

Assessment of Wellbeing and Anxiety-related Disorders in Those Seeking Rhinoplasty: A Crowdsourcing-based Study

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Background: Recently, it has been proposed that psychosocial concerns may motivate the demand for aesthetic rhinoplasty. Although successful operations often improve the quality of life and self-esteem symptoms in patients with sound mental health, they may actually result in unsatisfactory outcomes in those patients with significant depression, anxiety, or other severe psychological disorders. The purpose of this study was to assess the incidence of psychological disorders in patients seeking rhinoplasty.

Methods: A prospective cross-sectional study of 298 random volunteers was conducted, with each participant completing a survey instrument that was administered through an internet crowd-sourcing service (Amazon Mechanical Turk). Participants were asked to complete a 10-item standardized SHNOS scale, and a 26-question PRIME-MD questionnaire in order to assess functional and aesthetic need for rhinoplasty, and the incidence of psychological disorders respectively

Results: 38.95% of female participants reported a willingness to undergo aesthetic rhinoplasty, with a significantly lower number of men reporting the same (27.78%, $P = 0.042$). Adults between the ages of 18-24 (52.92%) were more willing to undergo aesthetic rhinoplasty, as compared to any other age group ($P < 0.01$). It was found that 57.84% of patients interested in surgery reported a psychological disorder as determined by the PRIME-MD questionnaire.

Conclusions: Those suffering from major depressive disorder, generalized anxiety disorder, or body dysmorphic disorder may seek aesthetic rhinoplasty as a solution. It is important that surgeons assess patient mental health prior to treatment in order to avoid unsuccessful outcomes secondary to psychosocial illness. (*Plast Reconstr Surg Glob Open* 2020;8:e2737; doi: [10.1097/GOX.0000000000002737](https://doi.org/10.1097/GOX.0000000000002737); Published online 21 April 2020.)

INTRODUCTION

In 2018, 213,780 cosmetic rhinoplasty procedures were performed in the United States, making it the third most common esthetic procedure performed by plastic surgeons.¹ Cosmetic rhinoplasty is aimed at altering the shape of the nose to improve the physical appearance of the face, which

significantly improves the quality of life.²⁻⁴ Several studies have concluded that there is a direct relationship between a patient's personality, attitude, and productivity, and their perception of self-image.⁵⁻⁷ Furthermore, one's self-image can be drastically altered by the perception of others, with the esthetic structure of the face playing a significant role in the way individuals view each other.⁶ In the event that the perceptions of others have a negative effect on one's self-image, this can be detrimental to the self-esteem of a patient, resulting in anxiety, depression, and other psychological disorders.⁸ This often leads to social avoidance which may further exacerbate the decline in mental health.^{8,9}

The face also plays a crucial role in reflecting emotional status changes and influences the individual's communication with others and thus productivity and acceptability in the society.⁷ In many patients, rhinoplasty may improve the appearance of the person leading to a

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drastic improvement in mental, emotional, and functional wellbeing.^{6,7} In turn, this may improve the professional life of the patient and, thus, increase their productivity in society.^{10,11}

However, recently, it has been proposed that although psychosocial concerns may primarily motivate the demand for esthetic rhinoplasty, they may also hinder positive outcomes.^{5,6,8,12} Although successful operations often improve the quality of life and self-esteem symptoms in patients with sound mental health, they may actually result in unsatisfactory outcomes in those with significant depression, anxiety, or other severe psychological disorders diagnosed preoperatively and not properly addressed in the postoperative setting.^{12,13} As such, the purpose of this study was to assess the incidence of psychological disorders in patients seeking rhinoplasty and to determine the most effective screening practices for such mental health conditions.^{14,15} We also sought to capture data using the Standardized Cosmesis and Health Nasal Outcomes Survey (SCHNOS) that has been recently advocated by Moubayed et al¹⁶ for use in all patients seeking cosmetic rhinoplasty.¹⁶

