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## Mental Health and Psychosocial Characteristics of Breast Augmentation Patients

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**Abstract**

Cosmetic breast surgery experience and a wide range of mental health, psychosocial, and sociodemographic variables were assessed in the population-based Norwegian Mother and Child Cohort Study ( $N = 78,252$ ). Breast augmentation patients reported elevated mental health problems. Factors in the domains of physical appearance, drug use, relationships, and exposure to abuse were all related to breast augmentation. Adjusting for such factors reduced the relationships between breast augmentation surgery and all mental health problems to non-significance. Results indicate that the increased prevalence of mental health problems among breast augmentation patients has to be understood from multiple perspectives involving several psychosocial domains.

*Keywords:* cosmetic surgery, breast augmentation surgery, mental health, depression, MoBa

## Introduction

Breast augmentation surgery is one of the most popular cosmetic surgery procedures, as more than 300,000 operations were performed in 2015 in the United States alone (American Society for Aesthetic Plastic Surgery, 2016). In light of the relatively high prevalence it is of concern that breast augmentation surgery is associated with an increased risk of suicide (see Sarwer et al., 2007; Manoloudakis et al., 2015). The increased suicide rates may be a result of a higher prevalence of mental health problems among breast augmentation patients; however, there is a lack of large-scale epidemiological studies examining whether breast augmentation patients in fact more frequently experience mental health problems. This report aims to produce that information by using the population-based Norwegian Mother and Child Cohort Study (MoBa) and including more than 70,000 women. If a preponderance of mental health problems is indeed found, we aim to examine whether the specific psychosocial and sociodemographic profile of breast augmentation patients may serve as an explanation for the increased prevalence of mental health problems in this group. This study will thus provide important indications concerning whether and why breast augmentation patients experience higher rates of mental health problems.

There is solid evidence for the notion that breast augmentation patients have a two to three times higher risk of suicide than women in the normal population, as six epidemiological studies have found increased risk (see Sarwer et al., 2007; Manoloudakis et al., 2015). However, an increased risk of suicide is not necessarily an indicator for reduced mental health, because risk factors for suicide other than mental health problems may explain the breast augmentation surgery–suicide association (Sarwer et al., 2007). Reviews have noted that reliable research on whether cosmetic surgery patients in general, and breast augmentation patients in particular, have more mental health problems is scarce. Most studies examining the issue show several limitations, including the lack of appropriate control or

comparison groups and insufficient samples sizes (Sarwer et al., 2007; Brunton et al., 2014).

One exception is an Australian population-based study showing that cosmetic surgery patients in general scored lower on well-being and life satisfaction and reported more frequent use of medications for nerves and to help them sleep (Schofield et al., 2002).

Moreover, a Danish study reported that women with cosmetic breast implants more often had been admitted to a psychiatric hospital prior to surgery than patients with other types of surgery (Jacobsen et al., 2004). However, there is a need for population-based studies that provide a more comprehensive picture of how breast augmentation patients differ in mental health from both other cosmetic surgery patients and women with no cosmetic surgery experience.

Most importantly, research on potential causes of a preponderance of mental health problems among breast augmentation patients is lacking. Most of the literature in the field proposes that potential elevated levels of mental health problems among patients are not a direct effect of having had breast augmentation surgery. Rather, it is assumed that women with a particular psychosocial profile are more prone to seek augmentation surgery and that at the same time their specific profile is linked to a higher risk of mental health problems (see Sarwer et al., 2007; Manoloudakis et al., 2015). However, the specific nature of differences between breast augmentation patients and other women and how such differences are related to mental health problems has not yet been examined. In the following, we propose six potential explanations of why augmentation surgery is linked to mental health problems.

First, appearance-related factors and self-esteem may be of importance, because cosmetic surgery patients may be motivated to undergo surgery to enhance body image and, as a consequence, general self-esteem (Sarwer et al., 1998). If more negative body image and lower levels of self-esteem remain after surgery, patients may show more mental health problems, because negative body image and self-esteem have been consistently shown to be

prospectively related to mental health problems, such as depression (Orth and Robins, 2013; Stice and Bearman, 2001). However, few studies have examined whether after cosmetic surgery in general, patients have lower levels of body image and self-esteem compared to normative samples, and no studies have focused on breast augmentation patients in particular. We thus have limited information on the role of body image and self-esteem for women who have had cosmetic breast augmentation surgery.

