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Psychological profile in women undergoing minimally invasive cosmetic procedures

A pilot–survey-based–retrospective study

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Abstract

Debate about the psychological background and the impact on self-perception and social integration of cosmetic surgery and minimally invasive cosmetic procedures (MICPs), such as botulinum toxin (BoNT) and facial filler injections is still ongoing. The aim of the present study was to assess the psychological background and the impact on self-perception and social integration of cosmetic surgery and MICPs. By means of a survey procedure, a thorough battery of validated questionnaires (VQs) investigating sociodemographic backgrounds and changes in body perception (brown obsessive-compulsive scale modified for body dysmorphic disorder; body appreciation scale (BAS-2); and multidimensional body self relations questionnaire–body area satisfaction scale), anxiety and depression (depression anxiety stress scales, personality traits (rosenberg self-esteem scale [RSE]), social interaction (social interaction anxiety scale), quality of life (World Health Organization Quality of Life) and eating attitude (Eating Attitude Test) was administered in a cohort of women routinely undergoing MICPs (n = 37) and in a matched group of women who never underwent such procedures (n = 29), serving as control group (CG). When compared to CG, MICPs participants demonstrated significant ($P < .05$) lower social interaction anxiety scale (SIAS-6) scores (95% confidence Interval [CI]: 6.4–7.5 vs 7.47–8.94; Cohen $d = 0.65$) and higher scores along the RSE (95% CI: 32.99–35.6 vs 28.22–32.66; Cohen $d = -0.74$) and BAS-2 (95% CI: 38.72–42.73 vs 32.36–38.88; Cohen $d = -0.66$). MICPs participants demonstrated significant positive correlations between age and number of total sessions ($R = 0.44$; 95% CI = 0.02–0.09) in the last 2 years which further negatively ($r = -0.45$; 95% CI = –0.5 to –0.04) and positively ($R = 0.54$; 95% CI = 0.07–0.18) correlated with SIAS-6 and BAS-2, respectively. The present study highlighted that women undergoing aesthetic medicine treatments are burdened by less interpersonal problems and demonstrate greater self-esteem and better own body perception. However, the absence of pre/post intervention data limits the understanding of whether observed psychological differences are a consequence of MICPs or factors influencing their adoption.

Abbreviations: BAS-2 = body appreciation scale, BDD-YBOCS = brown obsessive-compulsive scale modified for body dysmorphic disorder, BoNT = botulinum toxin, DASS-21 = depression anxiety stress scales, EAT-26 = Eating Attitude Test, MBSRQ = multidimensional body self relations questionnaire–body area satisfaction scale, MICPs = minimally invasive cosmetic procedures, RSE = rosenberg self-esteem scale, SIAS-6 = social interaction anxiety scale, WHOQOL = World Health Organization Quality of Life.

Keywords: body appreciation, botulinum toxin, cosmetic techniques, dermal fillers, self-esteem, social interaction

1. Introduction

The market for products useful for improving physical appearance tends to be constantly growing all over the world, despite possible economic crises. At the same time, there is also an increase in the demand for aesthetic medicine interventions, both in older and young women.[1] The demand for cosmetic surgery and minimally invasive cosmetic procedures (MICPs), such as botulinum toxin (BoNT) and facial filler injections, has increased dramatically over the past decade and the trend is continuously increasing.[2] It has been hypothesized that this phenomenon could be due to their relative easy and quick administration which may give the patients the idea to simply obtain a physical appearance change with the purpose of raising

MA and AM contributed to this article equally.

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The datasets generated during and/or analyzed during the current study are not publicly available, but are available from the corresponding author on reasonable request.

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their social and psychological well-being.[3] Probably also due to these aspects, attention has shifted to the psychological aspects related to the use of aesthetic expedients to adapt to the canons of society, investigating both the psychological characteristics of the patient who uses them, and the psychological modifications following the interventions.[4,5] Research has thus led to the hypothesis that the women most predisposed to request aesthetic medicine interventions are those who have mostly internalized the aesthetic canons of society.[5] Specifically, the impact of aesthetic medicine on the characteristics of individual facial connotations have a greater impact on self-perception, due to the influence of nonverbal communication which starts precisely from facial expressions.[4]

If some studies documented improvements in body image self-perception following beauty treatments,[6] others showed that the impact of the aesthetic perception of one's face influences social relationships and functioning within society. The latter showed that people who have a better self-image perception are more well integrated and have better job opportunities.[7]