METHODS

In this study, a prospective cross-sectional study was conducted of volunteers recruited through an internet crowdsourcing services, Amazon Mechanical Turk (AMT), over the course of 2 weeks (December 1, 2018 to December 14, 2018) using a survey instrument.¹⁷ Several studies have now validated the quality of data extracted from the worker population and have concluded that it is extremely representative of the US population.^{17–22} Workers are provided with a preset level of compensation and the estimated time of survey completion, and then subsequently screened by Amazon for quality responses. We did not allow workers with lower than a 5-star worker rating (the maximum possible score for worker quality) from participating in the survey. Motivation has been shown to be almost entirely from intrinsic enjoyment of the activity and, thus, this has demonstrated a lower bias in the selection of participants that actually respond to the survey completely and accurately.¹⁷

AMT workers are required to be over the age of 18 and registered through the Amazon service platform to prevent the same individual from taking the same survey more than once. Amazon also tracks IP addresses and worker IDs to prevent multiple survey responses from the same user who may control more than one worker account. Surveys were open to 250 people at a time for approximately 48–72 hours (repeated 4 times) and workers were paid \$0.10 per unique response. Between each survey period, a 24-hour hiatus was taken to screen for quality and completeness in each response before proceeding to collect more data.

Internet crowdsourcing is a powerful tool in its ability to elucidate the unique perspective of the masses, from a diverse group of individuals that may otherwise be inaccessible through other surveying methodologies. Additionally, using the AMT platform to administer surveys significantly reduces costs, response lag, and other

barriers to access specific patient populations that are still representative of the US population as a whole.¹⁷ Due to the nature of AMT workers disclosing no self-identifying information and not being patients at our institution, IRB approval for this study was not sought or necessary; however, the principles from the Declaration of Helsinki were upheld throughout the course of this study.

Crowdsourcing was utilized to gain survey responses to assess the mental health of the study participants, in addition to their interest in undergoing esthetic rhinoplasty procedures. The PRIME-MD is a validated questionnaire designed for self-reporting mental health information and was used to assess somatoform disease, irritable bowel syndrome, binge eating disorder, major depressive disorder, generalized anxiety disorder, and alcohol abuse disorder.^{14,15} Finally, patients were also administered the validated SCHNOS questionnaire to determine their preoperative functional or esthetic need for rhinoplasty (see **Appendix A, Supplemental Digital Content 1**, <http://links.lww.com/PRSGO/B352>).¹⁶

Screening Questions

Although Amazon Mechanical Turk requires that registered volunteers be over the age of 18, individuals may not be completely truthful when creating their account. To ensure that all surveyed participants were considered adults, the first question of the survey asked the participants to re-enter their age. If the age they entered did not match their registered age, the survey response was excluded. No other screening questions were administered to maintain a truly diverse representation of the US population.

Attention Check Question

To ensure that survey participants were paying close attention to each question and scenario and to also ensure that the generated data was a valid representation of patient opinions, the following 2 attention check questions were included approximately halfway through each major section of the survey. The question was structured similarly to the surrounding questions (either the PRIME-MD or SCHNOS surveys).

PRIME-MD question: “Over the past month how much of a problem was making the bed and the answer to this specific question is two.”

SCHNOS question: “During the past month, the answer to this question is yes.”

Respondents that entered a response other than “two” or “yes,” respectively, were excluded from this study. This is a validated technique to screen participants for true responses.¹⁷

Data Analysis

Data from the survey were pooled and assessed using Microsoft Excel 2016 (Redmond, Wash.). Statistics were also assessed using Microsoft Excel 2016, with continuous data evaluated using two-tailed two-sample unequal variance t tests ($\alpha = 0.05$). The STROBE statement was used as an effective guideline for the quality of this prospective cohort study (see **Appendix B, Supplemental Digital Content 2**, <http://links.lww.com/PRSGO/B353>).

RESULTS

A total of 622 MTurk participants were interested in the survey. Of these, 324 (52%) were excluded either because they did not meet the inclusion criteria (197), or they did not complete the survey (127). This is likely a result of many workers simply filling out the survey without reading the questions and subsequently failing the attention check. Therefore, a total of 298 participants that met the inclusion criteria (age screen and both attention check questions) with complete responses were included in this study. This screening methodology provides us with the highest quality data from the most attentive and reliable respondents.

