

Understanding Breast Implant Illness

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Aesthetic Surgery Journal
 2021, Vol 41(12) 1367–1379
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 DOI: 10.1093/asj/sjaa329
 www.aestheticsurgeryjournal.com

OXFORD
 UNIVERSITY PRESS

Abstract

Background: Breast implant surgery is the most common plastic surgery procedure performed globally. A subset of women with breast implants report experiencing a myriad of disabling and distressing physical and psychological symptoms attributed to their implants. Social media groups have coined the condition “breast implant illness” (BII). Little to no scientific research currently exists for BII.

Objectives: The aim of this study was to investigate the experiences of women with BII (both those with implants still in place and those who have explanted) and compare them with those of a control group of women with implants who do not report BII.

Methods: Women with self-reported BII and implants still in place (n = 51), self-reported BII who had explanted (n = 60), and women with implants in place without BII (n = 58) completed online self-report questionnaires about their symptoms, physical and mental health, health service use patterns, and lifestyle factors (eg, exercise, smoking, alcohol consumption).

Results: Women with BII, regardless of whether they had undergone explant surgery, reported experiencing more severe somatic symptoms, higher depression, anxiety and health anxiety, and poorer physical health than women without BII.

Conclusions: These findings highlight the need for further investigation into the causes, risk factors, long-term effects, and potential interventions for women who experience BII.

Resumen

Antecedentes: La cirugía de implantes mamarios es el procedimiento de cirugía plástica más común a nivel mundial. Un subconjunto de mujeres con implantes mamarios ha reportado que experimenta una miríada de síntomas físicos y psicológicos incapacitantes y angustiantes atribuidos a sus implantes. Los grupos de redes sociales han acuñado el término “enfermedad de los implantes mamarios” (EIM). Actualmente existe poca o ninguna investigación científica sobre la EIM.

Objetivos: El objetivo de este estudio fue investigar las experiencias de las mujeres con EIM (tanto aquellas con los implantes aún en su lugar como aquellas a quienes les habían sido explantados) y compararlas con las de un grupo control de mujeres con implantes que no reportaron EIM.

Métodos: Mujeres que autoinformaron EIM y que tenían los implantes aún en su lugar (n = 51), que autoinformaron EIM pero cuyos implantes habían sido explantados (n = 60) y mujeres con implantes en su lugar sin EIM (n = 58) completaron cuestionarios de autoinforme en línea sobre sus síntomas, salud física y mental, patrones de uso de servicios de salud y factores de estilo de vida (por ejemplo, ejercicio, tabaquismo, consumo de alcohol).

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Resultados: Las mujeres con EIM, independientemente de si se habían sometido a una cirugía de explantación o no, reportaron síntomas somáticos más graves, mayor depresión, ansiedad, angustia por su salud y peor salud física que las mujeres sin EIM.

Conclusiones: Estos hallazgos ponen de relieve la necesidad de una mayor investigación sobre las causas, los factores de riesgo, los efectos a largo plazo y las intervenciones potenciales para las mujeres que experimentan EIM.

Level of Evidence: 3

Editorial Decision date: October 26, 2020; online publish-ahead-of-print November 28, 2020.



Breast implant surgery is the most common surgical procedure performed by plastic surgeons worldwide, with almost 2 million women undergoing augmentation surgery each year;¹ approximately 50 million women globally have breast implants.² In the United States alone, 280,692 breast augmentation procedures were completed in 2019.³ Ever since breast implants were first introduced, there has been controversy over their use, with concerns raised about negative complications from surgery, and their potential link with autoimmune conditions.^{4,5} More recently, a proportion of patients who have undergone breast implant surgery have described experiencing distressing and often disabling physical and psychological symptoms, such as chronic pain, fatigue, memory and concentration difficulties, panic attacks, and depression. The term “breast implant illness” (BII) has been used to describe this nonuniform and varied constellation of over 100 symptoms.

Despite the increasing use of the term BII, and anecdotal reports by surgeons of increasing requests for explant surgery due to BII,⁶ there is little research on BII. There are no diagnostic tests for BII, no evidence-based methods to differentiate it from other conditions that share similar symptoms (eg, fibromyalgia, irritable bowel syndrome), and little knowledge about who will respond favorably to explant surgery. Moreover, little is known about its onset, course, risk factors, causes, and management. To date, only 1 study has examined symptoms among women with BII prior to and following explant surgery.⁷ This study found that women who self-reported as having BII presented with a variety of symptoms prior to explant, including fatigue, arthralgia, brain fog, muscle pain, and memory loss. Most women reported improvement or resolution of at least some of their symptoms following explant. However, these authors did not examine psychological symptoms, social media use, treatments, or lifestyle factors, or compare experiences between women with and without BII.

Without an adequate understanding of the pathophysiology of BII, several theories have been put forth regarding its cause. Whereas leading consumer advocates argue

that BII is caused by chemical and heavy metal toxicity, and immune dysfunction,⁸ other scientists have considered theories that focus on the psychological and social factors. For example, Dush⁹ argued that unwanted negative symptoms from breast implants are caused by stress, somatization, and the misattribution of unrelated symptoms to breast implants. Other theories have focused on the role of social media, which is commonly used by women with BII as a source of advice, support, and validation.¹⁰ The largest Facebook BII support group, “Healing Breast Implant Illness and Healing by Nicole,” currently has over 100,000 members, and several others together have a growing member base of over 25,000 users. However, despite their popularity, some experts have argued that social media may play a role in generating or exacerbating fear and anxiety, and could be prompting increasing numbers of women to request unjustified medical interventions.^{6,11,12}

Exploring the perspectives of the women who experience BII is a critical first step in scientifically testing existing theories about BII, and understanding its causes, course, risk factors, and treatment. The overall aim of this study was therefore to characterize the experiences of women who self-identify as having BII and compare them with a control group who denied having BII. We sought to compare these groups in terms of their demographic and clinical characteristics, symptom reporting, physical and mental health, health service use patterns, and lifestyle factors. The second aim was to describe the experiences of women with BII, including the onset and course of their symptoms, their access to health services, and coping strategies to self-manage their symptoms, and finally their beliefs about the causes of their symptoms and hopes for recovery. Thirdly, we sought to determine how explant surgery affects symptoms among women with BII. To achieve these aims, we recruited a convenience sample of women self-identified as having BII, half of whom had their implants remaining in place, and half who had undergone explant surgery. We compared them with a cohort of women who have breast implants, but did not self-report BII. We

expected that the women with BII who had their implants in place would experience more severe somatic and psychological symptoms and poorer self-rated health than those without BII, and that women with BII who had explanted would appear similar to women without BII.