Second, the potential preponderance of mental health problems in breast augmentation patients may be due to specific personality characteristics of patients, which in turn may increase the risk of mental health problems. The personality trait of neuroticism is of particular interest, as neuroticism is consistently associated with mental health problems (Lahey, 2009). Moreover, in one study, somewhat higher neuroticism scores were found in patients that had had cosmetic surgery than in women who had not (von Soest et al., 2009).

Third, mental health problems are associated with health risk behaviors and particularly drug use, including smoking, problematic alcohol usage and use and abuse of illicit drugs (Conway et al., 2006; Pedersen and von Soest, 2009). Research indicates that cosmetic surgery patients use more substances than other women: For example, one study found that smoking and alcohol use were associated with an increased probability of cosmetic surgery (Schofield et al., 2002). Similarly, two other studies found that breast augmentation patients were more prone to smoke; however, augmentation patients did not use alcohol more frequently in these studies than other women (Kjøller et al., 2003; Fryzek et al., 2000). The relationship between cosmetic surgery and mental health problems may thus be explained by increased drug use.

Fourth, cosmetic surgery may be motivated by the desire to enhance one's appearance to attract potential or current partners. In this line of thought, women who are single or who are in relationships that they do not perceive as satisfying may be overrepresented among

women seeking cosmetic surgery. Singles and persons living in unstable or unsatisfying relationships are, in turn, overrepresented among people with mental health problems (Kiecolt-Glaser and Newton, 2001). However, two Australian studies did not find any relationship between cosmetic surgery and marital status when controlling for relevant covariates (Schofield et al., 2002; Tranter and Hanson, 2015). It remains to be seen whether other relationship factors are related to breast augmentation surgery and whether such associations may explain the preponderance of mental health problems in breast augmentation patients.

Fifth, one epidemiological study reported a rather strong relationship between cosmetic surgery and a history of having been exposed to domestic violence and verbal abuse (Schofield et al., 2002). The findings open up the possibility that the comparably high frequency of mental health problems in cosmetic surgery patients may be due to patients' greater exposure to negative life events such as abuse.

Finally, potential sociodemographic differences between breast augmentation patients and other women may explain mental health differences.

### **Summary and Aim of This Study**

To sum up, few studies have examined differences between cosmetic surgery patients and women without cosmetic surgery in mental health and a broad variety of psychosocial factors, even though there is solid evidence for a link between breast augmentation surgery and an increased risk of suicide. Only few studies so far have used population-based samples to examine differences between patients and non-patients (Fryzek et al., 2000; Cook et al., 1997; Schofield et al., 2002), and the studies provide no or only limited information on mental health.

By using large-scale epidemiological data, this study aims to examine whether breast augmentation patients report elevated mental health problems and to explore potential

explanations of the increased prevalence of mental health problems in this group. Based on previous research, we expect that mental health problems are more prevalent among breast augmentation patients than other women. Moreover, we expect that mental health differences between patients and non-patients are related to differences between the groups in one or several of the following domains: (a) appearance-related factors and self-esteem, (b) personality, (c) drug use, (d) relationship factors, (e) exposure to abuse and (f) sociodemographic variables.

This study compares breast augmentation patients to women with no breast surgery and to breast reduction patients to obtain information on whether breast augmentation patients differ from both women with no breast surgery and women who had another type of breast surgery.

## **Methods**

### **Procedure and Participants**

Data from the MoBa study were used; MoBa is a prospective population-based pregnancy cohort study conducted by the Norwegian Institute of Public Health. Participants were recruited from all over Norway from 1999 to 2008. Pregnant women were invited to participate by mail prior to a routine ultrasound examination around week 17/18 of gestation. Women who consented received three questionnaires by mail during pregnancy, at week 17/18 (Q1), week 22 (Q2), and week 30 (Q3) of gestation. New questionnaires were administered at six months (Q4), 18 months (Q5), three years (Q6), and five years (Q7) after birth. Questionnaire data were linked to the Medical Birth Registry of Norway (BRN).

Invitations were sent to women for 277,702 pregnancies, with a 41% participation rate (Magnus et al., 2016). Of all 112,289 responses, 17,518 were excluded in this study, because they were from mothers who already had participated with an earlier pregnancy. Further, 15,353 women were excluded because they did not complete Q3, when breast surgery

information was assessed, resulting in 79,418 participants. Of those, 63,793 women (80.3%) completed Q5, and 26,592 women (33.5%) completed Q7. The low number of participants in Q7 is due to the fact that most children had not yet reached age 5, and their mothers had thus not yet received the Q7 questionnaire. The eighth version of the quality-assured data file from MoBa, released for research in 2014, was used in this study.

