Evaluation of Selfies and Filtered Selfies and Effects on First Impressions

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Abstract

Background: Selfies and filtered selfies are becoming more prevalent throughout society and in the facial plastic surgery clinic. The term “Snapchat dysmorphia” has been used to describe patients seeking procedures to look like their selfie or filtered selfie. This is particularly frequent in the Millennial population, aged 22 to 37 years.

Objectives: The authors sought to determine the effects on first impression from different photograph types: selfies, filtered selfies, a rear-facing smartphone camera, and a digital camera (DC). We hypothesize that the DC photographs will have the highest rated first impressions among evaluators despite the popularity of selfies and filtered selfies.

Methods: This study included 240 evaluators and 4 patients each completing the 4 different photograph types. The evaluators completed a survey rating first impression on various measures of success for each photograph type.

Results: A total of 960 first impressions were recorded for each of the 8 subscales, yielding 7680 individual assessments of first impression. The DC photograph was found to have the highest first impression scores among the 4 photograph types. There was no statistical difference between selfies and filtered selfies. The rear-facing smartphone camera received the lowest first impression scores.

Conclusions: Our findings indicate that the standard DC photograph taken during a preoperative consultation has higher first impressions than selfies or filtered selfies. Although “Snapchat dysmorphia” may continue to be a growing trend in the near future, our findings provide important information to discuss with patients in the preoperative visit to set realistic expectations.

appearance in selfies. The 2018 American Academy of Facial Plastic and Reconstructive Surgery Annual Survey further supports the increasing role of selfies in facial plastic surgery, particularly nonsurgical procedures, with the desire to look better in selfie as a primary motivator.

This trend has been most seen among Millennials, aged 22 to 37 years.

Social media has created a new avenue to take, edit, and post selfies within seconds. A selfie is defined as a self-portrait photograph of oneself (or oneself and others) taken with a phone camera held at arm’s length or pointed at a mirror that is usually shared through social media. The term “Snapchat dysmorphia” has been used over the last few years for the phenomenon of patients requesting procedures to look like their selfie or filtered selfie. Applying filters to photos allows oneself to smooth the skin, widen the eyes, narrow the jawline, plump the lips, and flatten the nasolabial folds, among countless other edits, with the click of a button. Although it has already been established that a selfie increases the nasal width by 30%, this is not a well-recognized phenomenon to the general public. Yet the appearance of a prospective patient’s nose is a common complaint when shown on selfies during a new consultation.

Filters are leading to a blurred viewpoint of one’s self and create unrealistic and unnatural expectations of one’s appearance but will increasingly need to be discussed, particularly with the growing Millennial patient population. On average, Millennials are expected to take 25,000 selfies in a lifetime, with at least 93 million selfies being posted to Instagram daily. It is clear that this current trend needs to be addressed when assessing patients for surgical and nonsurgical cosmetic procedures.

When discussing selfies and filters, the first impression one makes may often be based on one of these photographs posted on social media. First impressions have a deep evolutionary history in providing an initial judgement of a person. Previous studies have demonstrated improved first impressions after botulinum toxin, fillers, and facial plastic surgery procedures. In this study, we seek to determine the effects on first impression from different photograph types: selfies, filtered selfies, a rear-facing smartphone camera, and a digital camera (DC). We hypothesize that the DC photographs will have the highest rated first impressions among evaluators despite the popularity of selfies and filtered selfies.

METHODS

In this study, 10 volunteer patients were enrolled. Inclusion criteria consisted of males and females aged 22 to 37 years within the Millennial age group. The volunteer patients were recruited from within the office clinical staff, fellow otolaryngology residents, and acquaintances of the research staff. Volunteers were not compensated for their participation in this study. Five males and 5 females were enrolled. Patients were excluded if they were not within the desired age range. All patients provided written consent including signed photography consent before study enrollment. Study procedures were approved by the University of Illinois-Chicago Office for Protection of Research Subjects (Protocol #2018-1270) and completed from December 2018 through June 2019.