METHODS

Participants

Volunteer participants (N = 189) were recruited online between September 2019 and December 2019 via Facebook and Instagram advertisements (see [Supplemental Figure 1](#) for an example Facebook advertisement), posts on BII social media support groups, and via direct recruitment in US-based plastic surgery clinics. Participants provided their name as part of the consent process. However, data were deidentified during the data-analysis phase. Participants were given the option of entering a draw to win 1 of 3 \$100 gift cards upon study completion. Eligible participants were females who had undergone breast implant surgery and were fluent in English. Twenty-four participants were excluded as they reported not knowing whether they had BII (n = 20) or because they did not have BII but had their implants removed for other reasons (n = 4). The final sample consisted of 165 women: 111 women self-identified as having BII (51 women had their implants still in place, and 60 women had explanted), and 58 women who did not report having BII. All women in the latter group had their implants in place.

Survey

The online questionnaires were administered with Qualtrics¹³ (Provo, UT; see Appendix 1 for blank survey). First, participants were asked about their surgical and medical history, including checklists to assess any diagnoses of medical conditions and their past surgeries. Participants who self-reported as having experienced physical or psychological symptoms that negatively impacted their day-to-day activities after breast implant surgery were then asked about the nature, onset, and course of their symptoms, the perceived cause of their symptoms, beliefs about recovery, the health professional and online support from which they sought help, and lifestyle changes they had implemented to manage their symptoms. They also rated the percentage to which they believed their symptoms would resolve (0% = not at all, 100% = completely convinced). The survey also contained the following components.

Symptom Reporting

To assess both general physical symptoms and symptoms that are commonly reported by women with BII, we

administered a 61-item measure consisting of 36 items from the validated Generic Assessment of Side Effects (GASE),¹⁴ 10 common symptoms from the general population,¹⁵ and 15 symptoms commonly reported by women with BII (itchy eyes, pain or burning sensation around implant and/or underarms, reflux, fungal infections, intolerance to heat or cold, body odor, frequent urination, weight problems, low libido, night sweats, panic attacks, anxiety, depression, photosensitivity, and acne). Participants were asked to rate the intensity of each item on a scale from 0 (not present) to 3 (severe) over the previous 2 weeks.

Mental and Physical Health

The Hospital Anxiety and Depression Scale (HADS)¹⁶ was used to assess anxiety and depression symptoms, and the Whiteley-6¹⁷ was used to assess health anxiety. Both scales possess good psychometric properties.¹⁸⁻²¹ A cut-off score of 8 on the depression and anxiety subscales of the HADS,¹⁶ and a cut-off score of 18 on the Whiteley-6²² achieve optimal sensitivity and specificity in the detection of depression, anxiety, and health anxiety, respectively.

Physical Health

We obtained measurements of participants' self-rated health,²³ body mass index (BMI), and Physical Activity Vital Sign.²⁴ We also assessed current and past smoking history based on the brief World Health Organization screening items,²⁵ and screened for hazardous alcohol use with the Modified Alcohol Use Disorders Identification Test (AUDIT-C).²⁶

Statistical Analyses

All analyses were conducted with SPSS version 25. Group comparisons were made by between-group analyses of variance for dimensional variables, with significant overall results followed up with Bonferroni pairwise comparisons. Chi square tests were used to compare groups on categorical variables. We also present descriptive statistics on the sample of women with BII to describe the onset, course, and other features of their condition.

RESULTS

Demographic Characteristics

The demographic characteristics of the sample are reported in [Table 1](#). The age range of participants was 20 to 76 years (mean [standard deviation], 42.2 [11.9]). The majority of women were from the United States or Canada (68.5%), were married (61.4%) and had children (74.5%), had completed high school (23.2%) or a university/college degree (54.5%), and were in full-time (39.2%) or part-time

Table 1. Demographic Characteristics of Sample

	BII—implants in place (n = 51)		BII—explanted (n = 60)		No BII (n = 54)		Statistics
	Mean	SD	Mean	SD	Mean	SD	
Age (years)	44.9	11.4	44.5	11.5	37.4	11.5	$F(2,155) = 7.22, P = 0.001$
	n	%	n	%	n	%	
Children							$\chi^2(2) = 5.68, P = 0.059$
Yes	41	80.4	48	80.0	34	63.0	
No	10	19.6	12	20.0	20	37.0	
Marital status							$\chi^2(8) = 15.22, P = 0.055$
Never married	9	17.6	7	11.7	16	29.6	
Married/de facto	28	54.9	41	68.3	33	61.1	
Divorced/separated/widowed	14	27.4	12	20.0	5	9.3	
Education							$\chi^2(8) = 17.83, P = 0.023$
Less than high school	2	3.9	3	5.0	1	1.9	
High school	17	33.3	14	23.3	7	13.0	
Undergraduate degree	16	31.4	19	31.7	31	57.4	
Postgraduate degree	4	7.8	10	16.7	10	18.5	
Other	12	23.5	14	23.3	5	9.3	
Employment status							$\chi^2(12) = 27.22, P = 0.007$
Full-time paid work	19	37.3	17	28.3	28	51.9	
Part-time paid work	8	15.7	12	20.0	5	9.3	
At home parent	5	9.8	8	13.3	12	22.2	
Student	3	5.9	0	0.0	5	9.3	
Retired	3	5.9	4	6.7	1	1.9	
Not working—sick/disabled	8	15.7	12	20.0	0	0.0	
Not working—other	5	9.8	7	11.7	3	5.6	
Region							$\chi^2(12) = 27.22, P = 0.007$
North America (USA and Canada)	30	58.8	35	58.3	48	88.9	
Australia/New Zealand	10	19.6	12	20.0	1	1.9	
South America	3	5.9	3	5.0	0	0.0	
Europe	7	13.8	7	11.7	3	5.6	
Africa	0	0.0	2	3.3	0	0.0	
Not reported	1	2.0	1	1.7	2	3.7	

BII, breast implant illness; SD, standard deviation.

(15%) paid work. Groups did not significantly differ in their parental or marital status. Women with BII were significantly older than those without BII. Groups also differed in their education and employment status. Multinomial

logistic regression, with BII group as the dependent variable, and education level, and employment status as categorical predictor variables, revealed that women with BII who had their implants in place were less likely to have a

bachelor's degree, and masters or doctoral degree, and more likely to be out of work due to sickness and/or disability compared with the group without BII. The BII explant group were also less likely than the group without BII to have a bachelor's degree.