Informed consent was obtained from each participant. Moba has been approved by the Norwegian Data Inspectorate and the Regional Committee for Medical Research Ethics. The Ethics Committee also approved the specific study presented in this paper.

### Measures

**Breast surgery.** In Q3, women were asked whether they ever had had breast surgery, and if so, what kind of breast surgery. Response options were *breast enlargement*, *breast reduction*, *cancer/biopsy*, and *other*. Those who had ‘other’ breast operations were asked to specify in writing what kind of surgery was performed.

**Mental health problems and well-being.** In Q3, current mental health problems were assessed using eight items from the Hopkins Symptom Checklist (Tambs and Røysamb, 2014), assessing symptoms of depression and anxiety in the preceding two weeks. Internal consistency was  $\alpha = .91$ . As a measure of well-being, in Q3 life satisfaction was measured by the much used 5-item Satisfaction with Life Scale (Diener et al., 1985), with an internal consistency of  $\alpha = .89$ . Information on incidence of at least one episode of major depression in the respondent’s lifetime was assessed by the Life Time Major Depression Scale (Kendler et al., 1993). Respondents were also asked to indicate whether they had ever been diagnosed with a depressive disorder, an anxiety disorder, and an eating disorder.

**Self-esteem and appearance-related measures.** Self-esteem was measured in Q3 by a 4-item version of the Rosenberg Self-Esteem Scale (Tambs and Røysamb, 2014). Internal consistency was  $\alpha = .76$ . Concerning appearance, respondents were in Q5 asked, “Are you



able to accept your physical appearance?” with response options ranging from 1 (*not at all*) to 5 (*completely*). In Q1, weight dissatisfaction was measured by the item “Do you think you were overweight just before this pregnancy?” with response options 1 (*no*), 2 (*yes, a little*) and 3 (*yes, a lot*). Participants were also asked to evaluate how important it was for their own self-image to maintain a certain weight, with response options 1 (*no, not especially important*), 2 (*yes, quite important*) and 3 (*yes, very important*). Body mass index (BMI) was computed using information on respondents’ self-reported height and weight before pregnancy assessed in Q1.

**Drug use.** In Q3 a five-item short form of the Rutgers Alcohol Problems Index (DeRoo, 2014) was used. History of smoking was assessed by one item on whether the respondent had smoked daily at least at one point in their lifetime or not (*yes/no*). Lifetime history of cannabis use (*yes/no*) was assessed as well.

**Relationship variables.** Through linkage to the BRN, it was assessed whether the respondents were single or in a relationship. In Q1, respondents were asked to report how long (in years and months) the respondent and the baby’s father had had a sexual relationship. Relationship satisfaction was measured in Q3 by the 10-item Relationship Satisfaction Scale (Røysamb et al., 2014). Internal consistency was  $\alpha = .91$ . Loneliness was assessed in Q3 by the item “Do you often feel lonely?” with response options ranging from 1 (*almost never*) to 5 (*almost always*).

**History of abuse.** In Q3, respondents reported whether they had ever been exposed to physical abuse. Likewise, respondents were asked whether they ever had been forced to have sexual intercourse.

**Personality.** In Q7, Big Five personality traits were measured by the 50-item International Personality Item Pool (Goldberg et al., 2006). Internal consistency was  $\alpha = .89$ ,

$\alpha = .89$ ,  $\alpha = .79$ ,  $\alpha = .79$  and  $\alpha = .73$  for neuroticism, extraversion, conscientiousness, agreeableness, and openness, respectively.

**Sociodemographic variables.** Age was assessed in Q3. Education was assessed in Q1 and was transformed into number of years in education. Both the respondents' and their partners' income was assessed, with response options ranging from 1 (*no income*) to 7 (*more than 500,000 Norwegian kroner*). Respondents were also asked whether they were unemployed or received social security benefits. As a proxy of respondents' nationality, in Q1 respondents were asked whether their own or their parents' native language was Norwegian and were categorized into a groups of respondents whose native language was not Norwegian or whose two parents did not have Norwegian as their native language and a group of other respondents. Finally, as the study recruitment was conducted over several years, the year when completing Q3 was recorded, ranging from 1 (*first year of study*) to 10 (*10th year of study*).

## Analyses

Two dummy variables for surgery experience were constructed, where breast augmentation surgery was contrasted with no breast surgery and with breast reduction surgery, respectively. Regression analyses were then conducted with those dummy variables as predictors to examine whether breast augmentation patients on average had more mental health problems. Linear regression analyses were used for continuous outcome variables (i.e., current mental health problems and well-being), and probit regression analyses were used for dichotomous outcomes (i.e., lifetime history of depression and history of diagnosis of depressive, anxiety, and eating disorder). Likewise, linear and probit regression analyses were conducted to test for differences between groups for all potential confounders.