On the other side, follow-up research after aesthetic medicine interventions highlighted that – although higher levels of satisfaction were found in relation to a specific body area – no stable changes were found in terms of patient's personality, perception of self-esteem and quality of life.[8] In this light, interesting correlations emerged in literature between the perception of body image and psychiatric disorders such as eating disorders, social anxiety disorder, gender identity and, in particular, body dysmorphic disorder (BDD).[9]

Given the large debate among this issue and the potential impact of knowledge of patients' psychological background and consequences on aesthetic medical interventions, the aim of the present study was to assess – by means of a thorough battery of questionnaires – sociodemographic backgrounds and changes in body perception, personality traits, social interaction, quality of life and eating attitude in a cohort of women routinely undergoing MICPs when compared with a matched group of women who never underwent such procedures, serving as control group (CG), and to correlate these results with sociodemographic variables and qualito-quantitative aspects of MICPs.

2. Materials and methods

2.1. Participants

This was a descriptive cross-sectional study on 37 females (MICPS group) older than 18 years (mean age: 45.35 ± 10.49 years) who referred a cosmetic clinic for at least one procedure of BoNT (onabotulinumtoxinA; Botox Cosmetic/ONA; Allergan, Dublin, Ireland)and/or soft tissue filler (Stylage; Laboratoires Vivacy, Paris, France) injection during a 2-year (2021–2022) period. By means of fliers, institutional website, and/or word of mouth,

we also enrolled as CG a population of 29 age-matched healthy females (mean age: 43.06 ± 11.33 years) who did not have any kind of cosmetic procedure (including cosmetic surgery) before and who did not want to have any of these procedures. All the participants underwent a thorough general clinical and neurological evaluation as well as an interview with a skilled neuro-psychologist. As evaluated by medical history, physical, neurological and neuropsychological examination and routine blood tests, individuals suffering from major systemic or organ failure disorders including neurodegenerative, psychiatric and cardiovascular disorders with potential impact on quality of life were further excluded. Further, eating disorder, lower airways and/or lung diseases, active hepatitis, cirrhosis, anemia or hematological disease, chronic renal failure, vitamin B12 deficiency, cerebral vascular accidents, insulin dependent diabetes mellitus, hypothyroidism and Cushing Syndrome were not included in the study. Acute infection/fever, history of cancer disease in the last 5 years prior to study, autoimmune diseases or immunosuppressive therapy, polyneuropathy (autoimmune, alcohol-induced, or vitamin B12 defciency, collagenosis) were considered as exclusion criteria. Cognitive impairment was excluded with the Mini Mental State Examination. No patient was pregnant or breastfeeding. Participants addicted to drugs (antidepressants or antipsychotics) or tobacco/alcohol consumption were excluded. Individuals were excluded if they were unable to understand the examination procedures, or were unable to participate in study procedures because of physical conditions. In the MICPs group further exclusion criteria were: keloid scarring, history of reaction to BoNT, albumin or hyaluronic acid, dermatoses of the treatment area.[10] According to previous experiences,[11] after their enrollment all the participants completed an online survey by means of the platform SurveyMonkey® (San Mateo) which included the following demographic information: age, years of education (categorized as following: ≤5 years = 1; 6–8 years = 2; 9–13 years = 3; 14–16 years = 4; ≥ 16 years = 5), number of children (0 children = 0; 1 child = 1; 1–2 children = 2; ≥ 3 children = 3), familiar and marital status (single = 1; married = 2; cohabitant = 3; divorced/separated = 4; widowed = 5), working condition (unemployed = 1; housewife = 2; employed = 3; self-employed = 4) and annual gross salary (≤9.999€ = 1; 10.000–19.999 € = 2; 20.000 a 34.999 € = 3; 35.000–59.999 € = 4; ≥ 60.000 € = 5) were collected for both groups' participants. Further, both MICPs and CG participants filled in the following validated questionnaires (VQs) – which have been previously used in similar population[12–23] – and included in the online survey and carefully checked by a skilled neuro-psychologist.

2.1.1. World health organization quality of life.

The short version of the test, containing 26 items investigating 4 macro-areas (physical health area, psychological area, social relations area and environment area), was administered.