Surgical History

Table 2 presents data on participants' surgical history. On average, participants reported undergoing surgery 10 years prior to completing the study. The majority of women reported having surgery on both breasts (97.4%), for augmentation purposes (80.4%), and having silicone implants (69.7%). Four in 5 women reported that their implants were placed below the muscle (80.0%), and that the incision was underneath the breast (72.7%). The majority of women had implants manufactured by either Allergan plc (Dublin, Ireland) or Mentor (Santa Barbara, CA) (63.3%). Women without BII reported having undergone implant surgery more recently than women with BII. A greater proportion of women without BII had silicone implants than women with BII. A smaller proportion of women with BII who had their implants in place reported having smooth implants compared with the other 2 groups, although almost one-third of women with BII who had their implants in place reported being unsure of the surface type of their implant. There were no between-group differences in implant or incision placement.

Medical Diagnoses

Most of the women with BII (90.1%) reported having been diagnosed with a medical condition, whereas only 27% of women without BII had a diagnosed medical condition. Women with BII were significantly more likely than women without BII to have received a diagnosis of all listed medical conditions except for diabetes and Raynaud's syndrome (see Table 3).

Online Health Information and Support

Almost all women with BII (98.2%) reported accessing online sources of support, including social media support groups (90.1%), BII webpages (68.5%), general web searches (50.5%), and health websites (45.0%). Women with BII reported engaging in online searches related to health, symptoms, or treatment, and accessing social media pages/support groups related to BII more frequently than women without BII (see Supplemental Table 1). Almost two-thirds of women with BII reported that participating in social media support groups made them more aware or worried about symptoms (61.3%). A small proportion of women reported experiencing pressure from the online community to remove their implants (7.2%), and bullying or

negative comments from others regarding their choice to keep their implants (2%).

Symptom Reporting

Compared to women without BII, those with BII who had their implants in place reported more severe symptoms across every symptom that was assessed (see Table 4), except for convulsions and/or seizures which did not differ between groups. Participants in the BII (explant) group also reported more severe symptoms than the group without BII across all symptoms except for vomiting, increased appetite, and acne. Finally, comparisons between the 2 BII groups revealed that those who reported having BII and still had their implants in place reported more severe ratings across the majority of symptoms.

Mental and Physical Health

Table 5 presents data on participants' mental and physical health. Women with BII who had their implants in place had significantly higher scores on the HADS (depression and anxiety) and the Whiteley-6 (health anxiety) compared both with women with BII who had explanted and women without BII. The total and subscale scores of women with BII who had explanted were also significantly higher than those of women without BII.

The majority of women with BII rated their health as "fair" or "poor" (implants in place, 68.6%; explanted, 51.6%), whereas the majority of women without BII rated their health as "very good" or "excellent" (85.2%). Women with BII who had their implants in place had a significantly higher average self-reported BMI than women without BII, whereas women with BII who had explanted did not differ in their BMI from the other 2 groups. There was a higher proportion of current smokers in the BII (implants in place) group. Comparisons of the AUDIT-C alcohol screening measure showed that both groups of women with BII had lower alcohol use than those without BII. Groups did not differ in physical activity levels.

Characterizing the Experiences of Women With BII

The following analyses provide descriptive statistics of the experiences of the 111 women who self-identified as having BII.

Symptom Onset and Course

Over half (51.3%) reported symptom onset within 1 year post surgery, and two-thirds (66.7%) within 2 years post surgery (see Table 6). The majority (80.2%) of women reported that their symptoms had changed over time, whereas 18 reported that their symptoms were the same or similar since onset (4 women did not know).

Table 2. Participants' Surgical History

	BII—implants in place (n = 51)		BII—explanted (n = 60)		No BII (n = 54)		Statistics
	Mean	SD	Mean	SD	Mean	SD	
Years since implant	11.6	8.9	12.7	9.0	4.7	5.6	$F(2,159) = 15.89, P < 0.001$
	n	%	n	%	n	%	
Surgery							$\chi^2(4) = 4.84, P = 0.304$
Both breasts	51	100.0	56	93.3	53	98.1	
Left	0	0.0	3	5.0	1	1.9	
Right	0	0.0	1	1.7	0	0.0	
Reason for surgery							$\chi^2(4) = 7.20, P = 0.126$
Augmentation	41	80.4	43	71.7	49	90.7	
Reconstruction	6	11.8	8	13.3	2	3.7	
Other	4	7.8	9	15.0	3	5.6	
Type of implant							$\chi^2(4) = 12.02, P = 0.017$
Saline	14	27.5	21	35.0	8	14.8	
Silicone	32	62.7	38	63.3	45	83.3	
Don't know	5	9.8	1	1.7	1	1.9	
Implant surface							$\chi^2(4) = 14.290, P = 0.006$
Textured	21	41.2	18	30.0	13	24.1	
Smooth	16	31.4	37	61.7	32	59.3	
Don't know	14	27.5	5	8.3	9	16.7	
Implant placement							$\chi^2(4) = 4.40, P = 0.355$
Above muscle	9	17.6	8	13.3	7	13.3	
Below muscle	37	72.5	51	85.0	44	81.5	
Don't know	5	9.8	1	1.7	3	5.6	
Incision placement							$\chi^2(8) = 12.22, P = 0.142$
Armpit	2	3.9	2	3.3	2	3.7	
Underneath breast	37	72.5	38	63.3	46	85.2	
Around areola	6	11.8	15	25.0	5	9.3	
Belly button	1	2.0	0	0.0	0	0.0	
Other	5	9.8	5	8.3	1	1.9	
Manufacturer							$\chi^2(6) = 31.25, P < 0.001$
Allergan	18	35.3	13	21.7	20	37.0	
Mentor	14	27.5	32	53.3	8	14.8	
Other	2	3.9	10	16.7	6	11.1	
Don't know	17	33.3	5	8.3	20	37.0	

BII, breast implant illness; SD, standard deviation.

Table 3. Self-Reported Medical Diagnoses

	BII—implants in place		BII—explanted		No BII		Statistics
	n	%	n	%	n	%	
Fibromyalgia	16	31.4	27	45.0	1	1.9	$\chi^2(2) = 27.89, P < 0.001$
Hashimoto's disease	9	17.6	15	25.0	0	0.0	$\chi^2(2) = 14.86, P = 0.001$
Irritable bowel syndrome	22	43.1	29	48.3	6	11.1	$\chi^2(2) = 19.82, P < 0.001$
Gastrointestinal/digestive issues	29	56.9	31	51.7	8	14.8	$\chi^2(2) = 23.39, P < 0.001$
Breast cancer	5	9.8	9	15.0	1	1.9	$\chi^2(2) = 5.99, P = 0.05$
Other cancers	1	2.0	5	8.3	2	10.0	$\chi^2(2) = 6.22, P = 0.045$
Diabetes	3	5.9	1	1.7	1	1.9	$\chi^2(2) = 2.05, P = 0.359$
Osteoarthritis	8	15.7	11	18.3	2	3.7	$\chi^2(2) = 6.06, P = 0.048$
Rheumatoid arthritis	14	27.5	7	11.7	0	0.0	$\chi^2(2) = 17.89, P < 0.001$
Vertigo	11	21.6	28	46.7	0	0.0	$\chi^2(2) = 34.47, P < 0.001$
Raynaud's syndrome	4	7.8	10	16.7	5	9.3	$\chi^2(2) = 2.51, P = 0.285$
Endocrine dysfunction	7	13.7	17	28.3	2	3.7	$\chi^2(2) = 13.22, P = 0.001$
Neurological abnormalities	8	15.7	24	40.0	0	0.0	$\chi^2(2) = 29.74, P < 0.001$
Other	18	35.3	30	50.0	5	9.3	$\chi^2(2) = 40.64, P < 0.001$

BII, breast implant illness.

