working vs. working	—	—	—	—	—	—	1.00	0.85 (0.59, 1.21)	0.68 (0.32, 1.44)
Retired vs. working	—	—	—	—	—	—	1.00	1.21 (0.97, 1.51)	1.11 (0.72, 1.72)
General health at baseline (Q1)									
Fair/poor vs. excellent/very good/good	1.00	1.01 (0.60, 1.71)	2.84 (1.37, 5.89)[b]	1.00	1.20 (0.80, 1.82)	2.08 (1.20, 3.62)[b]	—	—	—
General health at risk communication (Q2)									
Fair/poor vs. excellent/Very good/good	—	—	—	—	—	—	—	—	—

[a] Reference Category.
[b] Significant odds ratio at $P < .05$.
[c] Not a visible minority category includes participants who identified as White, Indigenous, Indigenous and White, White and Arab, White and Latin American, White and West Asian.

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Supplemental Table 2 Multinominal Logistic Regression Model for "Getting Information That Could Cause Worry About the future," "Getting Information I Don't Want to know," "Getting Information That Could Leave Me Feeling helpless," "Getting Complicated Information That I Won't understand," "Getting Information That Could Cause Worry in My family" as Disadvantages of Receiving Personalized Risk Category Information (at Q3) by Sociodemographic and Health Characteristics

Characteristic	Getting Information That Could Cause Worry About the Future ($n = 2754$)			Getting Information I Don't Want to Know ($n = 2751$)			Getting Information That Could Leave Me Feeling Helpless ($n = 2798$)			Getting Complicated Information That I Won't Understand ($n = 2734$)			Getting Information That Could Cause Worry In My Family ($n = 2735$)		
	Odds Ratio (95% CI			Odds Ratio (95% CI)			Odds Ratio (95% CI)			Odds Ratio (95% CI)			Odds Ratio (95% CI)		
	Very Likely/ Likely ($n = 549$)	Neither likely nor unlikely ($n = 762$)	Very Unlikely/ Unlikely[a] ($n = 1443$)	Very Likely/ Likely ($n = 352$)	Neither likely nor unlikely ($n = 777$)	Very Unlikely/ Unlikely[a] ($n = 1622$)	Very Likely/ Likely ($n = 582$)	Neither likely nor unlikely ($n = 813$)	Very Unlikely/ Unlikely[a] ($n = 1403$)	Very Likely/ Likely ($n = 621$)	Neither likely nor unlikely ($n = 709$)	Very Unlikely/ Unlikely[a] ($n = 1404$)	Very Likely/ Likely ($n = 586$)	Neither likely nor unlikely ($n = 799$)	Very Unlikely/ Unlikely[a] ($n = 1350$)
Study site															
Quebec vs. Ontario	0.43 (0.33, 0.54)[b]	1.04 (0.85, 1.27)	1.00	0.34 (0.25, 0.46)[b]	1.01 (0.83, 1.23)	1.00	0.34 (0.27, 0.43)[b]	0.81 (0.66, 0.99)[b]	1.00	0.34 (0.27, 0.43)[b]	0.81 (0.66, 0.99)[b]	1.00	0.27 (0.21, 0.35)[b]	0.86 (0.70, 1.05)	1.00
Risk category															
Higher than average risk vs. average risk	1.66 (1.27, 2.16)[b]	1.23 (0.96, 1.56)	1.00	—	—	—	—	—	—	—	—	—	0.67 (0.49, 0.91)[b]	1.11 (0.87, 1.40)	1.00
High risk vs. Average risk	1.95 (1.26, 3.02)[b]	1.08 (0.70, 1.66)	1.00	—	—	—	—	—	—	—	—	—	1.62 (0.99, 2.64)	1.43 (0.94, 2.17)	1.00
Age (years)															
40-49 vs. 50-59	1.02 (0.73, 1.43)	0.91 (0.68, 1.20)	1.00	1.05 (0.68, 1.61)	1.04 (0.79, 1.36)	1.00	1.03 (0.74, 1.45)	0.97 (0.74, 1.28)	1.00	1.03 (0.74, 1.45)	0.97 (0.74, 1.27)	1.00	0.98 (0.68, 1.40)	0.86 (0.65, 1.12)	1.00
60-69 vs. 50-59	0.72 (0.56, 0.93)[b]	0.86 (0.68, 1.08)	1.00	0.75 (0.56, 1.00)	0.74 (0.59, 0.92)[b]	1.00	0.66 (0.52, 0.85)[b]	0.61 (0.49, 0.77)[b]	1.00	0.66 (0.52, 0.85)[b]	0.61 (0.49, 0.77)[b]	1.00	0.71 (0.57, 0.88)[b]	0.72 (0.59, 0.88)[b]	1.00
Family history of breast and/or ovarian cancer															
First- and second-degree vs. None	—	—	—	0.63 (0.40, 1.00)	1.01 (0.76, 1.35)	1.00	—	—	—	—	—	—	0.93 (0.65, 1.34)	0.93 (0.69, 1.27)	1.00
First-degree only vs. none	—	—	—	1.24 (0.89, 1.72)	1.25 (0.97, 1.61)	1.00	—	—	—	—	—	—	0.94 (0.69, 1.27)	1.04 (0.80, 1.35)	1.00
Second-degree only vs. none	—	—	—	0.90 (0.67, 1.20)	1.15 (0.93, 1.41)	1.00	—	—	—	—	—	—	0.97 (0.76, 1.24)	1.13 (0.92, 1.40)	1.00
Marital status															
Widowed/divorced/ single vs. Married/common law	—	—	—	—	—	—	—	—	—	—	—	—	0.75 (0.59, 0.96)[b]	0.99 (0.80, 1.21)	1.00