The aim of the questionnaire was to understand the quality of life of the participants. Each World Health Organization Quality of Life (WHOQOL) item is rated on a 1 to 5 scale, with higher scores indicating better quality of life. Higher transformed scores (closer to 100) reflect better well-being, while lower scores indicate poorer qquality of life. The 2 global quality of life and health satisfaction items are analyzed separately, and interpretation depends on clinical and population context. In research and practical applications, normative scores are often used for comparison: scores above 60 to 70 generally indicate acceptable or good quality of life; scores below 40 to 50 may suggest significant difficulties, especially in clinical settings.[13,24]

2.1.2. Depression anxiety stress scales.

The questionnaire was used to investigate the areas of anxiety, stress and depression in the sample. It consists of 21 items with the possibility of answering from *it never happened to me* to *it almost always happened to me*. Each item is rated on a scale from 0 to 3, where 0 means the item did not apply at all, and 3 means it applied very much or most of the time. The depression anxiety stress scales (DASS-21) does not have a universally agreed-upon strict cutoff, but it provides severity levels based on the score ranges for each subscale (depression, anxiety, and stress). These ranges can help to interpret the severity of symptoms, though they should be seen as general guidelines rather than absolute thresholds.[14,25] Depression severity level: Normal, 0 to 9; Mild, 10 to 13; Moderate, 14 to 20; Extremely severe, ≥ 28. Anxiety severity level: Normal, 0 to 7; Mild, 8 to 9; Moderate, 10 to 14; Extremely severe, ≥20. Stress severity level: Normal, 0 to 14; Mild, 15 to 18; Moderate, 19 to 25; Extremely severe, ≥34.[14,25]

2.1.3. Social interaction anxiety scale.

This short questionnaire consists of 6 questions with answers ranging from *not at all true* to *extremely true*. It has the objective of identifying interpersonal problems. A higher score

corresponds to more aggravated symptoms. The social interaction anxiety scale (SIAS-6) is a brief measure designed to assess anxiety related to social interactions. It consists of 6 items, with each item rated on a 5-point scale (from 0 = "not at all characteristic of me" to 4 = "extremely characteristic of me"). The total score is calculated by summing the individual item scores, which can range from 0 to 24. A higher score corresponds to more aggravated symptoms. 0 to 7: Low anxiety – This suggests that the individual experiences little to no anxiety in social interactions; 8 to 14: Moderate anxiety – This range indicates some level of social anxiety, with the individual potentially feeling anxious in certain social situations but not excessively; 15 to 24: High anxiety – A higher score suggests significant anxiety in social interactions, potentially impairing the person's ability to engage comfortably in social situations.[26]

2.1.4. Rosenberg self-esteem scale.

The purpose of the 10 item rosenberg self-esteem scale (RSE) scale is to measure self-esteem. Low self-esteem responses are "disagree" or "strongly disagree" on items 1, 3, 4, 7, 10, and "strongly agree" or "agree" on items 2, 5, 6, 8, 9. The scale ranges from 0 to 30. Scores between 15 and 25 are within the normal range; scores below 15 indicate low self-esteem.[27]

2.1.5. Brown obsessive-compulsive scale modified for body dysmorphic disorder.

The questionnaire includes 12 items investigating the symptoms of BDD, integrating the typical behaviors of obsessive compulsive disorder, including rituals and avoidance, and dysfunctional cognitions. Scores range from 0 to 48, with higher scores indicating more severe BDD symptoms. Minimal symptoms, 0 to 7; mild symptoms, 8 to 15; moderate symptoms, 16 to 23; severe symptoms, 24 to 31; extreme symptoms, 32 to 48.[28]

2.1.6. Body appreciation scale.

The tool was intended to investigate acceptance and favorable opinions towards one's own body. It consists of 10 questions with the possibility of answering from "never" to "always." A higher score would correspond to a better perception of one's own body. The total score is calculated by summing the individual item scores, yielding a range of 10 to 50. The interpretation is as follows: 10 to 30: Low body appreciation – This suggests that the individual has a low level of body appreciation, possibly struggling with body dissatisfaction or negative body image; 31 to 40: Moderate body appreciation – This indicates a moderate level of body appreciation, where the individual generally values their body, though they may have some moments of body dissatisfaction; 41 to 50: High body appreciation – This reflects a high level of body appreciation, with the individual showing strong respect and positive regard for their body.[29]

2.1.7. Multidimensional body self relations questionnaire–body area satisfaction scale.

Of the multidimensional body self relations questionnaire–body area satisfaction scale (MBSRQ) questionnaire, only the subtest relating to the "body areas satisfaction" was taken, providing a score from *very dissatisfied* to *very satisfied* in correspondence with some parts of the body. A higher score would correspond to a better perception of one's own body. A higher score would correspond to a better perception of one's own body. 9 to 18: Low body area satisfaction – this suggests a high level of dissatisfaction with most or all body areas. The individual likely experiences significant body dissatisfaction. 19 to 27: Moderate body area satisfaction – this indicates some level of dissatisfaction with certain body areas, but the person might still be satisfied with other areas. 28 to 36: High body area satisfaction – this indicates that the individual is generally satisfied with most body areas, though there may still be some areas of dissatisfaction. 37 to 45: Very high body area satisfaction – this suggests a high level of satisfaction with one's body areas, indicating a positive body image.[30]

2.1.8. Eating attitude test.

Scores range from "always" to "never" on a 6-point Likert scale. Low scores could indicate the presence of an eating disorder, with a cutoff equivalent to 20.[31]

At the end of the study period, number of total and specific (BoNT and/or soft tissue filler injection) sessions in the previous 2 years were extracted in the MICPs group from the participants' clinical charts of the MICPs participants.