Support Services

Almost all women with BII (99.1%) reported seeking help from a health professional about their symptoms. Approximately 87% of women reported seeking help from their general practitioner, and 66.7% of women reported seeking help from their plastic surgeon. Other health professionals from whom women reported seeking help included naturopaths (41.4%), psychologists (36.0%), psychiatrists (25.2%), rheumatologists (21.6%), exercise physiologists (13.5%), neurologists (9.9%), and gynecologists (6.3%).

Lifestyle Changes

The majority of women with BII (86.5%) reported having made changes to their lifestyle to try and control their symptoms, including changes in diet (76.6%), abstinence from, or reduction in, alcohol consumption (27.9%), changes in physical activity (15.3%), the use of supplements (12.6%) and medication (6.3%), and detoxification (10.8%).

Beliefs About the Causes of Symptoms and Recovery

Among women with BII, 24% of women reported believing that their symptoms were generally related to implants, whereas 76% had more specific beliefs about the causes of their symptoms. Almost 50% of women believed that their symptoms were due to the body's immune response fighting a foreign object, whereas 29% of women reported it as being due to toxic chemicals in the shell or the implant itself. Less common beliefs regarding the cause of

symptoms included ruptures, genetic vulnerabilities, or implant placement.

On average, women with BII who had their implants in place believed there was a 44.6% [40.1%] chance of their symptoms resolving, whereas women with BII who explanted believed there was a 61.4% [32.3%] chance of their symptoms resolving.

DISCUSSION

BII is being recognized as a growing complaint among women with breast implants, leading to increasing numbers of requests for explant surgery. To our knowledge, this is the first study to describe the experiences of women who self-report having BII, and the first to compare their symptom profiles, demographic characteristics, and mental and physical health with those of women without BII. Our overall aim was to improve current understanding and knowledge about BII, and to inform existing theories, and future research into prevention and treatments.

Our results shed light on the onset, course, and impact of BII. The majority of women with BII reported that the onset of their symptoms occurred within 2 years following surgery and that their symptoms changed over time and had worsened in severity since onset. Overall, women with BII had more severe somatic symptoms, higher depression and anxiety severity, more severe anxiety about their

Table 4. Self-Reported Physical Symptom Severity

	BII—implants in place		BII—explanted		No BII		Statistic			
	Mean	SD	Mean	SD	Mean	SD	Overall test	BII—implants in place vs no BII	BII—explanted vs no BII	BII—implants in place vs BII—explanted
GASE questionnaire										
Headache(s)	2.0	0.9	1.3	1.0	0.7	0.7	$F(2,158) = 26.313, P < 0.001$	$P < 0.001$	$P < 0.01$	$P < 0.001$
Hair loss	1.6	0.9	0.8	0.9	0.2	0.4	$F(2,158) = 41.011, P < 0.001$	$P < 0.001$	$P < 0.001$	$P < 0.001$
Dry mouth	1.5	1.1	1.0	1.0	0.3	0.5	$F(2,158) = 25.044, P < 0.001$	$P < 0.001$	$P < 0.001$	$P < 0.01$
Cough ^a	1.0	1.0	0.7	0.8	0.3	0.5	$F(2,158) = 12.002, P < 0.001$	$P < 0.001$	$P < 0.01$	NS
Congested and/or runny nose ^a	1.3	1.0	1.2	0.9	0.6	0.8	$F(2,158) = 9.478, P < 0.001$	$P < 0.001$	$P < 0.01$	NS
Dizziness	1.4	1.0	1.0	1.0	0.2	0.5	$F(2,158) = 25.969, P < 0.001$	$P < 0.001$	$P < 0.001$	NS
Ear and/or hearing problems ^a	1.5	1.2	1.1	1.1	0.3	0.6	$F(2,158) = 21.301, P < 0.001$	$P < 0.001$	$P < 0.001$	NS
Eye and/or vision problems ^a	1.9	0.8	1.3	1.0	0.2	0.5	$F(2,158) = 53.482, P < 0.001$	$P < 0.001$	$P < 0.001$	$P < 0.01$
Chest pain(s)	1.3	1.0	0.9	0.9	0.1	0.5	$F(2,158) = 23.680, P < 0.001$	$P < 0.001$	$P < 0.001$	NS
Palpitations and/or irregular heartbeat	1.2	1.0	1.0	1.0	0.1	0.3	$F(2,158) = 25.859, P < 0.001$	$P < 0.001$	$P < 0.001$	NS
Breathing problems	1.4	0.9	1.0	1.0	0.2	0.5	$F(2,158) = 28.357, P < 0.001$	$P < 0.001$	$P < 0.001$	NS
Low blood pressure	1.8	0.9	0.7	0.9	0.1	0.5	$F(2,158) = 10.672, P < 0.001$	$P < 0.001$	$P < 0.01$	NS
Cold hands or feet or other circulation problems	1.6	1.1	1.2	1.0	0.4	0.7	$F(2,158) = 21.490, P < 0.001$	$P < 0.001$	$P < 0.001$	NS
Abdominal pain	1.5	1.0	0.9	1.0	0.1	0.3	$F(2,158) = 38.050, P < 0.001$	$P < 0.001$	$P < 0.001$	$P < 0.001$
Upset stomach or indigestion ^a	1.7	1.0	1.2	0.9	0.4	0.7	$F(2,158) = 28.135, P < 0.001$	$P < 0.001$	$P < 0.001$	$P < 0.05$
Nausea	1.3	1.1	0.9	1.0	0.3	0.6	$F(2,158) = 15.030, P < 0.001$	$P < 0.001$	$P < 0.01$	$P < 0.05$
Vomiting	0.4	0.8	0.2	0.6	0.1	0.3	$F(2,158) = 3.861, P = 0.023$	$P < 0.05$	NS	NS
Constipation	1.3	1.1	0.9	1.0	0.2	0.5	$F(2,158) = 18.795, P < 0.001$	$P < 0.001$	$P < 0.001$	NS
Diarrhea	0.9	1.0	0.6	0.9	0.2	0.6	$F(2,158) = 8.272, P < 0.001$	$P < 0.001$	$P < 0.05$	NS
Reduced appetite	0.9	1.1	0.7	0.9	0.1	0.3	$F(2,158) = 13.288, P < 0.001$	$P < 0.001$	$P < 0.01$	NS
Increased appetite	0.7	1.0	0.4	0.7	0.2	0.6	$F(2,158) = 4.682, P = 0.011$	$P < 0.01$	NS	NS
Skin itching and/or rash	1.8	1.0	1.1	1.1	0.2	0.6	$F(2,158) = 35.468, P < 0.001$	$P < 0.001$	$P < 0.001$	$P < 0.001$
Tendency to develop bruises	1.8	1.0	1.1	1.0	0.5	0.8	$F(2,158) = 25.413, P < 0.001$	$P < 0.001$	$P < 0.01$	$P < 0.001$
Numbness and/or tingling sensations ^a	2.1	0.9	1.2	0.9	0.4	0.8	$F(2,158) = 54.208, P < 0.001$	$P < 0.001$	$P < 0.001$	$P < 0.001$
Fever and/or increased temperature	1.1	1.2	0.5	0.8	0.1	0.3	$F(2,158) = 21.667, P < 0.001$	$P < 0.001$	$P < 0.05$	$P < 0.01$
Abnormal sweating	1.7	1.2	1.1	1.2	0.2	0.5	$F(2,158) = 30.074, P < 0.001$	$P < 0.001$	$P < 0.001$	$P < 0.01$
Hot flushes	1.6	1.1	0.9	1.0	0.3	0.5	$F(2,158) = 30.130, P < 0.001$	$P < 0.001$	$P < 0.01$	$P < 0.001$
Convulsions and/or seizures	0.0	0.2	0.1	0.4	0.0	0.0	$F(2,158) = 1.545, P = 0.217$	NS	NS	NS
Fatigue and/or loss of energy	2.7	0.6	1.9	0.9	0.5	0.8	$F(2,158) = 98.062, P < 0.001$	$P < 0.001$	$P < 0.001$	$P < 0.001$
Drowsiness ^a	2.2	0.9	1.1	1.0	0.3	0.6	$F(2,158) = 59.894, P < 0.001$	$P < 0.001$	$P < 0.001$	$P < 0.001$

