The Zoom Boom: How Video Calling Impacts Attitudes Towards Aesthetic Surgery in the COVID-19 Era

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Abstract

Background: The COVID-19 pandemic has led to the widespread adoption of video calling. A parallel growth in aesthetic surgery demand has been documented.

Objectives: To identify associations between video call engagement and aesthetic surgery attitudes.

Methods: We distributed a cross-sectional survey via Amazon Mechanical Turk in November 2020. Respondents were asked to report their time spent video calling, video calling applications and features (eg, virtual backgrounds) they used, and aesthetic surgery attitudes using the 15-item Acceptance of Cosmetic Surgery Scale (ACSS; higher scores indicate greater acceptance). We compared ACSS scores between video call users and non-users using Student's t-tests. We used Pearson's correlation coefficient to quantify associations between ACSS scores and time spent on calls and multivariable analysis to estimate associations between video call engagement and ACSS scores.

Results: A total of 295 respondents (mean age, 37.6; 49.5% female) completed the survey. Across all video call applications surveyed, video call users had higher ACSS scores than non-users. Increased time respondents spent looking at their own face on video call was moderately associated with higher ACSS scores (r=0.48, P<0.01), while time spent looking at another person's face was not associated with a change in ACSS scores (r=0.09, P=0.11). Increased video call use was associated with higher ACSS scores.

Conclusions: Increased video calling use is associated with increased acceptance of aesthetic surgery. Although the clinical significance of ACSS scores can be better elucidated, plastic surgeons should consider the effects of video calling on patient motivations for aesthetic surgery in the COVID-19 era.

The COVID-19 pandemic and social distancing policies have led to widespread adoption of video calling applications for school, work, and social interactions.[1] In the early days of stay-at-home orders in the United States, the video conferencing platform Zoom (Zoom Video Communications, Inc., San Jose, CA, USA) gained over 100 million users within a month.[1] Zoom users turned to the platform for virtual work meetings, classes, social events, and religious services.[2] Healthcare workers have similarly adopted video calling technologies to provide telehealth visits, connect family members to hospitalized loved ones, and deliver trainee education.[3, 4] This shift from in-person to virtual video communication has changed the way we connect with one another, and many people predict that the widespread use of video calling technologies will persist even after the pandemic resolves.[5]

Concurrently, there has been increased public interest in aesthetic surgery despite a scaling-down of elective procedures to prevent the spread of COVID-19. An analysis of Google (Mountain View, CA, USA) searches during the first four months of the pandemic showed increased queries for the terms “plastic surgery” and “aesthetic surgery”.[6] Surveys from the American Society of Plastic Surgery have predicted continued interest in injectables, breast augmentation, liposuction, and abdominoplasty during the pandemic.[7] Recent literature has attempted to capture the specific factors driving patient interest for aesthetic surgery during the COVID-19 era. Jenny *et al* (2020) suggested that patients may be seeing themselves in the mirror more often given stay-at-home orders, leading to increased interest in aesthetic surgery.[8] Another study indicated that people are spending more time in solitude or behind face masks, making it easier to conceal post-operative swelling and bruising.[9] Given the massive shift towards virtual communications, it is possible that video calling may shape the way users perceive their own appearance and their attitudes towards aesthetic surgery. To the best of our knowledge, there are no studies examining the relationship between video calling and user perceptions of aesthetic surgery.

To address this knowledge gap, we aimed to characterize how engagement with video calling technologies during the COVID-19 pandemic is associated with attitudes towards aesthetic surgery. We hypothesized perceptions of aesthetic surgery may vary based on video call use, and that users with increased video call engagement may be more accepting of aesthetic surgery.

METHODS

Survey Instrument

We conducted a cross-sectional study using a study-specific 3-part survey with questions surrounding video call use, attitudes towards aesthetic surgery, and respondent demographics. We built the online survey on the Qualtrics XM Platform (Qualtrics, Provo, Utah, USA) and distributed

through Amazon Mechanical Turk (Amazon, Seattle, WA, USA) from November 18th to November 20th, 2020. The survey (Appendix, available online at www.aestheticsurgeryjournal.com) began with a brief description of the study and inclusion criteria requiring respondents to be 18 years or older and speak English as their primary language. For quality control, we embedded two attention check questions (one multiple choice, one sliding bar) and a CAPTCHA (Completely Automated Public Turing test to tell Computers and Humans Apart) verification question in the survey. Respondents who successfully completed all survey items, the CAPTCHA question, and both attention check questions were included in the study. Respondents were compensated $0.25 upon survey completion. This study was reviewed and approved by the Johns Hopkins Institutional Review Board.