Assessing Survey Bias

A total of 298 volunteers successfully completed the survey, with only 5.03% of survey participants demonstrating a response bias after completing the PRIME-MD questionnaire. Before any study participant was made aware of the contents of the survey, they were asked if they would consider esthetic rhinoplasty at any point in the future to correct their physical appearance. Following the completion of the survey, patients were once again asked the same question, and of these very few changed their response.

Patient Demographics

A total of 172 women and 126 men responded to and completed the survey. With respect to patient gender, 38.95% of female participants reported a willingness to undergo esthetic rhinoplasty, with a significantly lower number of men reporting the same (27.78%, $P = 0.042$). In addition, the rate of self-reported mental health disorders was disproportionately higher among women than men.

There was also a significantly higher percentage of young adults between the ages of 18–24 (52.92%) willing to undergo esthetic rhinoplasty, as compared to any

other age group ($P < 0.01$). These data are summarized in Figure 1.

Income further demonstrated a significant role in the willingness to undergo esthetic rhinoplasty, with 47.37% of individuals with an annual household income of \$50,000–\$75,000 interested in rhinoplasty, whereas only 32.41% of individuals with income less than \$50,000 interested in rhinoplasty ($P = 0.03$). In addition, individuals with an annual household income of greater than \$75,000–\$100,000 were also significantly less likely to be interested in rhinoplasty (28.85%; $P = 0.03$). These data were compared to and was consistent with demographic information collected by Gordon et al. for mean household income of patients undergoing esthetic plastic surgery (Fig. 2).²³

Mental Health Assessment

Although not many study participants reported being unsatisfied with the appearance of their nose (69), 65.22% were interested in esthetic rhinoplasty. This was significantly greater than those participants who were satisfied with the overall appearance of their nose, with only 15.32% still reporting a willingness to undergo esthetic rhinoplasty ($P < 0.00001$). However, of those patients who reported being satisfied with the appearance of their nose, 33.62% reported an SCHNOS score that indicated an esthetic or functional need for rhinoplasty. In addition, of those patients who reported being unsatisfied with the overall appearance of their nose, only 44.93% reported an SCHNOS score that actually indicated a need for rhinoplasty.

Furthermore, 57.84% of patients interested in surgery reported a psychological disorder as determined by the PRIME-MD questionnaire. These disorders included somatoform disease, irritable bowel syndrome, major depressive disorder, generalized anxiety disorder, and alcohol abuse disorder (Fig. 3).

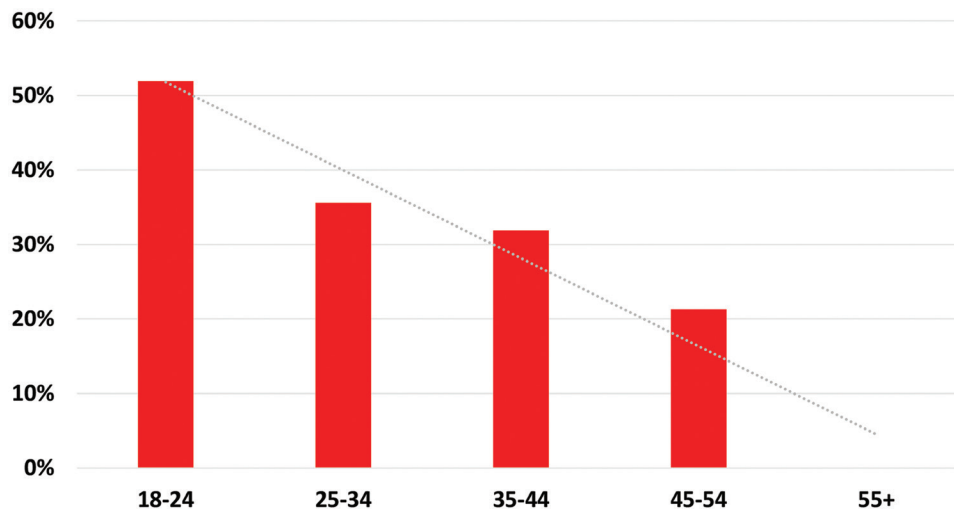


Fig. 1. Rhinoplasty interest expressed by age group.