The study was approved by the University Hospital Institutional Review Board (registration ID 1668/2017), it adhered to the principles of the Declaration of Helsinki, it adhered to the STROBE guidelines and all participants provided written informed consent after receiving a detailed explanation of the study.

2.2. Data handling and statistical analysis

Sample size was set according to recommendations related to pilot exploratory studies which suggest at least 12 participants per group[32] and was thus determined in accordance to previous similar studies' sample size in the same field.[33] The χ^2 test was carried out to define associations between categorical factors and groups and paired 2-tailed Student *t* test to compare continuous variables (*P* value < .05 was considered significant). Given their quantitative nature, descriptive data were calculated as mean ± SD for VQs scores, sociodemographic aspects and MICPs quantitative aspects. To assess that data for independent samples were of Gaussian distribution, D'Agostino K squared normality and Levene homoscedasticity test were applied (where the null hypothesis is that the data are normally and homogeneously distributed). A between-group analysis of variance was performed for each VQs. Sociodemographic variables and age were treated as a categorical and continuous predictors, respectively. The significant cutoff level (α) was set at a *P* value of .05. Then, according to previous protocols[34] and given the exploratory nature of the study, a 2-tailed Spearman rank correlation was performed in MICPs participants between MICPs sociodemographic and qualito-quantitative aspects (i.e. number of total and specific sessions in the previous 2 years) and those VQs scores which resulted as significantly different when comparing the 2 groups of subjects. A significant cutoff level (α) was set at a *P*-value of .05 (STATISTICA 7 package for Windows).

3. Results

Both groups of participants were found to be homogenous in terms of education, number of children, familiar and marital status, work condition and annual gross salary (Table 1). More than half of the participants belonging to both groups have more than 17 years of education and about one-third of them were married. About 40% of them had 1 or 2 children, about 55% were employed and about 60% of them declared an annual gross salary ranging from 10.000 to 34.999 € (Table 1).

Within MICPs participants 21 and 16 subjects underwent respectively 1 and 2 sessions of BoNT injections in the last 2 years; 1, 2, 17, 13, and 4 participants respectively underwent 0, 1, 2, 3 and 4 filler injections in the last 2 years. Collectively, 1, 2, 15, 5, 10, and 4 participants underwent in the last 2 years respectively 1, 2, 3, 4, 5, and 6 total procedures (Fig. 1).

MICPs participants were found to have significant lower SIAS-6 scores (*P* = .01; 95% confidence interval [CI]: 6.4–7.5 vs 7.47–8.94; Cohen *d* = 0.65) and higher scores along the RSE (*P* = .003; 95% CI: 32.99–35.6 vs 28.22–32.66; Cohen *d* = −0.74) and body appreciation scale (BAS-2) (*P* = .008; 95% CI: 38.72–42.73 vs 32.36–38.88; Cohen *d* = −0.66) when compared to CG participants. No significant changes were found

Table 1

Sociodemographic aspects of MICPs participants and matched CG.

	MICPs (n = 37)	CG (n = 29)	*T*-test; χ²
Age	45.35 (10.49)	43.06 (11.33)	*P* > .05
Education (yr)			
≤ 5	2	1	0.2531; *P* > .05
6 to 8	2	2	
9 to 13	3	2	
14 to 16	8	6	
≥ 17	22	18	
Familiar/marital status			
Single	7	7	2.7; *P* > .05
Married	12	9	
Cohabitant	6	8	
Divorced/separated	9	4	
Widowed	3	1	
Children (number**)**			
0	9	10	1.23; *P* > .05
1 to 2	15	12	
≥ 3	13	7	
Working condition			
Unemployed	2	2	0.18; *P* > .05
Housewife	1	1	
Employed	21	17	
Self-employed	13	9	
Annual gross salary (€)			
≤ 9.999	2	1	0.87; *P* > .05
10.000 to 19.999	14	9	
20.000 to 34.999	12	10	
35.000 to 59.999	3	4	
≥ 60.000	6	5	

Main sociodemographic aspects of MICPs participants and matched CG.
CG = control group, MICPs = minimally invasive cosmetic procedures.