The survey first queried respondents on their use of video call applications since the start of the COVID-19 pandemic, defined as January 2020. This included time spent on video call applications for work, school, or social events, measured in number of hours per weekday or weekend day. Respondents were then presented with a list of video call applications, eg, Zoom, Facetime (Apple Inc., Cupertino, CA, USA), Cisco Webex (Cisco Systems, Inc., San Jose, CA, USA), Microsoft Teams (Microsoft Corporation, Redmond, WA, USA), Google Hangouts (Google, Mountain View, CA, USA) and asked how many hours a day they spent on each platform on average (0-24 hours/day) since the start of the pandemic. We included the 16 most popular video calling applications identified from the literature and through an Apple application store search on November 1st, 2020 for "video call".[10] Applications were included if they allowed users to start free video calls with another user or group of users. Respondents could also report an unlisted video calling application using a free text box. Next, respondents were shown a list of video call enhancement features including virtual filters (eg, lighting filters, face filters such as Memoji camera effects, Zoom's "Touch Up My Appearance" feature), video backgrounds, and external devices (e.g., LED/ring light, laptop stand, tripod, external web camera) and asked to select all features they used at least once during the pandemic; a field was available to report any unlisted features they had used at least once. Respondents were then asked to report the percentage of their total call time a day they spent with a video filter on, a video background, an external device, looking at their own face, looking at another person's face, and with video on so others could see their face. Then, using a 11-point scale, respondents were asked to describe how much more or less aware of their own appearance they felt since the start of the pandemic and how their consideration to pursue aesthetic surgery had changed as a direct result of seeing themselves on video (5 = a lot more, -5 = a lot less).

Next, the 15-item, validated Acceptance of Cosmetic Surgery Scale (ACSS) was used to measure respondent attitudes towards aesthetic surgery.[11] The ACSS scale ranges from 1 to 7, with higher scores indicating greater acceptance of aesthetic surgery, and measures attitudes in three

domains: (1) consider, or the degree to which an individual would consider, having aesthetic surgery; (2) social, or the acceptance of aesthetic surgery based on social, motivation; and (3) intrapersonal, or the acceptance of aesthetic surgery based on intrapersonal, motivation. Scores from each ACSS domain are averaged to compute a mean score for overall acceptance of aesthetic surgery.

At the end of the survey, we asked respondents to provide demographic information (e.g., age, ethnicity, race, gender, education, income, employment status) and indicate their personal history of aesthetic treatments by selecting all relevant choices from lists of procedures (e.g., neurotoxin injection, laser skin resurfacing, chemical peels) and surgeries (e.g., arm lift, breast augmentation, facelift).

Statistical Analyses

Mean ACSS scores were compared between users and non-users of various video call applications and video call enhancement features using two-tailed Student's t-tests. Non-users were defined as those who used a platform for zero hours and users were defined as those who used a platform for more than zero hours. We calculated Pearson's correlation coefficient (*r*) to quantify the strength of the association between ACSS scores and time spent looking at own face versus other faces on calls. By convention, we considered the correlation as strong when *r* was greater than 0.70 and moderate when *r* was greater than 0.40 but less than 0.70.[12] To estimate the association between video call engagement and ACSS scores, we performed a multivariable analysis with the listed variables in **Figure 1**. The threshold for statistical significance was set at an alpha value of 0.05 for all statistical analyses. STATA Statistical Software (StataCorp, College Station, TX, USA) and GraphPad Prism version 6.04 (GraphPad Software, La Jolla, CA, USA) were used for all statistical analyses.