We then examined whether psychosocial and demographic variables functioned as confounders of the relationship between breast augmentation surgery and mental health.

Because one condition for confounders is that they have to be related to the predictor variable, only potential confounders that were significantly related to breast augmentation surgery were included in the analyses. As suggested by MacKinnon et al. (2000), we used tests comparable to mediation analyses to examine whether specific variables functioned as confounders. More specifically, specific confounder effects were estimated by the product of coefficients approach in a path analytic framework, and we estimated standard errors of the confounder effect by means of bootstrapping based on 1,000 bootstrap samples (Hayes, 2009).

A weighted least square estimator was used for probit regressions, and a robust maximum likelihood estimator was used for linear regressions. Missing data were replaced with values of the same variable from questionnaires at previous time points. Remaining missing data were handled statistically by the full information maximum likelihood approach for linear regression analyses and by a pairwise inclusion technique for probit regressions. As the study sample was large and many analyses were conducted, the level of significance was set to  $p < .001$ .

## Results

Of the 79,418 women participating in the study, 870 (1.1%) reported having had breast augmentation surgery and 853 (1.1%) reported having had breast reduction surgery. Moreover, 272 women (0.3%) reported having had breast surgery due to cancer and 894 (1.1%) reported having had other types of surgery to the breast, mostly removals of benign lumps, cysts, or birthmarks. The last two patient groups were excluded; the final sample thus comprised 78,252 women.

Table 1 displays descriptive statistics of all study variables for breast augmentation patients, women with no breast surgery and breast reduction patients, separately. As Table 1 shows, compared to women with no breast surgery, breast augmentation patients reported

significantly higher scores of current mental health problems and lower scores on subjective well-being ( $p < .001$ ). The differences were rather small in size, as indicated by measures of effect size of Cohen's  $d = 0.21$  and  $d = 0.20$  for mental health problems and well-being, respectively. Higher prevalence of a history of mental disorders was also observed, as lifetime history of major depression and having ever been diagnosed with depressive, anxiety and eating disorder were significantly higher among breast augmentation patients than in women with no breast surgery ( $p < .001$ ). We estimated the relative risk of mental disorders for breast augmentation patients compared to women with no breast surgery, resulting in risk ratios of 1.57, 1.98, 1.90 and 2.59 for lifetime history of major depression and diagnosis of depressive, anxiety and eating disorder, respectively. Note that even though the risk ratio for lifetime history of depression was lower than for the three other measures, 13.7% more women were categorized with a history of major depressive disorder among breast augmentation patients than in women with no breast surgery. No significant differences for all six measures were found when comparing breast augmentation with breast reduction patients ( $p > .01$ ).

Next, differences between breast augmentation patients and the two other groups were examined for psychosocial and demographic variables. As Table 1 shows, breast augmentation patients were less dissatisfied with their weight, considered their weight to be more important, and had lower BMI than women with no breast surgery. Breast augmentation patients showed higher levels of alcohol problems, smoking and cannabis use than the two other groups. Also for several relationship variables, breast augmentation patients reported lower scores, as the duration of their relationship with the father of the child had been shorter, they were less satisfied with their relationship to their partner, and they felt lonelier than women with no breast surgery. Breast augmentation patients reported more than a twofold prevalence of exposure to physical and sexual abuse. Concerning personality traits, no

significant differences were found except for extraversion, where breast augmentation patients showed higher levels than the two other groups. Finally, of sociodemographic factors, breast augmentation patients had attained lower levels of education, and their partners had higher incomes.

Next, we examined the relationships between breast augmentation surgery and mental health in more detail. Breast reduction patients were excluded from these analyses, as no significant differences between breast augmentation and reduction patients were found for any mental health measure. Linear regression analyses were conducted with current mental health problems and well-being as outcomes. In these analyses, outcome measures and continuous predictors were standardized; regression coefficients can thus be interpreted as standardized regression coefficients. We first conducted analyses with breast augmentation surgery as the sole predictor (see first row, Table 2). Mirroring results from Table 1, the regression coefficients indicate that breast augmentation patients had average current mental health problems scores that were 0.209 standard deviations (*SD*) higher than for women with no breast surgery, and they had average well-being scores that were 0.201 *SD* lower than for other women. We then added psychosocial and sociodemographic variables. Additionally, we estimated the unique contribution of each potential confounder in explaining parts of the surgery–outcome association by means of path analysis.