Table 4. Continued

	BII—implants in place		BII—explanted		No BII		Statistic			
	Mean	SD	Mean	SD	Mean	SD	Overall test	BII—implants in place vs no BII	BII—explanted vs no BII	BII—implants in place vs BII—explanted
Tremor and/or muscle spasms	1.5	1.1	1.0	1.0	0.0	0.2	$F(2,158) = 37.471, P < 0.001$	$P < 0.001$	$P < 0.001$	$P < 0.01$
Memory problems ^a	2.3	0.8	1.5	1.1	0.2	0.5	$F(2,158) = 85.651, P < 0.001$	$P < 0.001$	$P < 0.001$	$P < 0.001$
Difficulty concentrating ^a	2.2	0.8	1.5	1.1	0.4	0.7	$F(2,158) = 54.395, P < 0.001$	$P < 0.001$	$P < 0.001$	$P < 0.001$
Insomnia and/or sleeping problems	2.6	0.6	1.6	1.1	0.5	0.8	$F(2,158) = 68.228, P < 0.001$	$P < 0.001$	$P < 0.001$	$P < 0.001$
Nightmares and/or abnormal dreams	1.3	1.0	0.8	0.9	0.2	0.5	$F(2,158) = 20.936, P < 0.001$	$P < 0.001$	$P < 0.01$	$P < 0.01$
Neck pain	2.0	1.1	1.3	1.1	0.3	0.7	$F(2,158) = 40.631, P < 0.001$	$P < 0.001$	$P < 0.001$	$P < 0.01$
Back pain	2.2	0.8	1.2	1.1	0.4	0.7	$F(2,158) = 50.754, P < 0.001$	$P < 0.001$	$P < 0.001$	$P < 0.001$
Muscle pain	2.0	1.0	1.4	1.0	0.3	0.7	$F(2,158) = 44.645, P < 0.001$	$P < 0.001$	$P < 0.001$	$P < 0.01$
Muscle weakness ^a	1.9	1.0	1.2	1.0	0.2	0.5	$F(2,158) = 49.586, P < 0.001$	$P < 0.001$	$P < 0.001$	$P < 0.001$
Joint pain	2.2	0.9	1.5	1.0	0.4	0.8	$F(2,158) = 52.118, P < 0.001$	$P < 0.001$	$P < 0.001$	$P < 0.001$
Difficulty urinating	0.6	0.9	0.4	0.8	0.0	0.1	$F(2,158) = 10.021, P < 0.001$	$P < 0.001$	$P < 0.05$	NS
Problems with sexual performance and/or sex organs	1.4	1.2	1.0	1.1	0.1	0.3	$F(2,158) = 25.171, P < 0.001$	$P < 0.001$	$P < 0.001$	NS
Additional symptoms										
Itchy eyes	1.7	1.0	1.2	1.1	0.1	0.4	$F(2,157) = 37.974, P < 0.001$	$P < 0.001$	$P < 0.001$	NS
Pain or burning sensation around implant and/or underarms	1.4	1.1	0.9	1.1	0.1	0.5	$F(2,157) = 26.065, P < 0.001$	$P < 0.001$	$P < 0.001$	$P < 0.01$
Reflux	1.1	1.1	0.7	1.0	0.2	0.4	$F(2,157) = 14.699, P < 0.001$	$P < 0.001$	$P < 0.01$	$P < 0.05$
Fungal infections	0.6	0.9	0.6	0.9	0.0	0.0	$F(2,157) = 11.243, P < 0.001$	$P < 0.001$	$P < 0.001$	NS
Intolerance to heat or cold	1.6	1.1	1.4	1.1	0.1	0.4	$F(2,157) = 43.313, P < 0.001$	$P < 0.001$	$P < 0.001$	NS
Body odor	1.4	1.2	0.9	1.0	0.1	0.3	$F(2,157) = 25.791, P < 0.001$	$P < 0.001$	$P < 0.001$	NS
Frequent urination	1.3	1.1	0.9	1.0	0.1	0.3	$F(2,157) = 23.873, P < 0.001$	$P < 0.001$	$P < 0.001$	NS
Weight problems	1.6	1.1	1.2	1.1	0.3	0.6	$F(2,157) = 24.556, P < 0.001$	$P < 0.001$	$P < 0.001$	NS
Low libido	2.0	1.2	1.5	1.2	0.3	0.5	$F(2,157) = 36.745, P < 0.001$	$P < 0.001$	$P < 0.001$	NS
Night sweats	1.5	1.1	1.1	1.1	0.31	0.6	$F(2,157) = 19.203, P < 0.001$	$P < 0.001$	$P < 0.001$	NS
Panic attacks	1.3	1.1	0.8	0.9	0.3	0.7	$F(2,157) = 16.544, P < 0.001$	$P < 0.001$	$P < 0.01$	$P < 0.05$
Anxiety	2.0	0.9	1.4	0.9	0.7	0.8	$F(2,157) = 25.918, P < 0.001$	$P < 0.001$	$P < 0.001$	$P < 0.01$
Depression	1.8	1.01	1.1	1.0	0.5	0.8	$F(2,157) = 26.658, P < 0.001$	$P < 0.001$	$P < 0.01$	$P < 0.001$
Photosensitivity	1.6	1.1	1.2	1.1	0.2	0.6	$F(2,157) = 29.870, P < 0.001$	$P < 0.001$	$P < 0.001$	NS
Acne	0.9	1.0	0.4	0.7	0.3	0.6	$F(2,157) = 8.669, P < 0.001$	$P < 0.01$	NS	$P < 0.01$