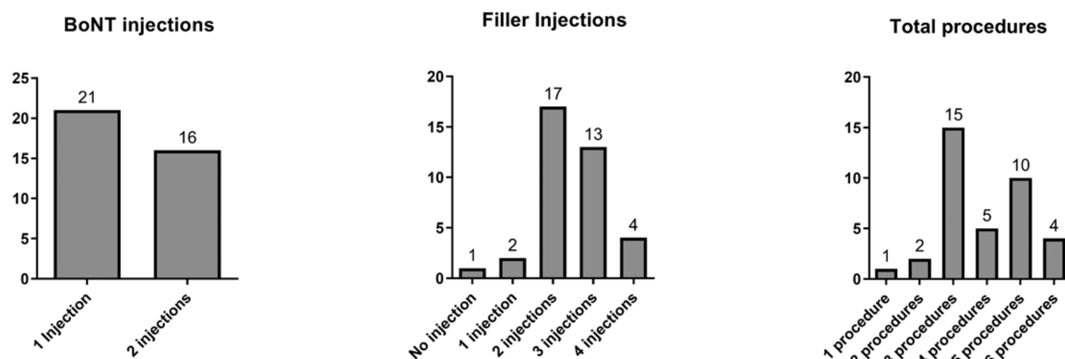

Figure 1. Histograms depicting number of BoNT, filler and total procedures in 37 MICPs participants in the last 2 years. BoNT = botulinum toxin, MICPs = minimally invasive cosmetic procedures.

when comparing the 2 groups along the other VQs neither significant interactions were found with main sociodemographic variables (Table 2 and Fig. 2).

Further, in MICPs participants significant ($P < .05$) positive correlations were found between age and number of BoNT injections ($R = 0.43$; 95% CI = 0.006–0.03), number of soft tissue filler injections ($R = 0.35$; 95% CI = 0.01–0.06) and number of total sessions ($R = 0.44$; 95% CI = 0.02–0.09) in the last 2 years. Furthermore, SIAS-6 and BAS-2 negatively and positively correlated with number of BoNT injections ($r = -0.34$; 95% CI = −0.13–0.05 and $R = 0.44$; 95% CI = 0.008–0.05, respectively), number of soft tissue filler injections ($r = -0.47$; 95% CI = −0.38–−0.07 and $R = 0.57$; 95% CI = 0.05–0.12, respectively) and number of total sessions ($r = -0.45$; 95% CI = −0.5 to −0.04 and $R = 0.54$; 95% CI = 0.07–0.18, respectively) in the last 2 years (Fig. 3).

4. Discussion

The main interesting findings of the present study reside in the significant changes found by means of the VQs in the MICPs participants who demonstrated – with respect CG participants – less interpersonal problems, higher level of self-esteem and

Table 2

Between-group effect in VQs investigating psychological aspects in MICPs and CG women and interactions with main sociodemographic aspects.

	Between-group effect				Sociodemographic interaction					
	MICPs (n = 37) Mean ± DS (95% CI)	CG (n = 29) Mean ± DS (95% CI)	Cohen *d*	Significance	Age	Education	Familiar status	Children	Working condition	Annual Salary
WHOQOL	94.91 ± 14.28 (90.31–99.52)	95.1 ± 17.31 (88.8–101.4)	0.01	*F*(1, 64) = 0.00225, *P* = .96231	*P* = .065	*P* = .51	*P* = .93	*P* = .62	*P* = .52	*P* = .079
DASS-21	30.72 ± 8.75 (27.9–33.55)	33 ± 8 (30.08–35.91)	0.27	*F*(1, 64) = 1.1773, *P* = .28198	*P* = .93	*P* = .82	*P* = .37	*P* = .3	*P* = .14	*P* = .59
SIAS-6	6.97 ± 1.75 (6.4–7.5)*	8.2 ± 2.12 (7.47–8.94)*	0.65	*F*(1, 64) = 7.018, *P* = .01015	*P* = .73	*P* = .83	*P* = .68	*P* = .24	*P* = .63	*P* = .37
RSE	34.29 ± 4.04 (32.99–35.6)*	30.44 ± 6.1 (28.22–32.66)*	−0.74	*F*(1, 64) = 9.440, *P* = .00312	*P* = .22	*P* = .069	*P* = .65	*P* = .059	*P* = .14	*P* = .063
BDD-YBOCS	26.56 ± 7.27 (24.22–28.91)	28.75 ± 9.06 (25.46–32.05)	0.26	*F*(1, 64) = 1.1875, *P* = .27992	*P* = .31	*P* = .088	*P* = .66	*P* = .72	*P* = .72	*P* = .1
BAS-2	40.72 ± 6.21 (38.72–42.73)*	35.62 ± 8.95 (32.36–38.88)*	−0.66	*F*(1, 64) = 7.4692, *P* = .00811	*P* = .82	*P* = .98	*P* = .9	*P* = .3	*P* = .77	*P* = .22
MBSRQ	31.78 ± 6.78 (29.59–33.97)	28.89 ± 7.74 (26.07–31.71)	−0.39	*F*(1, 64) = 2.5977, *P* = .11194	*P* = .96	*P* = .73	*P* = .58	*P* = .8	*P* = .44	*P* = .3
EAT-26	9.7 ± 14.97 (4.87–14.52)	8.55 ± 10.1 (4.87–12.23)	−0.09	*F*(1, 64) = 0.12605, *P* = .72373	*P* = .21	*P* = .079	*P* = .32	*P* = .19	*P* = .053	*P* = .16