After screening and enrollment, patients underwent the 4 photograph types being studied: a selfie, filtered selfie, rear-facing smartphone camera, and a DC. The selfie, filtered selfie, and rear-facing smartphone camera were taken on an iPhone 7 Plus (Apple Inc, Cupertino, CA). The selfie was taken with the iPhone 7Plus 7MP front-facing camera. The filtered selfie was taken within the Snapchat Application (Snap Inc, Santa Monica, CA) again with the front-facing camera. There were 2 predetermined filter types already in the Snapchat Application that were used for this study. The different filters affected the smoothness of the skin, skin hue, eye width, eye brightness, jawline size, and nasolabial fold depth. These filters did not place additional glasses, hats, masks, or other objects onto the face. The patient was allowed to take photographs with 2 different filters but ultimately choose only 1 filtered selfie for the study. The patients were instructed to take the selfie and filtered selfie in the frontal view. Patients were not instructed on the type of facial expression, but all patients ultimately smiled on their own accord. A smile was then used for all the remaining photographs to create standardized photographs. Additionally, although a traditional frontal view photograph in the facial plastic surgery office would ideally not include a significant amount of clothing visible, patients were allowed to take their own selfie to be as realistic as possible. This led to articles of clothing being present throughout all of the pictures, because the rear-facing and DC photographs were modeled off the patient’s selfie and filtered selfie. The selfie and filtered selfie were completed first to allow for the DC and rear-facing smartphone camera to match and create standardized photographs. The patient was allowed to take their own selfie and filtered selfie at a length of 12 inches, within the described definition of arm length according to the description of a selfie. Patients were given time to take multiple photographs and choose the 1 selfie and 1 filtered selfie they would theoretically post to social media.

The rear-facing smartphone picture was then taken at the length of 12 inches using the iPhone 7Plus dual 12MP rear-facing camera (Apple Inc). Again, multiple pictures were taken and patients were allowed to choose their favorite. The selfie, filtered selfie, and rear-facing
smartphone camera were taken with the room lights only. The DC utilized umbrella lighting at quarter length. The DC photograph was then taken in the standardized frontal fashion with a Nikon D300S DC (Nikon, Tokyo, Japan) with a 105-mm lens at 1.5 m and umbrella lighting at quarter strength. Once all 4 photographs were completed, patients were then shown back their photos in random order and ranked them in order of preference. Photographs of patients were then saved to a computer in random order. No photographs were stored within the Snapchat Application or posted to social media. The patients also completed a brief demographic questionnaire.

A total of 240 evaluators were then recruited for the first impression portion of the study. Evaluators were medical students at the University of Illinois-Chicago College of Medicine. Inclusion criteria for evaluators included males and females aged 18 years and older. A survey utilized to evaluate first impressions that was previously published and employed in prior first impression studies was utilized to evaluate defined categories of perception. The first impression questionnaire (FIQ) consisted of 8 Likert-type scales (Appendix A) that rated social skills, academic performance, dating success, occupational success, attractiveness, financial success, relationship success, and athletic success. This survey was a paper handout distributed by study personnel that was completed immediately on viewing the photographs. Evaluator responses were anonymous.

Each of the evaluators examined a prerandomized series of 4 photographs on a computer screen individually or projected images to a large group. They were randomized by study personnel for each evaluator to view only 1 of each of the patient's photograph types (DC, selfie, filtered selfie, rear-facing). The photographs were organized to allow each photograph type to have the same number of survey responses and for evaluators to rate examples of all the different photograph types, rather than having 1 group of evaluators rating only selfies, for example. Evaluators were not informed whether the images used different cameras or filters or were selfies. They were then asked to evaluate the photographs quickly to ensure capture of the first impression. Each evaluator analyzed only 1 photo from each of the patients to avoid an intrarater comparison of an individual's different photograph types and prevent any influence on subsequent results as performed in previous first impression studies.