RESULTS

A total of 432 respondents participated in the survey study. Of this group, 295 respondents met inclusion criteria. Respondent gender was evenly distributed (male 49.8%, female 49.5%) (**Table 1**). A majority of respondents were Caucasian (82.4%), had a four-year college degree (58.3%), were employed and working more than 40 hours a week (77.3%), and had no prior history of aesthetic surgery or procedures (66.7%). More than half of respondents (78.6%) reported feeling more aware of their appearance since the start of the pandemic, and 62.3% of respondents reported that they were more likely to consider pursuing aesthetic surgery as a direct result of seeing themselves on video more often.

Engagement With Video Call Applications

Respondents reported being on video calls for a median of 10 hours/weekday (IQR = 3-16) for work, 8 hours/weekday (IQR = 0-17) for school, and 9 hours/weekday (IQR = 2-17) for social purposes since the start of the COVID-19 pandemic (**Table 2**). On average, respondents reported utilizing ten different video call applications since the start of the pandemic (range: 0-16). The top applications respondents reported using were Zoom (91.9%), FaceTime (74.6%), Skype (Palo Alto, CA, USA) (70.5%), Cisco Webex (69.5%), WhatsApp (Facebook, Inc., Menlo Park, CA, USA) (67.5%), Google Meet (66.8%), and Microsoft Teams (64.4%). On average, respondents spent more than half their time on video calling applications with the video camera turned on [mean percentage of total call time: 52.9% (SD ±31.1%)], more than half their time on the call looking at other callers' faces [52.9% (SD ±28.1%)], and less than half their call time looking at their own face [43.8% (SD ±30.3%)].

The mean ACSS score across all survey respondents was 4.52 (SD: 1.31). The majority of respondents (94%) used at least one video call application since the start of the pandemic, while 18 respondent (6%) did not. Significantly higher ACSS scores were seen in users (mean ACSS: 4.57) rather than non-users (mean ACSS: 3.71) of any video call applications (mean difference in ACSS: 0.85, 95% CI, 0.23 to 1.47). Further, significantly higher ACSS scores were seen in users rather than non-users across all video call applications surveyed (**Figure 2**). For the top five video calling technologies, the mean ACSS score difference between users and non-users were as follows: Zoom: 0.81 (95% CI, 0.04 to 1.58); FaceTime: 1.04 (95% CI, 0.56 to 1.52); Skype: 0.75 (95% CI, 0.29 to 21); Cisco WebEx: 1.04 (95% CI, 0.59 to 1.50); WhatsApp: 0.90 (95% CI, 0.45 to 1.35). Increased percent of total call time spent looking at the respondent's own face on video call was moderately associated with higher ACSS scores (r=0.48, P<0.01), while time spent looking at another person's face was not associated with a change in ACSS scores (r=0.09, P=0.11, **Figure 3**).

Engagement With Video Call Enhancement Features

Respondents reported using on average two different video enhancement features (range: 1-8), with all respondents reporting using at least one of the aforementioned enhancement features. Top enhancement features included video backgrounds (45.4%), external web cameras (44.8%), video lighting filters (34.9%), and laptop stands (34.9%). When respondents were asked whether they have ever used the Zoom "Touch Up My Appearance" feature, 29.2% of respondents said yes. On average, respondents spent less than half their total call time enhanced by video lighting and face filters [mean percentage of total call time: 40.4% (SD ±31.2%)], virtual backgrounds [38.4% (SD ±32.0%)], and external devices [38.5% (SD ±32.7%)]. Significantly higher ACSS scores were seen in respondents who used virtual backgrounds (mean difference=0.67; 95% CI: 0.26 to 1.09), light filters (mean difference=0.57; 95% CI: 0.09 to 1.06), and laptop stands (mean difference=0.53; 95% CI: 0.10 to

0.96) compared to respondents who did not use these features (**Figure 4**). Users of external web cameras had a significantly lower ACSS score compared to non-users [mean difference= (-)0.60; 95% CI: -1.02 to -0.19]. There was no significant difference in overall ACSS scores between respondents who reported using either Zoom "Touch Up My Appearance," lighting filters, tripods, or LED/ring light and those who did not.

Associations Between Video Calling and ACSS Scores

Multivariable regression demonstrated that several factors were associated with higher ACSS scores, including time spent video calling, number of video calling applications used, and the percentage of call time with video camera on (**Table 3**).

