The Technological Momentum of Cosmetic Procedures

Research Paper submitted to the Department of Engineering and Society

Presented to the Faculty of the School of Engineering and Applied Science

University of Virginia • Charlottesville, Virginia

In Partial Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

Victoria Hinchberger

Spring, 2020

On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

Introduction to Cosmetic Procedures

To the public, cosmetic procedures seem perfect by many standards; they bring promises of enhanced appearances for patients, larger incomes for physicians, and a continuously increasing volume of patients for physicians to help- in the past 20 years alone, the volume of cosmetic procedures has risen 285% and is projected to grow 7.1% annually within the next five years (Castle, Honigman, and Phillips 2002). However in practice, these procedures have resulted in a two-fold increase in suicide rates among patients, an annual proportion of 13% of cosmetic surgeons facing medical malpractice suits, and the murder of 3 physicians by dissatisfied patients (Sansone and Sansone 2007; Therattil et al. 2017). There is a dark side to cosmetic procedures that must be addressed before the field further claims stake as a booming business and a global, cultural norm. Through analysis of the technological momentum and networks of cosmetic procedures, this sociotechnical paper investigates the ethics and potential sources for improvement within this field.

Documentary Research

The aim of this paper is to analyze the rise in cosmetic procedures and how it can be improved both in its standardization and adherence to medical ethics. Network analysis is used as a primary methodology in this paper. Given the vast actors and artifacts involved in cosmetic procedures, network analysis is used to detail relationships between actors and highlights common problems within the medical cosmetic field. The relevant human actors are cosmetic physicians, patients, and cosmetic technology developers. The non-human actors are the developed technology, assessments used for pre-operative suitability and Quality of Life (QoL), and the economic benefits of the cosmetic procedure market. These actors work together simultaneously to enhance the growth of this network and the amount of cosmetic procedures. Analysis will be organized by actors to highlight the bad actor and its effects on the network.

Relevant Concerns of Cosmetic Procedures

Since 1997, the volume of cosmetic procedures has risen 431%. A number of factors have led to this dramatic increase, including influence from the media, reduction in cost, and a continuously developing market for cosmetic medical technology (Furnham and Levitas 2012).

However, there is concern regarding the negative effects this rise has on the public. As shown in Figure 1, a longitudinal study conducted by von Soest et. al collected standardized measures of psychosocial variables among cosmetic surgery patients without known psychological disorders. Contrary to cosmetic surgery's aim to increase patients' wellbeing, the mean subjective ratings of patients' physical

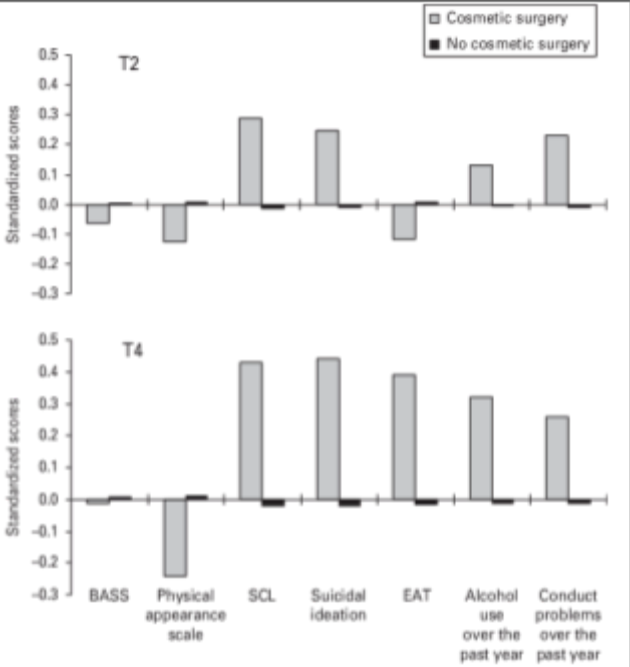

Figure 1: Standardized psychosocial assessment of participants in a study conducted by von Soest et. al before (T2) and after (T4) cosmetic surgery (von Soest et al. 2011).

appearance went down while suicidal ideation went up post-operation (von Soest et al. 2011).