Main between-group effect in VQs investigating psychological aspects in MICPs and CG women and interactions with main sociodemographic variables. Values are given in mean ± SD and 95% CI.
BAS-2 = body appreciation scale, BDD-YBOCS = brown obsessive-compulsive scale modified for body dysmorphic disorder, CG = control group, CI = confidence interval, DASS-21 = depression anxiety stress scales, EAT-26 = Eating Attitude Test, MBSRQ = multidimensional body self relations questionnaire–body area satisfaction scale, MICPs = minimally invasive cosmetic procedures, RSE = rosenberg self-esteem scale, SD = standard deviation, SIAS-6 = social interaction anxiety scale, VQs = validated questionnaires, WHOQOL = World Health Organization Quality of Life.
*Significant differences are indicated with asterisks.

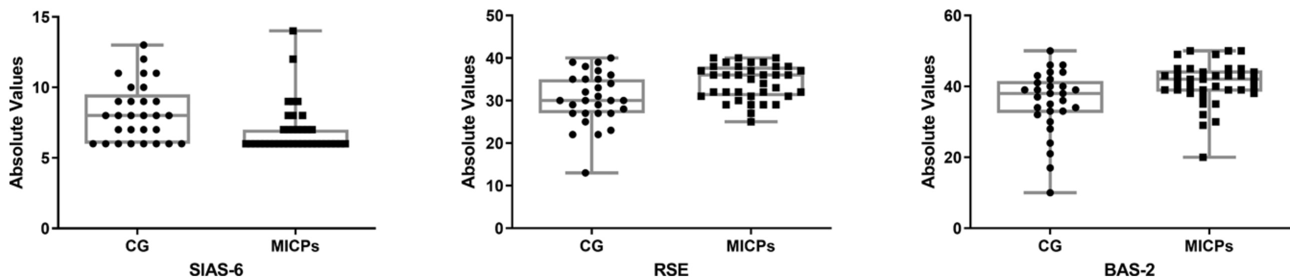

Figure 2. Box and whiskers dots plot depicting significant differences between MICPs and CG participants in VQs. BAS-2 = body appreciation scale, CG = control group, MICPs = minimally invasive cosmetic procedures, RSE = rosenberg self-esteem scale, SIAS-6= social interaction anxiety scale, VQs = validated questionnaires.

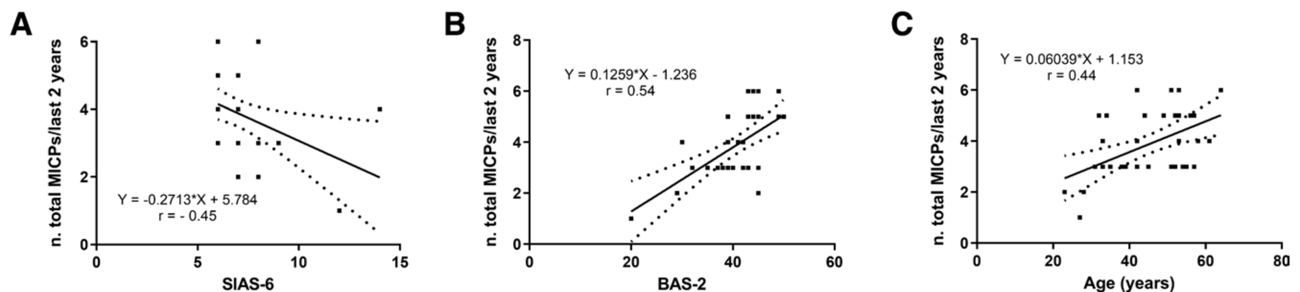

Figure 3. Significant (A) negative correlation between total MICPs in the last 2 years and SIAS-6 (B) positive correlation between total MICPs in the last 2 years and BAS-2, and (C) positive correlation between total MICPs in the last 2 years and age. Dot lines indicate ± 95% confidence intervals and black squares indicate individual data points. BAS-2 = body appreciation scale, MICPs = minimally invasive cosmetic procedures, SIAS-6 = social interaction anxiety scale,

better perception of own body (Fig. 2 and Table 2). Such significant differences were not found to be possibly impacted by main sociodemographic brackground of the 2 groups' participants. Interestingly, no differences in terms of BDD symptoms were found between the 2 groups.