DISCUSSION

During the COVID-19 pandemic, video calling has become the new standard for communication for work, education, and social activities. Given the increased and inherent exposure of looking at one's own face which accompanies use of this medium, investigating its effects on the US public's interest in aesthetic surgery can be informative. Our findings suggest that increased user engagement in video calling applications is associated with greater acceptance of aesthetic surgery. A deeper understanding of how video calling correlates with perceptions of aesthetic surgery can help guide aesthetic surgeons in patient outreach and care during the COVID-19 era and beyond.

We found that increased video call engagement was associated with higher ACSS scores and greater acceptance of aesthetic surgery (**Table 3**). The literature on ACSS scores in the general public report a mean score of 3.52 in pre-pandemic populations,[13] while we determined a mean score of 4.52 in our pandemic population. This aligns with recent literature noting a common reason for increased patient interest in aesthetic surgery during the pandemic: noticing less desirable facial features while on video calls.[8, 14-16] We further elucidated specific features of video call engagement that may contribute to favorable attitudes towards aesthetic surgery; this revealed that both more time spent on video calls and using greater numbers of video calling applications independently resulted in higher ACSS scores. Along these lines, Pfund *et al* (2020) demonstrated that increased time comparing oneself to others while on video calls is associated with decreased satisfaction with the face and body.[17] This may help explain the more favorable outlook on aesthetic surgery among our study respondents with increased video call engagement. Furthermore, bad video quality or poor lighting can exacerbate specific features and negatively impact one's body-image.[18] Together, these findings suggest that video calling may negatively affect or distort how patients see themselves, driving increased acceptance of aesthetic surgery. As videoconferencing continues

through the pandemic and beyond, plastic surgeons should consider if video calling is impacting patient motivations for aesthetic surgery. Patient screening for body dysmorphic disorder or other body image concerns via telemedicine (video call) may be more difficult and increasingly important during these consultations moving forward.[17]

We also determined that users of any video calling application were more likely to be more accepting of aesthetic surgery compared to non-users. This suggests that video calling in itself is associated with increased ACSS scores regardless of the application used. This finding may be explained in part by the inherent nature of all video calling applications that were evaluated, allowing participants to see themselves in a side-by-side comparison to other faces on the call. It is important for surgeons to recognize and address patient use of any of these video call technologies as a recent study demonstrated that patients who talk about their social media use with their providers tend to feel more empowered and actively participate in shared decision-making with their provider.[19] As technology can affect how patients approach conversations with their providers, surgeons should ask patients seeking aesthetic procedures about their video calling use and how it may impact their desire for aesthetic surgery. Based on our findings, patient-physician discussions that address how much time patients spend participating in video calls and the number of applications they use can provide insight into how video calling impacts patient motivations for aesthetic procedures.

We further found that specific video calling enhancement features were associated with greater acceptance of aesthetic surgery. Respondents who reported using face filters during video calls had higher ACSS scores. Prior research has established that face filters for selfies, eg, Snapchat (Snap Inc., Santa Monica, CA, USA) filters are associated with increased ACSS scores and can provide users with inspiration to seek out plastic surgery.[13] Our data demonstrated that video call enhancement features may affect individuals similarly to photo enhancements with face filters. Filters such as virtual makeup effects or Memoji characters, which may provide coverage of perceived facial flaws or simulate aesthetic surgery outcomes, may amplify interest in aesthetic surgery.[20] Laptop stand users also had higher ACSS scores compared to non-users, possibly because laptop stands can improve users' virtual appearances by providing more flattering views of the face. Indeed, Ward *et al* (2018) found that front-facing cameras distort facial appearances, making noses appear broader and faces wider at shorter focal lengths.[18] Therefore, potential aesthetic surgery patients may seek to correct flaws identified via video call such as submental fullness, wider jawlines, and rhytids. For rhytids in particular, video calling enables users to see their faces animated in conversation, potentially highlighting features such as active rhytids that are not present at rest. Surgeons may continue to see increased interest for interventions that address flaws made more

noticeable on video calls or corrected by filters and may want to anticipate and prepare for increased requests for these as video calls persist post-pandemic.