Additionally concerning is that this rise has been matched with easier access to cosmetic enhancement for sufferers of Body Dysmorphic Disorder (BDD) and other forms of body insecurity. While BDD sufferers make up only 2% of the general public, this group accounts for over 15% of cosmetic surgery patients (Dolgin 2015). Additionally, these patients tend to go unnoticed, with 84% of

cosmetic physicians reporting they have unknowingly performed surgery on a patient with BDD (Higgins and Wysong 2017).

This increased access is particularly problematic for BDD patients because this mental disorder puts sufferers at a higher risk for suicide and dissatisfied perceptions of physical appearance regardless of undergoing a comsetic procedure (7). Thus, it is likely the negative effects presented in Figure 1 are more drastic within this cohort. As detailed, there are clearly problems in oversight and assessment of patients undergoing cosmetic procedures. Currently, clinics and practices that perform cosmetic procedures attempt to screen for patients that would suffer negative psychological effects using questionnaires, yet these are neither standardized nor validated for use towards patients undergoing cosmetic enhancement. Given the lives at risk and lasting psychological effects implicated to be a result of cosmetic procedures, there exists an urgency to addressing this lack of standardization within the field.

STS Frameworks

Both Actor-Network Theory (ANT) and technological momentum are used in this paper to shed light on the development of cosmetic procedures to its current state. Formulated by Bruno Latour, ANT provides a methodological and systematic framework for analyzing sociotechnical networks (Cresswell, Worth, and Sheikh 2010). These networks highlight the interactions between both human and nonhuman actors. The benefit to ANT is that it provides a descriptive overview of the relationships among actors and how these relationships shape technological and social processes.

There is a complex network of actors that comprise the field of cosmetic procedures- physicians, patients, product developers and advertisers to name a few of the more relevant actors. The relationships within these networks are important in analyzing both the rise in cosmetic enhancement and ways to improve its development (Braga et al. 2018).

One criticism of ANT is that it is amoral. However, a proponent of ANT, Wiebe Bijker, countered that the moral nature of the given subject should be analyzed only after the network is

understood. While this paper is focused on the ethics of cosmetic enhancement, it is important to understand what actors are involved in this potential violation of ethics (Whittle and Spicer 2008). The ethics and morality of cosmetic enhancement will not be analyzed in conjunction with ANT analysis; rather, this analysis will occur following a detailed elucidation of the network.

After defining the network, technological momentum will be used to highlight the time-sensitive nature of addressing problems within cosmetic procedures. As previously mentioned, cosmetic procedures have markedly risen in quantity, and this can be attributed to the continually increasing influence of its technology. According to Dr. Thomas Hughes, technological momentum is a fusion of the more rigid theories of social constructivism and technological determinism. As sociocultural factors reinforce the technology, the technology itself gains more power and influence over the public. In terms of cosmetic procedures, society has pushed for its development since the 19th century, with records of rhinoplasties, skin flap surgeries, and face lifts (Denkler and Hudson 2015). While societal factors like post-World War II prosperity dominated its early development, the technology used in cosmetic procedures has ingrained itself into society. Continuing technological innovation and development in cosmetic surgery is progressively shaping both the economic market among cosmetic surgical vendors, as well as beauty standards and normalization of body modifications among the general public.

Critics of technological momentum include technological determinists. Proponents of this theory argue that technology has shaped the social values that have normalized and increased the number of annual cosmetic procedures. This argument is not applicable to the analysis because the focus is not about whether society or technology has shaped the growth of cosmetic procedures, but rather the dangers of the continual growth.

Results

Network of Cosmetic Procedures

As mentioned previously, the relevant human actors are cosmetic physicians, patients, and cosmetic technology developers. The non-human actors are the developed technology, assessment used for pre-operative suitability and quality of life (QoL), and the economic benefits of the cosmetic procedure market. These actors work together to continuously enhance the growth of this network and the amount of cosmetic procedures.

This interplay can be illustrated in a micro-level display of these actors, as illustrated by the patient "Joe" and the physician "Dr. Jane." When Joe walks into Dr. Jane's office for an elective rhinoplasty, for example, he will first meet with Dr. Jane and be given an assessment- whether it be a questionnaire or an interview- to determine whether he has a problem with his physical appearance indicating either BDD or another form of body insecurity (Bouman, Mulkens, and van der Lei 2017). One such assessment is the Utrecht questionnaire, as shown in Figure 2 (Lohuis 2014). Questions E3 and E4 are primarily used as indicators for BDD (Lohuis 2014). If approved for surgery, Joe will undergo the cosmetic procedure and Dr. Jane will use imaging and surgical tools developed from medical companies

The Utrecht questionnaire for outcome assessment in aesthetic rhinoplasty

I give the following score to the way I like the appearance of my nose:

0 1 2 3 4 5 6 7 8 9 10

Very ugly — Very nice

E1. Are you concerned about the appearance of your nose?