BII, breast implant illness; NS, nonsignificant ($P > 0.05$). SD, standard deviation. ^aCommon symptoms of BII that are not included in the original General Assessment of Side Effects Scale.

health, more diagnosed medical conditions, higher rates of current smoking, and higher BMIs than those without BII. The high rates of depression and anxiety experienced by these women is concerning, indicating that proactive screening and treatment of depression, anxiety, and health

anxiety is warranted in women self-identified as having BII. In the current sample, only 36% and 25.5% of participants had seen a psychologist and a psychiatrist, respectively. Longitudinal research is needed to examine whether pre-existing mental health problems or medical conditions are

Table 5. Psychological Distress, Health Anxiety, Alcohol Use, Physical Activity, and Self-Rated Health

	BII—implants in place		BII—explanted		No BII		Statistic			
	Mean	SD	Mean	SD	Mean	SD	Overall test	BII—implants vs no BII	BII—explanted vs no BII	BII—implants vs BII—explanted
HADS										
Total	24.59	6.84	19.71	7.94	11.55	5.99	$F(2,155) = 45.243, P < 0.001$	$P < 0.001$	$P < 0.001$	$P < 0.01$
Depression subscale	12.29	3.62	10.38	3.84	5.90	2.47	$F(2,155) = 48.196, P < 0.001$	$P < 0.001$	$P < 0.001$	$P < 0.05$
Anxiety subscale	12.29	4.21	9.25	4.71	5.65	4.12	$F(2,156) = 27.614, P < 0.001$	$P < 0.001$	$P < 0.001$	$P < 0.01$
Whiteley-6										
Total	23.44	6.02	20.04	6.27	10.74	5.86	$F(2,154) = 59.162, P < 0.001$	$P < 0.001$	$P < 0.001$	$P < 0.05$
Health worry subscale	11.42	3.15	9.74	3.47	6.12	3.22	$F(2,154) = 34.015, P < 0.001$	$P < 0.001$	$P < 0.001$	$P < 0.05$
Body preoccupation subscale	12.02	3.29	10.30	3.41	4.62	3.06	$F(2,154) = 71.004, P < 0.001$	$P < 0.001$	$P < 0.001$	$P < 0.05$
Physical health										
BMI	27.09	5.77	25.21	4.10	24.13	3.68	$F(2,154) = 5.34, P = 0.006$	$P < 0.01$	NS	NS
Physical activity vital sign	124.50	140.96	186.75	267.75	185.73	143.43	$F(2,152) = 1.65, P = 0.20$	NS	NS	NS
AUDIT-C	2.94	2.38	2.09	2.33	4.24	2.07	$F(2,152) = 11.88, P < 0.001$	$P < 0.05$	$P < 0.001$	NS
	n	%	n	%	n	%				
Self-rated health										
Excellent	3	5.9	5	8.3	23	42.6	$\chi^2(8) = 78.80, P < 0.001$	—	—	—
Very good	5	9.8	6	10.0	23	42.6				
Good	8	15.7	18	30.0	6	11.1				
Fair	18	35.3	14	23.3	2	3.9				
Poor	17	33.3	17	28.3	0	0.0				
Current tobacco smoker	12	23.5	4	6.6	4	7.4				

AUDIT-C, Modified Alcohol Use Disorders Identification Test; BII, breast implant illness; BMI, body mass index; HADS, Hospital Anxiety and Depression Scale; NS, nonsignificant ($P > 0.05$).

Table 6. Onset of Symptoms Post-Surgery

	n	%
Immediately after surgery	11	9.9
Within 1 month	13	11.7
1-6 months	14	12.6
6-12 months	19	17.1
1-2 years	17	15.3
2-3 years	7	6.3
3-4 years	7	6.3
4-5 years	8	7.2
>5 years	15	13.5

risk factors for developing BII after implant surgery, or are a direct consequence of BII, and whether these problems resolve following explant.

This study provides insight into where women with BII turn to for support, and the strategies they use to self-manage their symptoms. Our data showed that women with BII sought help and advice from both online sources and trained health professionals, the most common being general practitioners and plastic surgeons. The most common self-management strategies were changes in diet, reduction or elimination of alcohol, and increased exercise. Unsurprisingly, the majority with BII reported seeking support from the internet, with 71% accessing online BII support groups on a daily, or near-daily basis. Social media platforms provide a powerful way to connect with supports, feel heard and understood, and seek out

women who share similar experiences. However, some experts have argued that social media groups are causing and perpetuating heightened emotion and anxiety about BII, and encouraging women to self-diagnose BII rather than seeking rigorous medical work-up to rule out other potential causes of their symptoms.⁶ Moreover, there has been concern that women on these groups have shared nonmedical advice, steering patients towards potentially dangerous and unnecessary medical procedures. Notably, over 90% of women with BII sought advice and support from trained medical professionals including general practitioners and plastic surgeons, and other health professionals, such as naturopaths. These data suggest that they did not appear to self-diagnose BII without seeking medical advice. Nevertheless, the dynamic between social media influence and patient belief and action is complex and still being examined. Longitudinal research is needed to determine the time course of support-seeking, which can help to determine whether these women turn to social media because medical support has been lacking, or whether online information first prompts these women to question the role of their implants in causing their symptoms, and to seek medical care and advice.