The current study is not without limitations. First, our respondent population was based on the Amazon Mechanical Turk worker population, with more than half of respondents identifying as Caucasian, well-educated, and employed. While our study population may not be representative of the United States as a whole, it does match the demographics of patients seeking aesthetic surgery in the US, the majority of whom are college-educated or greater, employed, and Caucasian.[21] Second, our survey provides cross-sectional data collected in November 2020 and does not capture longitudinal changes in video conference platform usage and attitudes towards aesthetic surgery prior to or throughout the evolving COVID-19 pandemic. Given this, it is difficult to determine respondents' baseline acceptance of aesthetic surgery prior to the pandemic and if changes in video application use and aesthetic surgery acceptance are a result of technology use during the COVID-19 pandemic. To address this, we cited pre-pandemic ACSS scores[13] to provide a proxy baseline for comparison. Additionally, our study is limited by recall bias. In November 2020, respondents were asked to recall the amount of time they spent on video conferencing platforms starting from January 2020, and it is possible that respondents did not accurately recall the amount of time spent on platforms, looking at their own faces, and looking at other people's faces. Furthermore, while our multivariable regression focused on how video calling is associated with ACSS scores using the variables depicted in **Figure 1**, there may be other confounding variables such as body image and desire for better video cameras or video lighting that were not assessed in our survey and thus not included in our regression. Future studies that assess variables beyond those measured in our survey may more comprehensively evaluate the relationship between video calling and ACSS scores. Lastly, we recognize that the clinical interpretation of our findings on increased ACSS scores with video call engagement is limited. As there are no published studies on what ACSS score changes constitute clinical significance, the 0.05-point increase in ACSS scores we determined may or may not be of clinical significance or truly impact patient motivation for surgery. As such, the clinical significance of ACSS score changes is an area worthy of future investigation. Despite these limitations, our study presents a critical pilot effort to elucidate the relationship between video calling and attitudes towards aesthetic surgery.

CONCLUSIONS

Our findings suggest that increased engagement with video calling applications is associated with greater acceptance of aesthetic surgery. In particular, a user's time spent video calling, time spent with video on, time with video filter applied, and the number of applications and video enhancing

features used were all associated with greater acceptance of aesthetic surgery. By discussing patient use of video calling applications during consultations, surgeons can better determine how these technologies impact patient attitudes and motivations for surgery. Anticipation and preparation for facial surgeries that correct flaws commonly noticed on video call can help ensure aesthetic surgery practices thrive in the COVID-19 era and beyond.

Supplemental Material

This article contains supplemental material located online at www.aestheticsurgeryjournal.com.

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Table 1. Demographics of Survey Respondents Included in the Final Analysis

Respondents (n)	295
Age (Mean ± SD)	37.6 ± 11.3
Race	n (%)*
White	243 (82.4)
Black or African American	28 (9.5)
American Indian or Alaska Native	8 (2.7)
Asian	21 (7.1)
Native Hawaiian or Pacific Islander	2 (0.7)
Other/Prefer not to answer	1 (0.3)
Ethnicity	
Hispanic or Latino	83 (28.1)
Not Hispanic or Latino	212 (71.9)
Gender Identity	
Male	147 (49.8)
Female	146 (49.5)
Nonbinary	2 (0.7)
Education	
Less than high school degree	2 (0.7)
High school degree or equivalent	16 (5.4)
Some college but no degree	29 (9.8)
Associate degree in college (2-year)	22 (7.5)
Bachelor's degree in college (4-year)	172 (58.3)
Master's degree	53 (18.0)
Doctoral/Professional degrees	1 (0.3)
Annual Income	
<50K	86 (29.2)
50-75K	62 (21.0)
75-100K	59 (20.0)
100-150K	36 (12.2)
150-200K	6 (2.0)
>200K	2 (0.7)
Employment Status	
Employed, working 40+ hours a week	228 (77.3)
Employed, working 1-39 hours a week	46 (15.6)
Not employed, looking for work	7 (2.4)
Not employed, retired	6 (2.0)
Not employed, disabled	2 (0.7)
Not employed, (other)	6 (2.0)
Personal history of aesthetic surgery and procedures	
Has had aesthetic surgery or procedure	99 (33.6)
Never had aesthetic surgery or procedure	196 (66.4)