Not at all	A little	Moderate	Much or often	Very much or often
1	2	3	4	5
☐	☐	☐	☐	☐

E2. Does this concern bother you often?

Not at all	A little	Moderate	Much or often	Very much or often
1	2	3	4	5
☐	☐	☐	☐	☐

E3. Does this concern affect your daily life (e.g., your work)?

Not at all	A little	Moderate	Much or often	Very much or often
1	2	3	4	5
☐	☐	☐	☐	☐

E4. Does this concern affect your relationships with others?

Not at all	A little	Moderate	Much or often	Very much or often
1	2	3	4	5
☐	☐	☐	☐	☐

E5. Do you feel stressed by the appearance of your nose?

Not at all	A little	Moderate	Much or often	Very much or often
1	2	3	4	5
☐	☐	☐	☐	☐

Figure 2: Utrecht preoperative assessment for rhinoplasty patients (Lohuis 2014).

with whom she collaborates. Joe might also fill out a post-procedure questionnaire about his quality of life or satisfaction with the results. Joe will then be billed following the procedure for all appointments and the procedure itself. Now magnify this to all 17 million procedures performed annually. Clearly, the network extends to a substantial portion of the country.

There are important characteristics of these actors that have promoted the increase in cosmetic procedures. For one, physicians like Dr. Jane have financial incentives to encourage patients to undergo a cosmetic procedure. Unlike any other specialty, elective cosmetic enhancement is not covered by insurance and it follows typical consumer-economic trends (Richardson et al. 2015). The increasingly lucrative nature of the field has pushed non-specialists to perform cosmetic services. No longer are board-certified plastic surgeons dominating this field. Rather, it is not out of left field for an ear, nose, and throat doctor to be giving a face-lift (Murphy 2012). This increase in the number of doctors performing cosmetic procedures has made it both more accessible as well as less specialized, which can lead to more errors and increased dissatisfaction from patients.

Patients like Joe are being pushed to go under the knife due to factors including body image, cultural normalization, and media influence (Haas 2008). Although plastic surgery has local origins - as was the case of the previously mentioned Hindu surgeon - it has become a globalized practice along with the beauty standards that further normalize its use (Chuang, Barnes, and Wong 2016a). The media plays a large part in this globalization of procedural and beauty norms - with social media and TV, there is a heavier influence from the fashion industry and 'influencers' on the shaping of beauty ideals. This cultural fusion of beauty has led to more uniform procedures for cosmetic surgeons, allowing for the spread of techniques. Continuing with rhinoplasty as an example, although up to Joe's discretion, cosmetic surgeons like Dr. Jane have become well-trained in shaping a particular type of nose: straight, small, and in proportion with the rest of the face. With heightened preparedness for cosmetic enhancements, physicians are more readily able to perform these procedures, further contributing to the

increased volume.

These types of procedures would not be possible without the development of medical technology. Across the medical field, the past two decades have increasingly integrated technology as an essential component. As mentioned previously, the economic opportunity within the field of cosmetic procedures provides a market for medical technology developers. Tech developers have focused on reducing invasiveness and improving visualization (Mustoe and Han 1999). To illustrate, the effects of a face-lift that once required an incision from the temple to the back of the ear can now be accomplished with minimally-invasive injections (Edgar 2017). Additionally, the development of computer-assisted imaging systems gives both physicians and patients more control over the visualization and development of the desired results. A physician can provide clear imagery of what the results will look like even before the procedure has been performed. Both the advancement of non-invasive and imaging technology has increased the push towards cosmetic enhancement.