Although some works have shown that the faces of people extremely modified by aesthetic medicine are perceived as less attractive, the beauty prototypes proposed by society are constantly changing and with them also the perception of the other, the patients' psychological attitude and the inter-personal interactions.[35] However, few studies in literature investigated the psychological profile of those patients requesting minimally invasive facial rejuvenation procedures – by using different batteries, sample size and sociodemographic evaluations – and assessing these patients as suffering from higher levels of psychiatric problems than the control subjects.[3,7,36]

Nevertheless, less interpersonal problems, higher level of self-esteem and better perception of own body demonstrated in MICPs participants in the present study tend to expand those works which observed that, in patients undergoing minimally invasive antiaging treatment procedures, traits of greater extraversion, openness to new experiences, and agreeableness are present.[7] These data – together with the absence of correlation with eating disorders – have been speculated as contributing to a higher quality of life,[7] reduction of all symptoms related to social relationships, anxiety and depression and higher degrees of self-esteem.[37] From a speculative point of view MICPs participants' psychological attitude depicted for the first time a possible "virtuous" circle in which the better perception of own face and body (higher scores on BAS) could have fostered the higher level of self-esteem (higher level on RSE), resulting – in turn – in less interpersonal problems (lower scores on SIAS). This psychological pattern is supported by those studies indicating the face as the part of the body most influencing the perception of the self-image and the possibility of communicating emotions and information about oneself through facial expressions.[4] However, the literature is controversial about these aspects and many authors warned about the possibility that the desire to look better – giving an impression to be more extroverted along different batteries – could be not a sign of social adaption[3,38,39] but rather a reflection of underlying insecurities and societal pressures that influence individual behavior in complex ways.[40] This complexity suggests that the pursuit of an idealized self-image may often lead individuals to engage in superficial behaviors, masking deeper emotional struggles and contributing to a cycle of anxiety and dissatisfaction.[41] This cycle can create a paradox where the pursuit of external validation ultimately undermines genuine self-acceptance, leading individuals to prioritize appearances over authentic connections and well-being.[42] Such dimensions have been partially corroborated by various empirical investigations, which elucidate that approximately 50% of individuals pursuing cosmetic surgical interventions are at a discernible level of vulnerability for certain psychiatric disorders.[43] Furthermore, a comprehensive systematic review examining the psychological profiles of patients undergoing cosmetic plastic surgery revealed elevated incidences of narcissistic and histrionic personality disorders, as well as heightened levels of depression, anxiety, social isolation, and self-destructive behaviors in comparison to CGs.[44] Moving from such review evidences many studies to now obtained contrasting results with regard each other and the present findings. Beyond the complex terrain of this subject matter, possible differences may reside in the methodological approach. In terms of study design, if some works evaluated the postoperative effect of cosmetic procedures evidencing a beneficial effect in terms of on self-esteem and satisfaction with life,[37,45] others preoperatively demonstrated that patients seeking for such procedures need to find or regain a positive self-image,[39] while restropective works found an incidence of psychological burden in about 50% of women seeking for plastic procedures.[43] Further, discrepancies may be also related to the lack of a CG of participants not seeking for plastic/cosmetic procedures in most of the studies,[13,37,39,43] on different sample size wich may vary from a few of dozen[46] to more than 100 participants[7] and on the non homogeneous use of psychological and quality of life testing.[44]