Table 2 shows that when including all confounders, relationships between breast augmentation and the outcomes diminished to non-significance for both current mental health problems and subjective well-being. Importance of weight, alcohol problems, relationship satisfaction, loneliness, physical abuse and education were significantly related to both outcomes, and those variables served also as significant confounders.

When examining lifetime history of depression and diagnosis of depressive, anxiety and eating disorders, probit regressions were used. Again, we first conducted analyses with

breast augmentation surgery as the sole predictor of history of mental health problems (see Table 3). We then conducted multiple regression analyses, including all potential confounders simultaneously. Also here, the inclusion of covariates resulted in reducing all associations between breast augmentation surgery and history of mental health problems to non-significance. Moreover, results showed that importance of weight, cannabis use, loneliness and physical and sexual abuse were consistently associated with a history of mental health problems, as these variables predicted higher probabilities of all four outcomes. Analyses of the unique confounding effects for those five variables showed also significant results, thereby indicating that the inclusion of these factors significantly reduced the relationship between breast augmentation surgery and history of mental health problems.

### **Discussion**

This large-scale population based study shows that compared to women with no breast surgery, breast augmentation patients had more current mental health problems, reported lower well-being, and reported about twice as often lifetime histories of depressive disorders and diagnoses of depressive, anxiety, and eating disorders in unadjusted regression analyses. Factors that were of importance for statistically explaining the augmentation surgery–health problem association included: (a) appearance-related measures, such as perceived importance of one’s weight; (b) drug use, such as problematic alcohol use and/or cannabis use; (c) relationship factors, such as feelings of loneliness and relationship dissatisfaction; and (d) having been exposed to physical and sexual abuse.

Besides the solid evidence for a two- to threefold increased risk of suicide among breast augmentation patients (Sarwer et al., 2007; Manoloudakis et al., 2015), epidemiological studies on mental health differences between breast augmentation patients and women with no breast surgery are scarce. This study provides novel information on this issue by showing that breast augmentation was in fact related to self-reported current mental

health problems, lower levels of current well-being and reported history of major depressive episodes and diagnoses of depressive, anxiety, and eating disorders when not adjusting for any covariates. The relationships between breast augmentation surgery and current mental health problems and well-being were small in size. However, in a lifetime perspective such relatively small differences in current symptoms between patients and other women may lead to considerable differences in the prevalence of disorders like depressive, anxiety, and eating disorders, as reflected by risk ratios indicating the prevalence of history of these disorders to be about twofold in breast augmentation patients. The findings of this study are in line with other reports indicating that cosmetic surgery patients have increased prevalence of mental health problems (Schofield et al., 2002; Jacobsen et al., 2004). However, this study is the first to provide solid evidence for such mental health problems in a large-scale population-based epidemiological study of breast augmentation patients.

A further aim of this study was to examine factors that may be of importance in explaining the breast augmentation surgery–mental health association. We focused on six potential explanations. First, results showed that breast augmentation patients place more importance on their weight, which again was negatively related to all mental health outcomes. This finding is in accordance with research showing that similar concepts, such as perceived pressure to be thin and thin-ideal internalization, are prospectively related to mental health problems, such as depression. Even though the present study only assessed importance of one's weight, we hypothesize that breast augmentation patients may be generally more invested in their physical appearance (and not only in weight) than other women, which may put them at risk for mental health problems and reduced well-being.

Second, breast augmentation patients did in general not differ from other women on broad personality traits. A notable exception was the higher mean level of extraversion among breast augmentation patients, a finding that accords with other empirical studies

examining cosmetic surgery patients in general (von Soest et al., 2009). However, high levels of extraversion were not related to increased mental health problems, and there is as such little support for the notion that broad personality may serve as an explanation for the breast augmentation–mental health association.

Third, for all mental health outcomes, alcohol problems, cannabis use, or both statistically explained increased mental health problems and lower well-being among breast augmentation patients. Possibly, the preponderance of drug use among breast augmentation patients is an indication of such patients being more prone to engage in risky health behaviors, as cosmetic surgery may be conceptualized as such a form of behavior. The elevated drug use may also have other negative consequences than reduced mental health: Drug use, and particularly alcohol use, is related to a higher risk of suicide, independent of mental health problems (Norström and Rossow, 2016). The high level of drug use may thus be an additional explanation for the high suicides rates among breast augmentation patients.