Where this network is less advanced is the assessments used to measure a patient's suitability and the procedure's success. Compared to the previously mentioned developments, this actor lags in development. The current method to determine the suitability of a patient for cosmetic procedures is not standardized. While the previously mentioned Urtecht questionnaire, as illustrated in Figure 2 on page 6, is used for elective rhinoplasties, the same validated assessments are not used across other cosmetic procedures. Additionally, only two of the questions - E3 and E4 - from the self-reported questionnaire have been implicated in BDD patients (Lohuis 2014). Thus, even this valid instrument leaves room for patients with BDD to go undetected. In one study, researchers evaluated the various mental health assessments physicians use. They found that there is both disagreement among physicians about the instruments used for diagnosing patients as well as the symptoms for which patients should be tested. Physicians have been reported to use standardized screening assessments with yes/no responses, self-reported questionnaires from the patient, and clinical interviews (Wildgoose et al. 2013). These

pre-operative measures deviate significantly from one another. Additionally, while these methods test for patient concerns like anxiety and body discomfort, the researchers found the methods do not cover the same concerns. One of the issues that could be leading to this continual lack of standardization is that these measures were not validated with the focus on patients undergoing elective, cosmetic procedures (Wildgoose et al., 2013). Rather, they are intended for the general public. Just as a physician would assess a person with diabetes differently than a healthy person, the same measures should be taken for assessing cosmetic procedure patients. By focusing on characteristics pertinent to these patients, these assessments could be better standardized and tailored for these specific patients.

Once the patients are approved for cosmetic enhancement, it is also important for physicians to measure the procedures' value and success. This can be accomplished through operationalizing the patients' QoL before and after the procedure. Unfortunately, the assessments used have also been shown to lack standardization and validity (Dreher et al. 2016). In one study, researchers collected information about the QoL of patients following cosmetic surgery. While results indicated that QoL generally increased based off of the questionnaires used, they cannot be verified without valid and reliable measurement tools. It is shocking that there are so few studies, and not well conducted ones, on the worthwhileness of elective surgery. What if these types of surgeries are doing more harm than good? This lack of value is reminiscent of the nicotine/cigarette epidemic- the demand and production of cigarettes was so high once the studies finally came out about the physical effects, that people were hooked and social norms were solidified, despite the clear dangers. As cosmetic procedures gain popularity, it is imperative that standardized, validated, and mandatory assessments are created to determine whether these elective procedures do not violate medical ethics.

In the health field, there are four main principles of medical ethics to which physicians must adhere- respect for autonomy, justice, beneficence, and nonmaleficence (Gillon 1994). Failure to follow these principles can result in a range of both legal and ethical ramifications. Beneficence and

nonmaleficence are of particular interest. These two principles combined state that physicians should both promote good and prevent harm to patients. As previously mentioned, there is little to no standardization in assessing patients undergoing cosmetic procedures. Therefore, how can it be justified that physicians are adhering to this code when they have no grounds for validation? This question will hopefully drive actors in this network to shape the development of cosmetic procedures in the coming decade.

Technological Momentum of Cosmetic Procedures

The characteristics in this network have led to the increasing influence of medical technology within the field of cosmetic procedures. Initially, the dominating factors were cultural. Physical attractiveness has been highly valued since civilizations arose, due to both a pleasing aesthetic appearance and associated benefits such as higher social class and job opportunities (Gordon, Crosnoe, and Wang 2013). After Indian physicians initially developed plastic and reconstructive surgery in 800 B.C.E. through use of skin grafts, these techniques were gradually adapted for use in cosmetic procedures (Chuang, Barnes, and Wong 2016b).

The development was initially slow because of the imprecision, high error rates, and invasive nature of the tools used. Given that cosmetic procedures are elective, it is unlikely a person would choose to undergo a non-essential surgery without an anesthetic or numbing medication for example. The first surgery to use a compound reminiscent of an anesthetic was that performed by William Morton in 1846- he used an ether compound to numb the patient to the procedure. Over the next fifty years, the anesthetics were developed and eventually considered safe. The first of certain procedures like rhinoplasties and breast augmentations were performed in the late 1800's and early 1900's, although they were still in their primitive stages and not well advertised.

The push that led to the development of modern cosmetic surgery was the two world wars. Post-WWI, the United States experienced both a rise in the economy and -more importantly- in injured civilians and war veterans. Allocating economic resources towards treating the disfigurements, physicians

refined various reconstructive and cosmetic procedures leading to the first modern rhinoplasty in 1923 and face-lift in 1931 (Chuang, Barnes, and Wong 2016b). From this post-world war era also arose the organization of the American Society of Plastic and Reconstructive Surgeons (ASPRS) in 1931. Although cosmetic surgery was still not included in this group, the ASPRS set important precedents on the standards, goals, and techniques involved in the procedures that have diffused into the field of cosmetic procedures.