Ultimately, for this portion of the study, 4 patients were employed. These 4 patients were chosen to prevent evaluator fatigue from completing hundreds of first impressions on the FIQ. The chosen 4 patients represented 2 men and 2 women. This included 2 Caucasians, 1 African American, and 1 Asian American. The chosen 4 patients were an accurate representation of gender and ethnicity from the patients in this study. This allowed 60 different evaluators for each patient photograph. In total with 240 evaluators and 4 photographs, 960 first impressions were recorded for each of the 8 subscales, yielding 7680 individual assessments of first impression. Evaluators also completed a brief demographic questionnaire.

Statistical analyses were performed utilizing MATLAB statistical analysis and confirmed with Microsoft Excel (Microsoft Co, Redmond, WA) data analysis program. Each of the 8 categories' mean values on the FIQ for a particular patients' photographs were compared employing 2-tailed paired t tests among all photograph types. Statistical significance was defined as $P < 0.05$ (2-sided). Following this, a multivariate analysis of variance was performed to analyze the mean total FIQ scores among all 4 photograph types. After a statistically significant $P$ value was found, further 2-tailed unpaired t tests were used to examine for differences among photograph types both in total FIQ scores and individually among all 8 first impression categories.

**RESULTS**

Ten volunteer patients were enrolled in the study with 5 males and 5 females. The mean age of the males was 29.0 years (range, 26-33 years) and the mean age of the females was 25.8 years (range, 25-28 years). Patient demographics are displayed in Table 1. A total of 240 evaluators were included for the first impression analysis. There were 111 males (46.3%) and 129 females (53.7%). The mean age of male evaluators was 25.6 years (range, 22-35 years) and the mean age of the female evaluators was 25.9 years (range, 21-46 years). The remainder of evaluator demographics including ethnicity, education level, relationship status, and sexual orientation are listed in Table 2.

The multivariate analysis of variance among the mean total FIQ scores between the 4 photograph types found a $P$ value of 0.0001. Two-tailed unpaired t tests then revealed statistically significant differences among the photograph types. Results are shown in Table 3. The DC mean score among all 8 individual categories of 7.43 was found to be statistically significantly higher than selfies (mean [M], 7.18), filtered selfies (M, 7.15), and rear-facing photographs (M, 6.84) with $P$ values of 0.05 for selfies, 0.02 for filtered selfies, and less than 0.001 for rear-facing photographs, respectively. Selfies were found to have a statistically significant result with a mean score of 7.18 compared with a rear-facing photographs mean of 6.84 ($P = 0.01$). Filtered selfies were statistically significantly higher as well compared with rear-facing photographs with a mean of 7.15 for filtered and 6.84 for rear-facing ($P = 0.01$). Selfies (M, 7.18) vs filtered selfies (M, 7.15) did not differ with $P$ value of 0.83.
When comparing the mean scores of each photograph type in each individual category of the first impression questionnaire, occupational success and financial success were found to have significant results. The DC mean rating of 7.76 to rear-facing mean of 7.02 in occupational success found a P value of 0.02. In addition, the DC mean in financial success of 7.44 to rear-facing mean of 6.75 found a P value of 0.01.

The 4 patients were also analyzed individually among all 8 individual categories compared against each different photograph type. Given the large volume of t tests performed in this study comparing each of the 4 photographs with the 8 individual first impression categories (192 t tests), the relevant and statistically significant results will be listed. Figures 1 to 4 show the photographs utilized for the 4 patients to provide examples of the 4 different photograph styles analyzed in this study. Notably, in 2 of the 4 patients, the DC scored significantly higher compared with selfies and filtered selfies in the dating success category (P = 0.005 and 0.02, respectively). The DC photograph also scored significantly higher on relationship status to selfies in 1 patient (DC M = 7.43, selfie M = 6.85, P = 0.05). There was no difference between DC and filtered selfies on relationship success in this individual. In another patient, DC mean was significantly higher in athletic performance compared with selfies (DC M = 6.85, selfie M = 6.19, P = 0.05). There was no difference between DC and filtered selfies with athletic success in this individual.

The rear-facing smartphone photograph was found to have the most significant differences with lower means compared with the other photograph types. Refer to Tables 4 and 5 to review mean scores by individual category of first impression and significant comparison results for Patient 1, respectively. For each patient, the rear-facing photographs were found to have a total of 7, 9, 13, and 11 significantly lower results among each patient individually when reviewing all 8 categories on the first impression questionnaire.