Fourth, concerning relationship variables, breast augmentation patients reported being together with their partner fewer years, being less satisfied with their relationship, and feeling lonelier than other women. Patients may attempt to use surgery and the resulting changes in appearance to become more sexually attractive, socially more connected, and to feel less lonely. Particularly loneliness, which was consistently related to mental health, may thus explain parts of the relationship between breast augmentation surgery and mental health.

Fifth, exposure to physical and sexual abuse was considerably more prevalent in breast augmentation patients than among other women, and abuse exposure explained statistically parts of the breast augmentation surgery–mental health association. Similar results were obtained by one other study, where cosmetic surgery patients in general reported higher frequencies of abuse exposure (Schofield et al., 2002). One explanation for this finding may be that exposure to abuse leads women to detach their own body and physical



appearance from the self (Hill and Fischer, 2008). Exposure to abuse may thus be correlated with breast augmentation because abuse experiences may lead women to have a more instrumental attitude towards their own body.

Finally, socio-demographics were not related to the breast augmentation–mental health association to a great degree. There is thus little support for the notion that socio-demographic factors serve as explanations for increased mental health problems among breast augmentation patients.

The results thus indicate that confounders in several psychosocial domains are involved in the breast augmentation surgery–mental health association. However, the results provide no definitive information on directions of the relationships between confounders and breast augmentation surgery. The literature in the field primarily proposes that certain psychosocial profiles increase the probability of seeking augmentation surgery (see Sarwer et al., 2007; Manoloudakis et al., 2015). In this case, factors such as high importance of weight, drug use, high levels of loneliness and exposure to abuse may increase the probability of having breast augmentation surgery, and at the same time these factors increase the risk of mental health problems and reduced well-being. However, reverse causal directions are possible as well. For example, postoperative complications and their consequences could contribute to mental health problems and reduced well-being; however, that explanation has been considered rather unlikely, because empirical studies typically report high patient satisfaction and positive psychological changes after cosmetic surgery (Sarwer, 2007; Manoloudakis et al., 2015).

### **Limitations**

A major limitation is that the study does not provide information on the causal direction of the relationship between breast augmentation surgery, mental health and psychosocial variables. Large-scale longitudinal studies assessing mental health problems and

psychosocial factors prior to having breast augmentation surgery are needed to obtain more information concerning whether mental health differences already exist before surgery or mental health problems develop as a result of surgery. Also, the study is based primarily on self-report. This may be particularly problematic for history of mental health problems, because such measures may be particularly vulnerable to potential biases related to retrospective recall. However, it may be less probable that such biases are different for women with and with no breast augmentation surgery.

Concerning limitations of the measures, the study provides no information on the type of breast augmentation procedure patients underwent. In particular, whether breast implants were used or other procedures such as fat-grafting techniques were utilized was not assessed. Therefore, it was not possible to examine if elevated mental health problems were specific for some, but not all surgical procedures. Moreover, even though a variety of psychosocial factors were assessed, additional measures could have been included. In particular, more comprehensive assessments of body image are lacking. Concerning limitations related to generalization of the study results, only 41% of invited women participated, and prevalence estimates of breast surgery may be to a certain degree biased by selective participation (Magnus et al., 2016). Attrition is another limitation. Importantly, particularly Big Five personality traits were measured at a time point when not all participants had been approached yet, resulting in high rates of missingness. Even though contemporary statistical techniques were used to account for missing data, the considerable amount of missing data may have reduced statistical power to detect relationships between breast augmentation surgery and personality factors. Moreover, this study only included expectant mothers in Norway. It remains to be seen if the study results can be generalized to other countries and to women without children.

## **Conclusions**

This study provides solid support for the notion that women who have had breast augmentation surgery have a lifetime history characterized by more mental health problems, and they report higher concurrent symptom loads of depression and anxiety and lower levels of well-being than women with no breast surgery. The results indicate that the increased prevalence of mental health problems among women undergoing breast augmentation surgery is not due to one single factor but rather has to be understood from multiple perspectives involving factors from several psychosocial domains, including physical appearance, drug use, relationships and exposure to abuse. Broad personality dimensions and sociodemographic factors are probably of less importance.

Even though the possibility of a causal influence of breast surgery in itself on mental health problems cannot be ruled out, it is probable that differences in mental health and psychosocial characteristics are at least partly a result of patient characteristics that were already observable before surgery. However, future large-scale longitudinal studies are needed to provide more definite data on causal directions of the association between breast augmentation surgery and mental health and psychosocial factors. Likewise, more research is needed on whether the psychosocial and mental health profile of breast augmentation patients presented in this study is specific for breast augmentation patients or can be generalized to patients undergoing other types of cosmetic surgery. The surprisingly high preponderance of drug use and exposure to abuse among patients should also be an important focus for future research. Moreover, in addition to mental health issues, relationship issues, drug use, and past aversive experiences may be of clinical importance when working with clients who have had or are considering breast augmentation surgery.