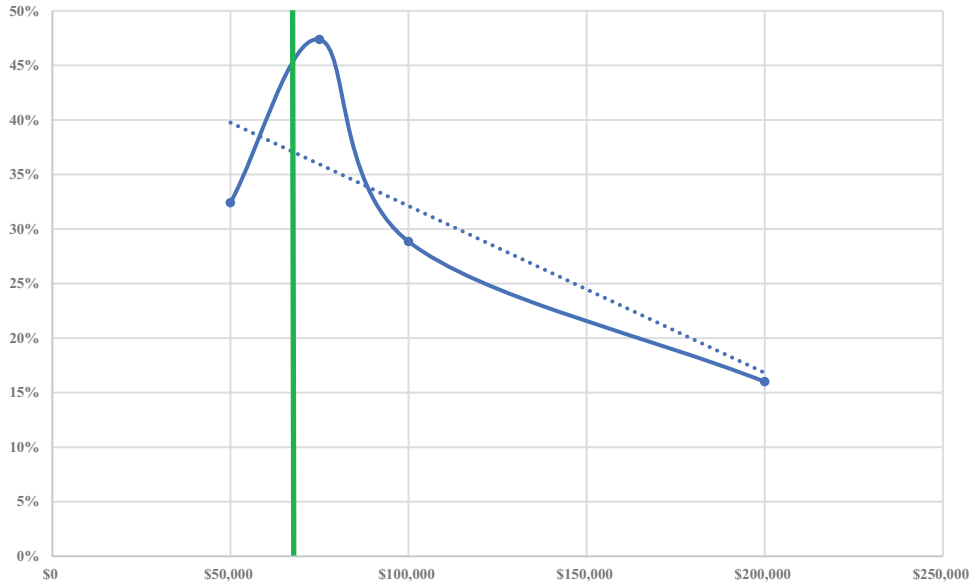


Fig. 2. Percentage of study participants interested in undergoing esthetic rhinoplasty with respect to their annual household income (blue), compared to the average household annual income (\$60,976) of all patients who underwent esthetic plastic surgery in the United States in 2018 (green).

DISCUSSION

The results of our crowdsourcing study were revealing with respect to the prevalence of mental illness among those patients interested in esthetic surgery. It was found that a significant number of patients interested in esthetic rhinoplasty could be screened for a mental health condition with a simple 32-question self-assessment. This implies that more than half of all patients seeking rhinoplasty may undergo a suboptimal postoperative course due to their mental health. This poses a substantial risk to both the patient and provider and, thus, should be assessed by all surgeons offering esthetic rhinoplasty.

An interesting finding was the dichotomy between the patient-reported desire for esthetic surgery, patient satisfaction with the appearance of their nose, and the overall SCHNOS scores reported by these patients. It was found that a majority (55.07%) of individuals unsatisfied with the appearance of their nose did not actually have a functional or esthetic need to undergo rhinoplasty (as determined by the SCHNOS scale). In contrast, those individuals that were satisfied with the overall appearance of their nose were almost as likely (33.62%) to have a functional or esthetic need for rhinoplasty (no statistical significance was found between the two groups). This