Table 2. Time Spent on Video Call Applications Since the Start of COVID-19

	Time spent in hours/weekday (median, [IQR])	Time spent in hours/weekend (median, [IQR])
Work	10 [3-16]	7 [0-15]
School	8 [0-17]	5 [0-15]
Social	9 [2-17]	10 [2-18]

Table 3. Multivariable Regression of Acceptance of Cosmetic Surgery Scale Scores

Variable	Regression coefficient (SE) [95% CI]	*P* value
Weekday time on video call application	1.63 (0.22) [1.19 to 2.07]	<0.01
Weekend time on video call application	1.74 (0.24) [1.27 to 2.2]	<0.01
Number of video call applications used	0.41 (0.06) [0.3 to 0.53]	<0.01
Number of enhancement features used	0.06 (0.01) [0.04 to 0.08]	<0.01
% of call time with video camera on	1 (Constrained)	
% of call time with video filter	1.77 (0.26) [1.27 to 2.28]	<0.01
% of call time with video background	2.15 (0.3) [1.56 to 2.75]	<0.01
% of call time with external device	2.14 (0.3) [1.55 to 2.74]	<0.01

Figure Legend

Figure 1. Measured (gray) and outcome variables (orange) for our multivariable analysis.

Figure 2. ACSS scores for users (blue) versus non-users (gray) of evaluated video call applications. Abbreviations: *$P \leq 0.05$.

Figure 3. Correlation between total call time spent looking at own (red) versus another's face (black) and ACSS score.

Figure 4. ACSS scores for users (blue) versus non-users (gray) of evaluated video call enhancement features. Abbreviations: ns = not significant, ** $P \leq 0.01$, *** $P \leq 0.001$.

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Not employed, (other)	6 (2.0)
Personal history of aesthetic surgery and procedures	
Has had aesthetic surgery or procedure	99 (33.6)
Never had aesthetic surgery or procedure	196 (66.4)

Table 2. Time Spent on Video Call Applications Since the Start of COVID-19

	Time spent in hours/weekday (median, [IQR])	Time spent in hours/weekend (median, [IQR])
Work	10 [3-16]	7 [0-15]
School	8 [0-17]	5 [0-15]
Social	9 [2-17]	10 [2-18]

Table 3. Multivariable Regression of Acceptance of Cosmetic Surgery Scale Scores

Variable	Regression coefficient (SE) [95% CI]	*P* value
Weekday time on video call application	1.63 (0.22) [1.19 to 2.07]	<0.01
Weekend time on video call application	1.74 (0.24) [1.27 to 2.2]	<0.01
Number of video call applications used	0.41 (0.06) [0.3 to 0.53]	<0.01
Number of enhancement features used	0.06 (0.01) [0.04 to 0.08]	<0.01
% of call time with video camera on	1 (Constrained)	
% of call time with video filter	1.77 (0.26) [1.27 to 2.28]	<0.01
% of call time with video background	2.15 (0.3) [1.56 to 2.75]	<0.01
% of call time with external device	2.14 (0.3) [1.55 to 2.74]	<0.01