Despite that, findings of the present and other studies positing that users of MICPs have a higher level of quality of life, more open to experiences, more extroverted and more agreeable[7] are further corroborated by negative and positive correlations found in the present work between SIAS-6 and BAS-2 and the number of BoNT injections, number of soft tissue filler injections and number of total sessions in the last 2 years. This could remark a certain association between higher perception of own face and body and better social interactions with the number of MICPs procedures (Fig. 3). Such results are of interest considering that people undergoing minor aesthetic medicine operations have shown more uninhibited and less anxious behavior in relating to others[45] and a modification of the facial expressions linked to the expression of the various emotions would seem to be correlated to the improvement of the mental disorders in those who use aesthetic corrections.[47] Indeed, due to a possible bottom-up process, some authors hypothesized that improvement of facial appearance could be involved in the alleviation of those symptoms related to anxiety and depression.[46,48] On the other side, some studies have questioned the consequences that BoNT-related modifications of facial expressions could have in communication with others, with possible downside effects in daily lives where recognizing emotional states and understanding emotional content is a fundamental competence.[49,50] Other works highlighted that the recourse to MICPs is higher in subjects with higher levels of anxiety and lower levels of self-esteem than CG[51] or in case of history of burnout syndrome and bullying experiences.[3]

Finally, in the present study MICPs participants demonstrated significant positive correlations between age and number of BoNT injections, number of soft tissue filler injections and number of total sessions in the last 2 years (Fig. 3). These results collectively suggest that the aging is a pivotal factor inducing patients to undergo MICPs and could expand previous findings demonstrating that perception of one's face satisfaction after treatment with BoNT injections significantly improved especially in relation to age.[52] Considering that changes in physical appearance due to aging can be a major source of stress for the individuals, negatively impacting on quality of life, self-esteem and psychosocial well-being and that a crucial aspect caused by aging seems to be the change in the skin of the face[53] present data could suggest that the age-related increase of the recourse to minimally invasive facial procedures could unravel a coping strategy to minimize the burden of aged physical appearance impacting on psychological well-being.

These findings are confirmed by those studies reporting the influence of face appearance in many social dynamics, from early childhood, underlining a greater attraction towards the faces of young people than those of the elderly. Such studies concluded that the aspects of the face that change the most with age are those for which people tend to require more interventions, in order to reduce the evidence of physical flaws.[37]

In conclusion, the present study highlighted – by using VQs and reducing those social/economic/demographic bias that could impact on MICPs recourse and/or on VQs scores by homogeneously sampling the 2 groups of participants – that subjects undergoing aesthetic medicine treatments are burdened by less interpersonal problems and demonstrate greater self-esteem and better own body perception. Interestingly, such a behavior was demonstrated not only for BoNT procedures, but a also for soft tissue filler injections indicating for the first time that the above-mentioned differences on VQs are possibly related to all those minimal facial procedures which subjects demand as a whole.

However, considering that the controversial results on the incidence of psychopathological disorders in dermatologic cosmetic settings, primarily focusing on cosmetic surgery candidates, this research gap underscores the necessity for a deeper understanding of the psychological profiles of patients seeking dermatologic cosmetic procedures and the long-term effects of these disorders on mental health and treatment results.[44] Enhancing this research may facilitate the formulation of customized psychological assessments and interventions that cater to the specific requirements of these patients, thereby enhancing their satisfaction with cosmetic procedures and overall well-being.[54] Integrating psychological evaluations into the preoperative phase may aid in recognizing at-risk individuals, enabling proactive strategies to alleviate potential adverse effects related to cosmetic interventions.[55]

5. Limitations of the study

The findings of the present study has to be handled carefully due to different limitations. These are the relative small sample size, necessity of reliance on patient self-reporting, and absence of previous neuro-psychological evaluations evaluated by means of the same VQs. Many volunteers might be hesitant to disclose a mental health history or psychiatric medication use to a psychologist out of embarrassment, and it is possible that answers have been affected by this experience. Moreover, the study did not record the facial subregions undergone MICPs and the way that such qualitative aspects may have related to VQs results. However, such suboptimal solutions have been reported in previous similar studies.[3] Furthermore, although the results of the present study tends to align with previous similar experiences,[7,37] participants were studied from 2021 to 2022, coinciding with the peak of the COVID-19 pandemic. During this timeframe, social interactions experienced significant disruption,[56] raising the question of whether this may have influenced the psychological outcomes of the participants. Comprehending the magnitude of these psychological disruptions could be essential for the interpretation of the results, as it may elucidate the ways in which isolation and modified social dynamics affected psychological health outcomes during such an extraordinary period.[57] Additional investigation is required to examine the potential ramifications of these psychological issues on the demand for cosmetic facial procedures. Finally, the cross-sectional nature of the investigation precludes any inference on causation and the possibility to differentiate between psychological effects of MICPs and preexisting psychological differences may skew preferences for their use. The absence of pre/post intervention data – indeed – limits the understanding of whether observed psychological differences are a consequence of MICPs or factors influencing their adoption. This complexity necessitates further investigation to elucidate these relationships and to develop effective interventions in those patients seeking for cosmetic procedures and needing psychological supports.

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