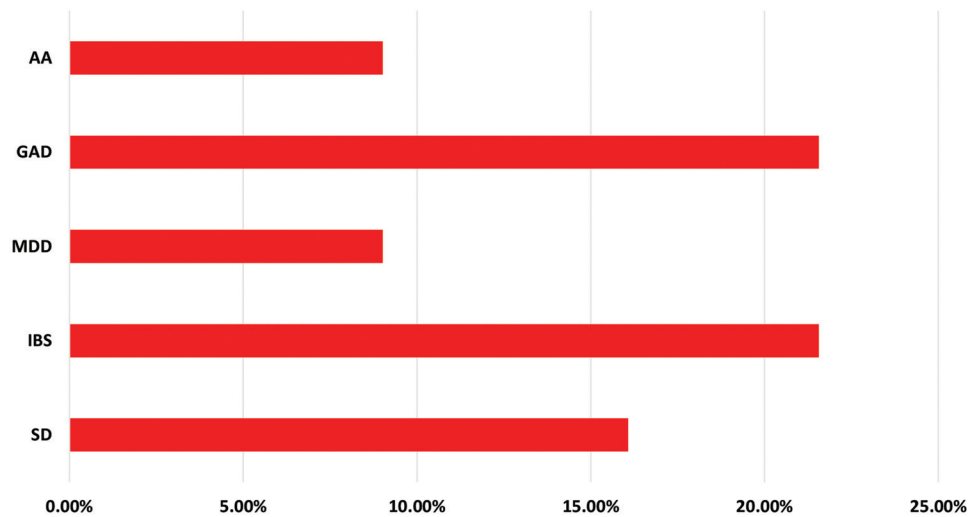


Fig. 3. The prevalence of mental health disorders among all study participants who were interested in esthetic rhinoplasty. AA, alcohol use disorder; GAD, generalized anxiety disorder; IBS, irritable bowel syndrome; MDD, major depressive disorder; SD, somatoform disorder.

demonstrates that the objective need for rhinoplasty does not significantly vary based on one's subjective need for surgical correction. As such, we find that those patients who actively seek esthetic rhinoplasty are those who are also more likely to potentially suffer from body dysmorphism or other mental illness that has negatively impacted their self-image.

Future studies should investigate the number of these patients that regularly take any medication or undergo other treatment modalities for their mental health disorder. Even so, at the time of the survey, the responses of the patient screened them for a mental health disorder. As such, it is important for the plastic surgeon to administer a similar screening tool and refer the patient to proper management before undergoing esthetic rhinoplasty. The results of our bias assessment also implicate that addressing mental health with the patient will not significantly change their mind about undergoing esthetic rhinoplasty. Rather this process will likely increase the psychosocial health of the patient and, thus, improve the outcomes without a significant increase in patients lost after the initial consultation.

In addition to the mental health implications of this study, it was not surprising to find that a majority of the patients who completed the survey were women. Although the AMT platform offers a representative study population (an equal number of men and women), we found that after starting the survey, women were more interested in the subject matter. As such, women were likely to continue the survey to completion. Furthermore, it is known that the diagnosis of psychiatric disorders is higher in women than in men and could have thus skewed our results.^{24,25} However, it is also known that a larger proportion of women opt for esthetic rhinoplasty, and as such we believe that our study population is still representative of those patients that would seek surgical correction.^{26,27}

A potential limitation of using Amazon MTurk may be that a single study participant could submit multiple survey responses. Individuals could also circumvent the survey process completely, using a random number generator to create survey completion codes that are required for study participants to claim monetary rewards. Another potential limitation of this study, and inherent to many surveying methodologies, is an internal bias that exists among individuals that choose to take a specific survey for monetary gain. In an attempt to avoid this bias, keywords about the contents of the survey were not mentioned at all in the survey title, or in any of the demographic screening questions. Furthermore, the survey was subdivided into several sections, and the participant could not view future sections until completing any previous ones. As such, the only mention of rhinoplasty was in the last section (of 4 total), at which point, many individuals would no longer "turn back," because they had come this far already. MTurk remains a powerful tool for surveying the US population and can be an excellent resource for collecting anonymous patient information.

CONCLUSIONS

The results of this study, as a reflection of the general US population, demonstrate that a majority of individuals interested in esthetic rhinoplasty may be suffering from an anxiety-related disorder. Those suffering from a major depressive disorder, generalized anxiety disorder, or body dysmorphic disorder may seek esthetic rhinoplasty. As such, it is important that surgeons assess patient mental health before surgery and create a psychosocial treatment regimen to address individual patient needs to avoid unsuccessful outcomes secondary to mental illness. Treatment should be started preoperatively and continued postoperatively to improve recovery and patient satisfaction.

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