The role of social media, BII support groups, and health anxiety appears to be more complicated. Our data indicated that women with BII had higher overall health anxiety and preoccupation with their bodily symptoms than those without BII. In addition, almost two-thirds felt that the social media groups made them feel more anxious or aware of their symptoms. These findings are consistent with literature demonstrating a positive correlation between online searching for health information and health anxiety.²⁷ However, it is worth noting that there is research showing that actual health status also predicts more frequent online searches for health information.²⁸⁻³⁰ Although our results suggest that social media platforms may be exacerbating health anxiety for a significant proportion of women with BII, further experimental and longitudinal research is needed to determine whether online support groups directly cause, or exacerbate, health anxiety in women with BII.

Past research has shown that explant surgery may be effective in reducing symptoms of BII.^{7,10,31} We therefore expected the BII explant group to be more similar to the control group in their self-reported physical and mental health. However, our results showed that women who had undergone explant surgery were still experiencing more severe physical symptoms, poorer mental health, and poorer overall health than women without BII, despite experiencing less distress, less severe somatic symptoms, and slightly better physical health compared with those with BII who still had their implants. The only positive health result for women with BII was lower alcohol use, likely driven by the reduction of alcohol as a means to self-manage their

symptoms. Our findings suggest that explant surgery may not be a cure for BII, and that symptoms may not resolve entirely following explant. Longitudinal cohort studies with pre, post and multiple follow-up assessments after explant surgery are needed to investigate whether this is, indeed, the case. These studies can also be used to identify individual difference variables that predict long-term outcomes (eg, body preoccupation, age, symptom severity, time since implant surgery, preexisting medical conditions) following explant. Nonetheless, it is important that the surgeon respects the patient's wishes if they choose to remove their implants, but also stresses to patients that the mechanisms by which implants may cause symptoms are unclear¹⁰ and that there are potential risks of undergoing surgery.³²

Understanding women's beliefs about the causes of their illness is important because beliefs can influence healthcare seeking, treatment decision-making, and other behavioral responses to illness and symptoms.³³⁻³⁵ It is also important to inform educational, prevention, and intervention programs, and future research, that answers the questions of greatest importance to patients. The two most common beliefs about the causes, not counting nonspecific "breast implants," were that the implants are being "rejected" as a foreign body, weakening the immune system, and that toxic chemicals are leaching into the bloodstream. In women with BII, these beliefs may influence where they seek help (eg, medical vs social media), decisions about explantation, and other health behaviors such as reducing alcohol to detox the body. Notably, there is currently no empirical evidence linking breast implants to neurotoxicity or an autoimmune response. Although popular BII websites list a variety of heavy metals as ingredients of implants, trace elements that are present in implants are known to be below acceptable levels as defined by regulatory bodies.³⁶ The only heavy metal used in the manufacturing process is platinum, which is present at a zero valence state and at a level that has no known toxicity.³⁷ Furthermore, some patients who have undergone explant have reported a very rapid relief of symptoms after implant removal, which would be unexpected if chemical/metal toxicity or an immune system response was involved. However, it remains possible that there are other factors associated with breast implants, such as the growth of bacteria,⁷ which may underlie symptoms. Nonetheless, the mismatch between patient beliefs and the current literature highlights the need for surgeons to educate patients with the most up-to-date scientific evidence regarding the safety of breast implants.

Limitations

There are a number of limitations of the current study. First, the sample was self-selected, making it possible that

symptomatic women were selectively recruited, and that the results may not generalize to general population cohorts. Second, the study solely comprised retrospective, self-reported measures, which may be influenced by demand effects and recall biases. Third, a number of demographic and other characteristics differed between women with and without BII, such as age, time since surgery, and implant type and manufacturer. For instance, women with BII were older, and had undergone surgery earlier than women without BII. It is possible that age and time since surgery serve as risk factors or predictors of BII. It is also possible that these variables confounded the results. For instance, symptoms reported by women with BII may at least partly be due to aging. Stronger conclusions about the symptom profile could have been drawn through the inclusion of additional control groups, including age-matched women who have never had implants, and women who have had their implants removed for reasons other than symptoms of BII. An additional limitation of the current study was that the only thyroid condition participants were assessed for was Hashimoto's disease. Participants were not asked about other thyroid conditions, such as thyroiditis and hypothyroidism. These conditions share similar symptoms to BII, and may have therefore accounted for the symptoms reported by participants in the current study. Finally, the study was cross-sectional, meaning we were unable to determine causal relations between variables or monitor symptom progress and long-term outcomes for each group. For instance, we were unable to determine whether symptoms of anxiety or depression were a cause or symptom of BII. Nevertheless, our results do indicate the utility of longitudinal studies to follow-up patients within the first 2 years after surgery to explore who is most at risk of developing unwanted symptoms following implant surgery.

CONCLUSIONS

These findings highlight the poor mental and physical health experienced by women with BII, and suggest that explant surgery may not completely cure these disabling symptoms. Longitudinal research needs to explore who is at greatest risk of developing BII and examine the efficacy of explant surgery at alleviating symptoms.

Supplemental Material

This article contains supplemental material located online at www.aestheticsurgeryjournal.com.

Disclosures

Drs Newby, Tang, and Faasse, and Ms Maria Sharrock, have no conflicts of interest to declare. Dr William Adams is an FDA IDE investigator for Motiva (Establishment Labs, Alejuela, Costa Rica).

Funding

This study was supported by an Aesthetic Surgery Education and Research Foundation (ASERF) grant. J.M.N. is supported by an Australian Medical Research Future Fund Career Development Fellowship (APP1145382). The MRFF and ASERF had no involvement in any aspect of the study, or the preparation of this manuscript.