Figure 1

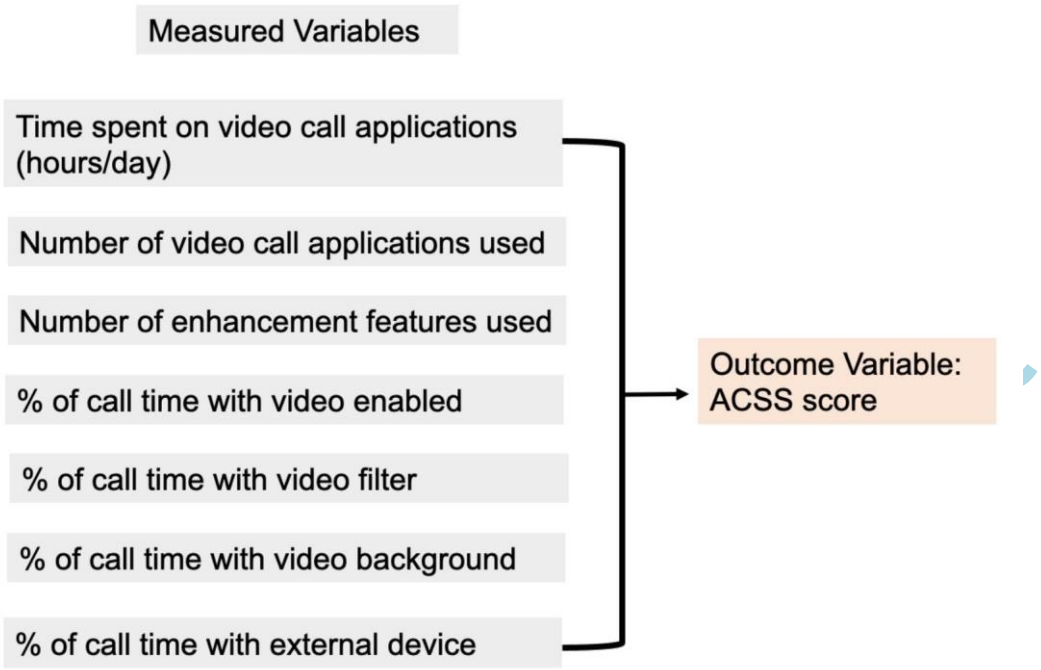

Figure 2

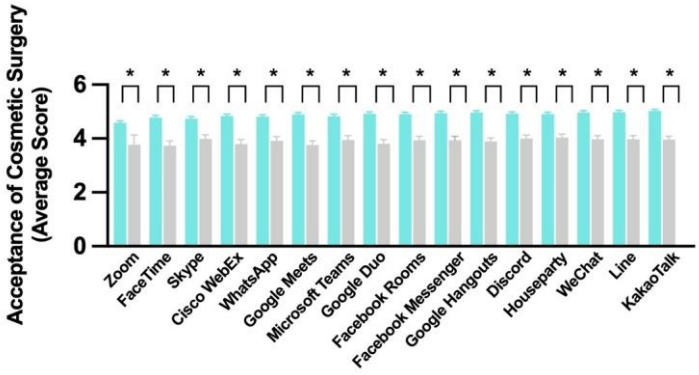

Figure 3

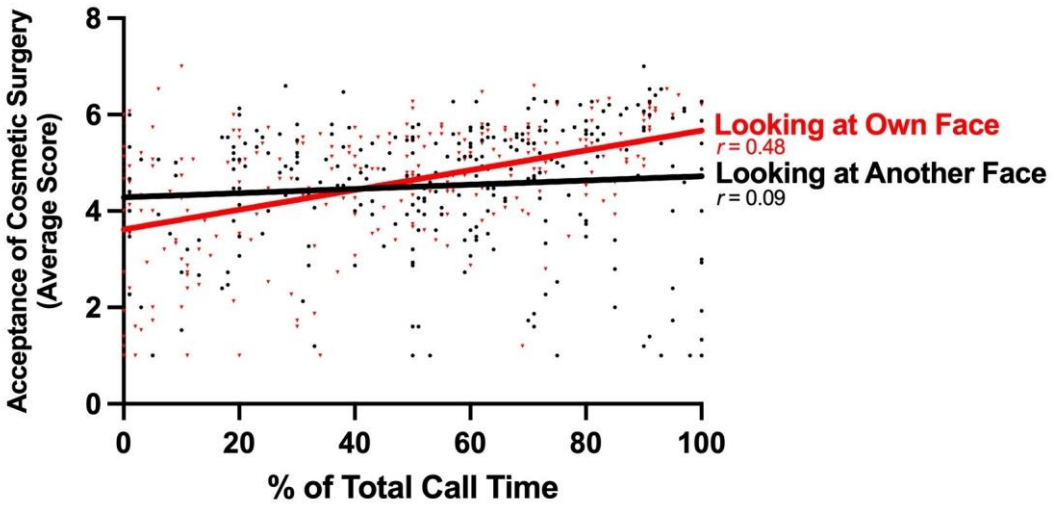

Figure 4