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Supplemental Table 2 (*continued*)

Characteristic	Getting Information That Could Cause Worry About the Future ($n = 2754$)			Getting Information I Don't Want to Know ($n = 2751$)			Getting Information That Could Leave Me Feeling Helpless ($n = 2798$)			Getting Complicated Information That I Won't Understand ($n = 2734$)			Getting Information That Could Cause Worry In My Family ($n = 2735$)		
	Odds Ratio (95% CI			Odds Ratio (95% CI)			Odds Ratio (95% CI)			Odds Ratio (95% CI)			Odds Ratio (95% CI)		
	Very Likely/ Likely ($n = 549$)	Neither likely nor unlikely ($n = 762$)	Very Unlikely/ Unlikely[a] ($n = 1443$)	Very Likely/ Likely ($n = 352$)	Neither likely nor unlikely ($n = 777$)	Very Unlikely/ Unlikely[a] ($n = 1622$)	Very Likely/ Likely ($n = 582$)	Neither likely nor unlikely ($n = 813$)	Very Unlikely/ Unlikely[a] ($n = 1403$)	Very Likely/ Likely ($n = 621$)	Neither likely nor unlikely ($n = 709$)	Very Unlikely/ Unlikely[a] ($n = 1404$)	Very Likely/ Likely ($n = 586$)	Neither likely nor unlikely ($n = 799$)	Very Unlikely/ Unlikely[a] ($n = 1350$)
Visible minority group membership															
Visible minority vs. not a visible minority[c]	0.97 (0.60, 1.54)	0.95 (0.58, 1.55)	1.00	0.93 (0.54, 1.61)	1.04 (0.66, 1.64)	1.00	—	—	—	—	—	—	1.15 (0.70, 1.89)	0.95 (0.58, 1.55)	1.00
Born in Canada															
Born outside of Canada vs. born in Canada	1.45 (1.04, 2.02)[b]	1.09 (0.78, 1.53)	1.00	1.33 (0.91, 1.95)	1.31 (0.95, 1.80)	1.00	1.08 (0.80, 1.46)	1.15 (0.86, 1.54)	1.00	1.08 (0.80, 1.46)	1.15 (0.86, 1.54)	1.00	1.20 (0.85, 1.70)	1.44 (1.04, 2.01)[b]	1.00
Highest level of education															
College/registered apprenticeship/Trades certificate vs. University Bachelor's degree or above	1.09 (0.88, 1.37)	1.35 (1.11, 1.64)[b]	1.00	1.38 (1.06, 1.78)[b]	1.39 (1.15, 1.68)[b]	1.00	1.04 (0.83, 1.29)	1.39 (1.15, 1.68)[b]	1.00	1.04 (0.83, 1.29)	1.39 (1.15, 1.69)[b]	1.00	1.37 (1.10, 1.70)[b]	1.32 (1.09, 1.60)[b]	1.00
High school diploma or below vs. University Bachelor's degree or above	1.18 (0.85, 1.65)	1.53 (1.15, 2.02)[b]	1.00	1.52 (1.04, 2.21)[b]	1.68 (1.28, 2.21)[b]	1.00	1.18 (0.86, 1.63)	1.61 (1.22, 2.12)[b]	1.00	1.18 (0.86, 1.63)	1.61 (1.22, 2.12)[b]	1.00	1.44 (1.05, 1.98)[b]	1.44 (1.08, 1.92)[b]	1.00