In fact, cosmetic surgery was initially presented with opposition from members of the ASPRS. Cosmetic surgeries were viewed as unnecessary in the 1940's and 1950's by physicians, according to the first president of the American Academy of Cosmetic Surgery, Richard Webster (Cosmetic Surgery in the United States 1999). This initial stigma from plastic and reconstructive surgeons toward the field led to slower growth over the next thirty years, until Richard Webster spoke to physicians in 1963 and realized the heightened level of interest in surgeons toward the field of cosmetic surgery. On October 18, 1964, the American Academy of Cosmetic Surgery was formed. There were multiple professional societies and organizations in both cosmetic surgery that formed afterwards up until 1985. This institutional organization, normalization, and acceptance of cosmetic surgery among physicians was crucial to the development of the field. It led to increased education - the first instruction of liposuction, one of the most common procedures in 2019, was in 1982- and consumer demand (Alsarraf et al. 2002).

The increased consumer demand and economic benefits for physicians and medical technology developers has created a positive feedback loop in the popularity of cosmetic procedures. In fact, before the economic recession in 2007 cosmetic procedures were projected to jump to 55 million by 2015 (Richardson et al. 2015). While it has not yet reached this magnitude, both the technology and popularity of these procedures is predicted to increase in demand (Ross 2019). If previous development of cosmetic procedure techniques is a predictor of the future, the amount of technology will increase and the methods further refined because there will always be a need for reconstructive surgical methods, which can then be

passed onto this field. For example, there are current clinical trials for use of regenerative medicine therapies like use of stem cells and growth of new skin to help with facial deformities. If these are passed onto the field of cosmetic procedures, there will be even more resources for cosmetic procedures, better aesthetic outcomes, and less invasive methods used- all technological drivers for its increase.

This economic rather than moral drive in cosmetic procedure developments has important implications for the future of the field and changes in the network. Because doctors and medical technology developers receive a much more lucrative pay with cosmetic procedures, it is possible that they could be treating patients that should not be treated due to the payoff. As previously mentioned, there is currently a lack of standardization and validation in assessing patients. Although adding standardized, intensive, and cosmetic patient-focused assessments would better uphold medical ethical principles, it could lead to a drop in the number of patients and thus financial gain from physicians. Therefore, it is possible that the physicians themselves would be likely to push for such an initiative. It indicates that other institutional members or outside institutions might need to get involved to serve as unbiased determiners of whether there should be changes in this field.

Recommendations for the network

This report sheds light on the network, momentum, and projected future growth for cosmetic procedures. It also provides areas for which this field could improve to meet the continual growth of its technology and cultural normalization. Based on these findings, two recommendations can be made. First, institutionally uniform assessments for suitability and success should be geared towards cosmetic patients. These validated measures will better uphold medical ethical principles with stronger indications that these procedures provide the best treatment for patients. Second, researchers should conduct a formal, longitudinal study that quantitatively investigates the post-operative QoL of cosmetically enhanced patients that were determined fit for a given procedure. This way, the value of the procedure - excluding

the patients who had significant contraindications from the first assessment - can be quantitatively measured.

Limitations and Future Directions

There were limitations in this study that will be important to consider in future research. For one, this study is limited in scope due to the allotted time. Both an increase in depth and in conclusions made from the current findings could result if this research was conducted over a longer period. For example, there were no individual patient or physician interviews used in this study. By including these individual interviews, a micro-level analysis could be applied to highlight the individual nature of elective procedures. Additionally, researchers could look into the legalities of medical ethics and whether the suspected violations proposed in the paper are actual, institutional violations.

Conclusion

The rise in popularity of cosmetic procedures has important implications both for its current state and its future directions. As of present day, the growth in its technology and global use has not been met with an increase in the measures used to validate its use and value. Human actors in this network have both a moral and institutional responsibility to develop better quantitative methods geared towards the best treatment of patients receiving cosmetic procedures. Failure of the field to follow the previously mentioned recommendations and changes could compromise this foundational right given to patients. Because cosmetic procedures are projected to follow the current increasing growth, it is important these disparities are both recognized and addressed in the near future.

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