**DISCUSSION**

First impressions are a deeply rooted human evolutionary tool that has adapted for quickly assessing another individual as friend or foe.\(^8,11\) Although previous studies have been published showing the improvement on first impressions following botulinum toxin, fillers, and facial plastic surgery,\(^8,10\) the growing use of selfies and
filtered selfies on social media generated the focus of this study. Which type of photograph provides the best first impression?

When employing the mean score among all 8 categories on the first impression questionnaire, the highest rated photos were from the DC, in support of

<table>
<thead>
<tr>
<th>Comparison group</th>
<th>Mean DC</th>
<th>Mean selfie</th>
<th>Mean filter</th>
<th>Mean rear-facing</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC vs selfie</td>
<td>7.43</td>
<td>7.18</td>
<td>N/A</td>
<td>N/A</td>
<td>0.05</td>
</tr>
<tr>
<td>DC vs filter</td>
<td>7.43</td>
<td>7.15</td>
<td>N/A</td>
<td>N/A</td>
<td>0.02</td>
</tr>
<tr>
<td>DC vs rear-facing</td>
<td>7.43</td>
<td>6.84</td>
<td>N/A</td>
<td>N/A</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Selfie vs filter</td>
<td>N/A</td>
<td>7.18</td>
<td>7.15</td>
<td>N/A</td>
<td>0.83</td>
</tr>
<tr>
<td>Selfie vs rear-facing</td>
<td>N/A</td>
<td>7.18</td>
<td>7.15</td>
<td>6.84</td>
<td>0.01</td>
</tr>
<tr>
<td>Filter vs rear-facing</td>
<td>N/A</td>
<td>n/a</td>
<td>7.15</td>
<td>6.84</td>
<td>0.01</td>
</tr>
</tbody>
</table>

DC, digital camera; N/A, not applicable in comparison group.

Figure 1. Patient 1 is this 25-year-old female. (A) DC photograph, (B) selfie, (C) filtered selfie, and (D) rear-facing smartphone.

Figure 2. Patient 2 is this 26-year-old male. (A) DC photograph, (B) selfie, (C) filtered selfie, and (D) rear-facing smartphone camera.
Our hypothesis. We hypothesized this based on patient preoperative consultations that often involve filtered selfies, but then patients realize there is a large difference between photographs when the DC photograph is taken in the office during their visit. Furthermore, selfies and filtered selfies have been found to create wider noses and overall can often produce an unnatural appearance. There were statistically significant differences among the DC compared with selfies, filtered selfies, and rear-facing smartphone photographs. There were no differences noted when comparing selfies with filtered selfies on first impressions. The lowest rated photograph among all 8 categories of first impression was the rear-facing smartphone camera. This begs the question: What could be causing these results while selfies and filters have become so intertwined in our daily life?

**Table 4.** Patient 1 FIQ Mean Score by Category

<table>
<thead>
<tr>
<th>FIQ category</th>
<th>Mean DC</th>
<th>Mean selfie</th>
<th>Mean filter</th>
<th>Mean rear-facing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social skills</td>
<td>8.05</td>
<td>8.25</td>
<td>7.83</td>
<td>7.83</td>
</tr>
<tr>
<td>Academic performance</td>
<td>7.67</td>
<td>7.39</td>
<td>7.15</td>
<td>7.05</td>
</tr>
<tr>
<td>Dating success</td>
<td>8.03</td>
<td>7.28</td>
<td>7.55</td>
<td>7.14</td>
</tr>
<tr>
<td>Occupational success</td>
<td>7.75</td>
<td>7.68</td>
<td>7.37</td>
<td>7.14</td>
</tr>
<tr>
<td>Attractiveness</td>
<td>7.96</td>
<td>7.84</td>
<td>7.63</td>
<td>7.57</td>
</tr>
<tr>
<td>Financial success</td>
<td>7.53</td>
<td>7.33</td>
<td>7.0</td>
<td>6.74</td>
</tr>
<tr>
<td>Relationship success</td>
<td>7.48</td>
<td>7.26</td>
<td>7.12</td>
<td>7.06</td>
</tr>
<tr>
<td>Athletic success</td>
<td>7.28</td>
<td>7.08</td>
<td>6.75</td>
<td>6.58</td>
</tr>
</tbody>
</table>

DC, digital camera; FIQ, first impression questionnaire.