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Supplemental Table 2 (*continued*)

Characteristic	Getting Information That Could Cause Worry About the Future ($n = 2754$)			Getting Information I Don't Want to Know ($n = 2751$)			Getting Information That Could Leave Me Feeling Helpless ($n = 2798$)			Getting Complicated Information That I Won't Understand ($n = 2734$)			Getting Information That Could Cause Worry In My Family ($n = 2735$)		
	Odds Ratio (95% CI			Odds Ratio (95% CI)			Odds Ratio (95% CI)			Odds Ratio (95% CI)			Odds Ratio (95% CI)		
	Very Likely/ Likely ($n = 549$)	Neither likely nor unlikely ($n = 762$)	Very Unlikely/ Unlikely[a] ($n = 1443$)	Very Likely/ Likely ($n = 352$)	Neither likely nor unlikely ($n = 777$)	Very Unlikely/ Unlikely[a] ($n = 1622$)	Very Likely/ Likely ($n = 582$)	Neither likely nor unlikely ($n = 813$)	Very Unlikely/ Unlikely[a] ($n = 1403$)	Very Likely/ Likely ($n = 621$)	Neither likely nor unlikely ($n = 709$)	Very Unlikely/ Unlikely[a] ($n = 1404$)	Very Likely/ Likely ($n = 586$)	Neither likely nor unlikely ($n = 799$)	Very Unlikely/ Unlikely[a] ($n = 1350$)
Employment status															
Not working vs. working	0.53 (0.33, 0.85)[b]	1.08 (0.75, 1.54)	1.00	0.50 (0.29, 0.88)[b]	0.85 (0.59, 1.22)	1.00	0.66 (0.42, 1.03)	1.13 (0.79, 1.61)	1.00	0.66 (0.42, 1.03)	1.13 (0.79, 1.61)	1.00	—	—	—
Retired vs. working	0.75 (0.57, 0.98)[b]	1.03 (0.81, 1.30)	1.00	0.68 (0.50, 0.93)[b]	1.07 (0.85, 1.35)	1.00	0.91 (0.70, 1.17)	1.17 (0.92, 1.48)	1.00	0.91 (0.70, 1.17)	1.17 (0.92, 1.47)	1.00	—	—	—
General health at baseline (Q1)															
Fair/poor vs. excellent/very good/good	0.89 (0.52, 1.55)	1.22 (0.79, 1.87)	1.00	0.77 (0.39, 1.51)	1.26 (0.83, 1.91)	1.00	0.85 (0.50, 1.45)	1.11 (0.72, 1.69)	1.00	0.85 (0.50, 1.44)	1.11 (0.72, 1.69)	1.00	—	—	—
General health 1-year after risk communication (Q3)															
Fair/poor vs. excellent/very good/good	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

[a] Reference category.
[b] Significant odds ratio at $P < .05$.
[c] Not a visible minority category includes participants who identified as White, Indigenous, Indigenous and White, White and Arab, White and Latin American, White and West Asian.