REFERENCES

1. International Society of Aesthetic Plastic Surgery. *ISAPS International Survey on Aesthetic/Cosmetic Procedures Performed in 2018*. Hanover, NH: International Society of Aesthetic Plastic Surgery; 2018.
2. Sieber DA, Adams WP Jr. What's your micromort? A patient-oriented analysis of breast implant-associated anaplastic large cell lymphoma (BIA-ALCL). *Aesthet Surg J*. 2017;37(8):887-891.
3. The Aesthetic Society. The Aesthetic Society's cosmetic surgery national data bank: statistics 2019. *Aesthet Surg J*. 2020;40(Supplement_1):1-26.
4. Press RI, Peebles CL, Kumagai Y, Ochs RL, Tan EM. Antinuclear autoantibodies in women with silicone breast implants. *Lancet*. 1992;340(8831):1304-1307.
5. Cohen Tervaert JW, Colaris MJ, van der Hulst RR. Silicone breast implants and autoimmune rheumatic diseases: myth or reality. *Curr Opin Rheumatol*. 2017;29(4):348-354.
6. Jewell ML, Jewell HL. Breast implant-associated illness: medicine by belief, so says Dr Google. *Aesthet Surg J*. 2019;39(4):NP87-NP89.
7. Lee M, Ponraja G, McLeod K, Chong S. Breast implant illness: a biofilm hypothesis. *Plast Reconstr Surg Glob Open*. 2020;8(4):e2755.
8. Healing Breast Implant Illness. Breast implant illness symptoms. <https://www.healingbreastimplantillness.com/breast-implant-illness-symptoms/>. Published 2020. Accessed February 19, 2020.
9. Dush DM. Breast implants and illness: a model of psychological factors. *Ann Rheum Dis*. 2001;60(7):653-657.
10. Tang SYQ, Israel JS, Afifi AM. Breast implant illness: symptoms, patient concerns, and the power of social media. *Plast Reconstr Surg*. 2017;140(5):765e-766e.
11. McGuire PA, Haws MJ, Nahai F. Breast implant illness: how can we help? *Aesthet Surg J*. 2019;39(11):1260-1263.
12. Magnusson MR, Cooter RD, Rakhorst H, McGuire PA, Adams WP Jr, Deva AK. Breast implant illness: a way forward. *Plast Reconstr Surg*. 2019;143(3S A Review of Breast Implant-Associated Anaplastic Large Cell Lymphoma):74S-81S.
13. *Qualtrics Survey Software [computer program]*. Provo, UT: Qualtrics; 2016.
14. Rief W, Glombiewski JA, Barsky AJ. *Generic Assessment of Side Effects: GASE*. 2009. www.GASE-scale.com. Accessed December 22, 2020.
15. Petrie KJ, Faasse K, Crichton F, Grey A. How common are symptoms? Evidence from a New Zealand national telephone survey. *BMJ Open*. 2014;4(6):e005374.
16. Bjelland I, Dahl AA, Haug TT, Neckelmann D. The validity of the Hospital Anxiety and Depression Scale. An updated literature review. *J Psychosom Res*. 2002;52(2):69-77.

17. Asmundson GJR, Carleton NR, Bovell CV, Taylor S. Comparison of unitary and multidimensional models of the Whiteley Index in a nonclinical sample: implications for understanding and assessing health anxiety. *J Cogn Psychoth.* 2008;22(2):87-96.
18. Zigmond AS, Snaith RP. The Hospital Anxiety and Depression Scale. *Acta Psychiatr Scand.* 1983;67(6):361-370.
19. Fergus TA. Repetitive thought and health anxiety: tests of specificity. *J Psychopathol Behav Assess.* 2013;35(3):366-374.
20. Fergus TA, Kelley LP, Griggs JO. The Whiteley Index-6: an examination of measurement invariance among self-identifying Black, Latino, and White respondents in primary care. *Assess.* 2018;25(2):247-258.
21. Fergus TA, Limbers CA, Griggs JO, Kelley LP. Somatic symptom severity among primary care patients who are obese: examining the unique contributions of anxiety sensitivity, discomfort intolerance, and health anxiety. *J Behav Med.* 2018;41(1):43-51.
22. Fergus TA, Kelley LP, Griggs JO. Examining the Whiteley Index-6 as a screener for DSM-5 presentations of severe health anxiety in primary care. *J Psychosom Res.* 2019;127:109839.
23. Schnittker J, Bacak V. The increasing predictive validity of self-rated health. *PLoS One.* 2014;9(1):e84933.
24. Greenwood JL, Joy EA, Stanford JB. The Physical Activity Vital Sign: a primary care tool to guide counseling for obesity. *J Phys Act Health.* 2010;7(5):571-576.
25. Centers for Disease Control and Prevention, World Health Organization. *Tobacco Questions for Surveys: A Subset of Key Questions from the Global Adult Tobacco Survey (GATS).* Atlanta, GA: World Health Organization; 2011.
26. Bush K, Kivlahan DR, McDonnell MB, Fihn SD, Bradley KA. The AUDIT alcohol consumption questions (AUDIT-C): an effective brief screening test for problem drinking. Ambulatory Care Quality Improvement Project (ACQUIP). Alcohol Use Disorders Identification Test. *Arch Intern Med.* 1998;158(16):1789-1795.
27. McMullan RD, Berle D, Arnáez S, Starcevic V. The relationships between health anxiety, online health information seeking, and cyberchondria: systematic review and meta-analysis. *J Affect Disord.* 2019;245:270-278.
28. Rice RE. Influences, usage, and outcomes of internet health information searching: multivariate results from the Pew surveys. *Int J Med Inform.* 2006;75(1):8-28.
29. Bundorf MK, Wagner TH, Singer SJ, Baker LC. Who searches the internet for health information? *Health Serv Res.* 2006;41(3 Pt 1):819-836.
30. Goldner M. Using the internet and email for health purposes: the impact of health status. *Soc Sci Q.* 2006;87(3):690-710.
31. de Boer M, Colaris M, van der Hulst RRWJ, Cohen Tervaert JW. Is explantation of silicone breast implants useful in patients with complaints? *Immunol Res.* 2017;65(1):25-36.
32. McGuire PA, Deva AK, Glicksman CA, Adams WP Jr, Haws MJ. Management of asymptomatic patients with textured surface breast implants. *Aesthet Surg J Open Forum.* 2019;1(3):ojz025. doi: [10.1093/asjof/ojz025](https://doi.org/10.1093/asjof/ojz025). [Epub ahead of print].
33. Petrie KJ, Myrtveit SM, Partridge AH, Stephens M, Stanton AL. The relationship between the belief in a genetic cause for breast cancer and bilateral mastectomy. *Health Psychol.* 2015;34(5):473-476.
34. Petrie KJ, Weinman J. Patients' perceptions of their illness: the dynamo of volition in health care. *Curr Dir Psychol Sci.* 2012;21(1):60-65.
35. Weinman J, Petrie KJ, Sharpe N, Walker S. Causal attributions in patients and spouses following first-time myocardial infarction and subsequent lifestyle changes. *Br J Health Psychol.* 2000;5(3):263-273.
36. Wixtrom RN, Adams WP Jr. PSC deep dive—concerns about heavy metals in breast implant. 2020. <https://www.theplasticsurgerychannel.com/2020/01/21/psc-deep-dive-concerns-about-heavy-metals-in-breast-implants/>. Published 2020. Accessed June 26, 2020.
37. Wixtrom RN. Silicone breast implants and platinum. *Plast Reconstr Surg.* 2007;120(7 Suppl 1):118S-122S.