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Table 1

*Descriptive Statistics and Results from Linear and Probit Regression Analyses for Indicators of Mental Health and Psychosocial Variables for Breast Augmentation Patients, Breast Reduction Patients and Women With No Breast Surgery*

	Breast augmentation patients		Women with no breast surgery		Breast reduction patients		Regression results	
	M	SD	M	SD	M	SD	Breast augmentation compared to no breast surgery, <i>p</i>	Breast augmentation compared to breast reduction surgery, <i>p</i>
<i>Mental health</i>								
Symptoms of depression and anxiety	1.35	0.43	1.28	.36	1.32	0.40	<.001	.041
Subjective well-being	5.52	1.13	5.71	.97	5.50	1.10	<.001	.647
Lifetime history of major depression, %		37.3		23.6		34.1	<.001	.180
History of diagnosis of depression, %		14.6		7.2		12.1	<.001	.132
History of diagnosis of anxiety disorder, %		7.5		3.8		4.7	<.001	.021
History of diagnosis of eating disorder, %		8.2		3.1		5.7	<.001	.051
<i>Self-esteem and appearance related factors</i>								
Self-esteem	3.21	0.50	3.21	0.49	3.14	0.50	.590	.004
Accept of appearance	3.65	0.89	3.68	0.83	3.43	0.89	.289	<.001
Weight dissatisfaction	1.44	0.62	1.62	0.69	1.99	0.73	<.001	<.001
Importance of weight	2.05	0.65	1.79	0.62	1.89	0.64	<.001	<.001
Body mass index	22.02	3.01	24.02	4.26	26.54	4.75	<.001	<.001
<i>Personality</i>								
Neuroticism	2.67	0.78	2.62	0.73	2.66	0.75	.432	.958
Extraversion	3.81	0.63	3.58	0.66	3.59	0.70	<.001	.004
Conscientiousness	4.08	0.52	4.00	0.52	4.00	0.50	.045	.161
Agreeableness	4.36	0.40	4.28	0.42	4.29	0.40	.016	.161
Openness	3.63	0.47	3.60	0.48	3.61	0.47	.449	.677
<i>Drug use</i>								
Alcohol problems	0.52	1.18	0.26	0.79	0.31	0.84	<.001	<.001
History of daily smoking, %		65.8		49.7		54.8	<.001	<.001
History of cannabis use, %		20.2		10.9		14.2	<.001	.002
<i>Relationship variables</i>								
Being single, %		7.8		4.1		5.2	.002	.757
Years together with partner	5.66	3.87	6.83	3.89	6.89	4.24	<.001	<.001
Relationship satisfaction	5.22	0.82	5.35	0.66	5.32	0.73	<.001	.003
Satisfaction with sex life	3.32	1.11	3.45	1.01	3.38	1.08	.002	.223
Loneliness	1.86	0.95	1.71	0.86	1.74	0.90	<.001	.004
<i>History of abuse</i>								
History of physical abuse, %		25.7		10.4		16.3	<.001	<.001
History of sexual abuse, %		24.3		11.5		17.0	<.001	<.001
<i>Sociodemographic variables</i>								
Age	29.98	4.61	29.50	4.64	31.32	4.34	.003	<.001
Education (in years)	13.71	2.65	14.75	2.65	14.23	2.71	<.001	<.001
Income	4.06	1.35	3.99	1.38	4.05	1.35	.130	.862
Partner's income	5.15	1.40	4.91	1.39	4.94	1.36	<.001	.002
Receiving social security benefits, %		5.1		4.0		8.1	.139	.016
Immigrant, %		5.9		6.4		4.3	.596	.181
Year of study participation	6.20	2.05	5.69	2.16	5.73	2.15	<.001	<.001



Table 2

*Linear Regression Analyses Predicting Current Mental Health Problems and Subjective Well-Being*