**Figure 3.** Patient 3 is this 28-year-old male. (A) DC photograph, (B) selfie, (C) filtered selfie, and (D) rear-facing smartphone camera.

**Figure 4.** Patient 4 is this 25-year-old female. (A) DC photograph, (B) selfie, (C) filtered selfie, and (D) rear-facing smartphone camera.
As seen in Figures 1 to 4, there are clear differences among the various photograph types. Despite all the pictures being taken in the same setting, there are obvious variations in color and lighting; 3 of the 4 photographs were taken on a smartphone compared with the DC using umbrella lighting. Furthermore, a smartphone has different quality cameras for selfies: the front-facing camera (7MP) and the rear-facing camera (dual 12MP).

As discussed, a selfie distorts the nasal appearance with widening of 30% when taken at 12 inches from the face. A selfie is taken at a much closer distance than a typical photograph taken by another person. Therefore, for outside evaluators rating first impressions, a selfie has an unnatural appearance. The DC photograph provides a much more natural appearance of someone you would be meeting for the first time. The rear-facing photograph was also taken at the same selfie distance and was noted to create a different color hue, and the close distance itself likely contributed to the more negative first impression results. No lighting or position changes were made prior to this photograph being taken and thus is attributed to the smartphone camera itself.

Filtered selfies include many factors that contribute to an unnatural appearance. In addition to being taken at selfie length, the filter intrinsically may alter skin texture, widen the eyes, narrow the jawline, plump the lips, and flatten the nasolabial folds. When the 10 patients rated their own photographs, 5 of 10 (50%) chose the selfie as their best photograph, 4 of 10 (40%) chose the filtered selfie, and 1 of 10 (10%) chose the DC photograph. This is in contrast to the results of outside evaluators’ first impression of their photographs, where DC photographs had the highest ratings. This makes one wonder if social media has affected what an individual thinks of their own appearance.

Selfies and filtered selfies are by far the most common type of photograph being taken daily, with at least 93 million selfies being posted to Instagram daily. Recent publications have suggested that selfies and filtered selfies are now the norm and have altered the perception of beauty, at least to oneself. This is especially true among the Millennial age group between 22 and 37 years. Filtered selfies are brought into a new patient consultation but do not represent an accurate appearance and also sets unrealistic expectations of a final outcome. In contrast to preoperative imaging software such as Vectra (Canfield Scientific, NJ), which can be used to make alterations in the preoperative visit, filtered selfies do not set realistic outcomes. The filtered selfie makes significant changes in several areas of the face that may not be attainable or would need multiple procedures to obtain. Other types of preoperative imaging allow for the patient and surgeon to set realistic expectations with shared decision-making. This type of open communication can help prevent negative outcomes and increase patient satisfaction, rather than modeling surgical goals from a filtered selfie with unachievable results. Although neurotoxin and injectable fillers may be used to achieve a slimmer jawline or fuller lips, these procedures cannot replicate what a filter does. This has been a challenging and growing aspect particularly, but not limited to, the Millennial age range.

Inherently, filtered selfies produce a more feminine image and thus can have more negative first impressions on males. Figures 2 and 3 reflect this. Figures 2C and 3C with the filtered selfies appear substantially different from the patient’s DC photograph in Figures 2A and 3A. The filter alters the photograph color, skin texture, and brightness of the eyes particularly. Additionally, a slimmer jawline in males affects the perception of masculinity negatively, in contrast to women in whom a narrowed jawline has a positive result on their appearance.