	Mental health problems		Subjective well-being	
	Regression coefficient	Confounder effect	Regression coefficient	Confounder effect
	<i>Basic model: Only breast augmentation surgery included</i>			
Breast augmentation	0.209*		-0.201*	
	<i>Full model: Breast augmentation surgery and all potential confounders included</i>			
Breast augmentation	-0.007		-0.038	
Weight dissatisfaction	0.063*	-0.016*	-0.047*	0.012*
Importance of weight	0.077*	0.031*	-0.032*	-0.013*
Body mass index	-0.035*	0.017*	0.012	-0.005
Extraversion	-0.033*	-0.011	0.100*	0.035*
Alcohol problems	0.081*	0.026*	-0.037*	-0.012*
History of daily smoking	0.017	0.007	0.021	0.008
History of cannabis use	0.030*	0.012	-0.043*	-0.017*
Years together with partner	-0.004	-0.001	0.006	-0.002
Relationship satisfaction	-0.161*	0.031*	0.384*	-0.075*
Loneliness	0.316*	0.057*	-0.176*	-0.032*
History of physical abuse	0.062*	0.037*	-0.051*	-0.031*
History of sexual abuse	0.041*	0.021*	-0.021	-0.011
Education (in years)	-0.018*	0.007*	0.069*	-0.027*
Partner's income	-0.030*	-0.005*	0.034*	-0.006*
Year of study participation	0.004	0.001	0.010	0.002

*Note.* Outcomes and continuous predictors are standardized. Regression coefficients involving continuous predictors can thus be interpreted as standardized regression coefficients. Regression coefficients of dichotomous predictors provide information about the difference between categories of the predictor in the outcome variable, measured in z-scores.

\* $p < .001$ .

Table 3  
*Probit Regression Analyses Predicting History of Mental Disorders*

	Lifetime history of major depression			History of diagnosis of depressive disorder			History of diagnosis of anxiety disorder			History of diagnosis of eating disorder		
	<i>B</i>	<i>aRR</i>	Con-founder effect	<i>B</i>	<i>aRR</i>	Con-founder effect	<i>B</i>	<i>aRR</i>	Con-founder effect	<i>B</i>	<i>aRR</i>	Con-founder effect
	<i>Basic model: Only breast augmentation surgery included</i>											
Breast augmentation	0.387*	1.57		0.394*	1.98		0.315*	1.90		0.462*	2.59	
	<i>Full model: Breast augmentation surgery and all potential confounders included</i>											
Breast augmentation	0.076	1.10		0.103	1.21		0.035	1.08		0.149	1.39	
Weight dissatisfaction	0.059*	1.08	-0.015*	0.059*	1.12	-0.015*	0.016	1.04	-0.004	0.158*	1.43	-0.040*
Importance of weight	0.088*	1.12	0.037*	0.072*	1.15	0.030*	0.052*	1.12	0.022*	0.222*	1.65	0.093*
Body mass index	-0.029*	0.96	0.014*	-0.018	0.97	0.009	-0.020	0.96	0.009	-0.201*	0.64	0.095*
Extraversion	-0.040	0.95	-0.014	-0.036	0.93	-0.012	-0.077*	0.85	-0.026	-0.004	0.99	-0.001
Alcohol problems	0.050*	1.07	0.016*	0.038*	1.07	0.012*	0.040*	1.09	0.013*	0.015	1.03	0.005
Smoking	-0.034	0.96	-0.014	-0.070*	0.87	-0.029*	0.015	1.03	0.006	-0.092*	0.81	-0.038*
Cannabis use	0.166*	1.23	0.067*	0.204*	1.45	0.082*	0.159*	1.40	-0.065*	0.152*	1.40	0.061*
Years together with partner	0.030*	1.04	-0.009*	0.016	1.03	-0.005	0.044*	1.10	-0.013*	-0.042*	0.91	0.013*
Relationship satisfaction	-0.036*	0.95	0.007*	-0.043*	0.92	0.008*	0.003	1.01	-0.001	0.007	1.02	-0.001
Loneliness	0.143*	1.21	0.026*	0.177*	1.40	0.032*	0.130*	1.33	0.023*	0.059*	1.14	0.011*
Physical abuse	0.206*	1.29	0.126*	0.139*	1.29	0.084*	0.141*	1.35	0.086*	0.084*	1.21	0.051*
Sexual abuse	0.166*	1.23	0.083*	0.167*	1.36	0.084*	0.132*	1.32	0.066*	0.167*	1.44	-0.084*
Education (in years)	0.034*	1.05	-0.014*	-0.029*	0.95	0.012*	-0.063*	0.87	0.025*	0.020	1.05	-0.008
Partner's income	0.024*	1.03	0.004	-0.010	0.98	-0.002	-0.027	0.94	-0.005	-0.010	0.98	-0.002
Year of participation in study	0.012	1.02	0.003	0.021	1.04	0.005	0.065*	1.15	0.015*	0.000	1.00	0.000

Note. *B* = regression coefficient; *aRR* = adjusted risk ratio.

\**p* < .001.