Although selfies and filtered selfies are likely to remain prevalent in our society, it is important to realize the

<table>
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<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC vs selfie dating success</td>
<td>8.03</td>
<td>7.28</td>
<td>N/A</td>
<td>N/A</td>
<td>0.004</td>
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<tr>
<td>DC vs RF academic success</td>
<td>7.67</td>
<td>N/A</td>
<td>N/A</td>
<td>7.05</td>
<td>0.04</td>
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<tr>
<td>DC vs RF dating success</td>
<td>8.03</td>
<td>N/A</td>
<td>N/A</td>
<td>7.14</td>
<td>0.001</td>
</tr>
<tr>
<td>DC vs RF occupational success</td>
<td>7.75</td>
<td>N/A</td>
<td>N/A</td>
<td>7.14</td>
<td>0.03</td>
</tr>
<tr>
<td>DC vs RF financial success</td>
<td>7.53</td>
<td>N/A</td>
<td>N/A</td>
<td>6.74</td>
<td>0.008</td>
</tr>
<tr>
<td>DC vs RF athletic success</td>
<td>7.28</td>
<td>N/A</td>
<td>N/A</td>
<td>6.575</td>
<td>0.03</td>
</tr>
<tr>
<td>Selfie vs RF occupational success</td>
<td>N/A</td>
<td>7.68</td>
<td>N/A</td>
<td>7.14</td>
<td>0.04</td>
</tr>
<tr>
<td>Selfie vs RF financial success</td>
<td>N/A</td>
<td>7.33</td>
<td>N/A</td>
<td>6.74</td>
<td>0.05</td>
</tr>
</tbody>
</table>

DC, digital camera; FIQ, first impression questionnaire; N/A, not applicable in comparison group; RF, rear-facing.
outward perception they can produce. Previous research has found that selfies can make one less trustworthy, less socially attractive, less open to new experiences, and more narcissistic, with males having more negative results than females. Some of the most common reasons for taking and posting selfies include self-approval by others, belonging, and documentation of events. The term social exhibitionism has been used for individuals posting selfies to attract attention and was found to be more common in extroverts. All of this remains in support of our current study, which found that selfies and filtered selfies did not produce the best first impressions.

Our study helps to show support in discussing with patients that although they prefer their selfie or filtered selfie, others actually perceive the DC as the best first impression. This type of photograph is the most accurate representation of one’s appearance; therefore, this should be utilized when discussing possible surgical or nonsurgical treatment options. This would provide a much more realistic discussion about final outcomes.

Subjective evaluation studies such as this have several limitations that deserve mentioning. The selfie and filtered selfie were taken by the patient themselves to create a realistic environment, but this adds difficulty in creating standardized photographs. The patients were instructed to take the selfie and filtered selfie with their face centered in the photograph to allow for the other photograph types to match. This further led to articles of clothing being present throughout all of the pictures, because the rear-facing and DC photographs were modeled off the patient’s selfie and filtered selfie. Although having clothing present may alter one’s overall perception of beauty and first impression, a selfie taken outside of a research setting would also commonly have clothing visible. Patients were not instructed to smile or make any specific facial expression, though all patients smiled on their own accord while taking their selfie and filtered selfie; therefore this was utilized when taking the rear-facing and DC photographs to try to create standardized photographs. Different facial expressions and varying articles of clothing may influence first impressions, which is an area for further research.

Furthermore, the patients were allowed to take their photos first in order for the other photographs to be standardized to match them. Another limitation was the small patient size. However, with 60 evaluators making 8 first impressions on the FIQ, there were 480 individual first impressions per photograph. Although this helps increase the power of the study, a larger sample size of patient photographs being reviewed would further increase the power and reliability of this study. Additionally, selfies are commonly taken at varying angles and have even been found to produce a more attractive result when taken 30°C off the midline. In this study, the selfies and filtered selfies were taken in the frontal view for standardized photographs. This presents an area of future research in comparing different angles of selfies to DC photographs. The evaluators were also all medical students, and this limits the generalizability of this study to society as a whole.

CONCLUSIONS

Our findings indicate that the standard DC photograph taken during a preoperative consultation has higher first impressions than selfies or filtered selfies. While “Snapchat dysmorphism” may continue to be a growing trend in the near future, our findings provide important information to discuss with patients in the preoperative visit to set realistic expectations.

Disclosures

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