Research Article

How Does Wearing a Face Mask Affect Persons Trustworthiness and Attractivenes

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Abstract

Face masks became a necessary part of everyday life during the Covid-19 pandemic. Prior to the pandemic, most people associated face masks with health care facilities and immunocompromised people. This effect leads to a lower evaluation of the attractiveness of the wearer's face. People's attractiveness correlates with trustworthiness and willingness to communicate. This study examined how the Covid-19 pandemic affected people's perceptions of attractiveness and trustworthiness when looking at faces with face masks. To investigate this question, research participants were presented with a series of photographs of men and women who were divided into three attractivity groups, wearing a black face mask, a white face mask, a blue surgical face mask, and faces without masks. A total of 209 respondents participated in the survey, 80.9% were female and 19.1% were male. Of these, 42.1% of respondents said they were in a relationship and 57.9% said they were not. As many as 80.9% of the respondents were aged between 18-25 years, 10% of the respondents were aged between 26-30 years and 9.1% of the respondents were aged above 30 years. The average age of respondents was 23.6 years. The results showed that the least attractive and trustworthy were the faces without face masks. Faces covered with a black face mask were perceived to be the most attractive and trustworthy. A statistically significant difference was found between men's and women's ratings of trustworthiness and attractiveness in favour of women. The influence of gender, age and relationship status of raters (respondents) on the attractiveness and trustworthiness ratings of models.

Keywords: face masks; respirator; SARS-CoV-2; attractiveness; trustworthiness.
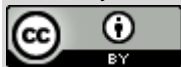
Table of Contents

Significance statement

Face masks found their use during the Covid-19 pandemic as part of everyday life. While previous research has investigated the effect of face masks on emotion recognition or the effect of face masks on attractiveness, it has only looked at, for example, one gender from the perspective of both being a rater and being the one that is rated, and none has looked at multiple factors at once. The effect of face masks (blue surgical face mask, white and black face mask, no face mask) on the attractiveness and trustworthiness of both genders was investigated, and further exploration was conducted on the impact of raters, gender, relationship status, and age on the ratings of the models. As face masks have become a part of our wardrobes, more and more people feel their influence in mate selection, emotion perception, nonverbal communication, etc. A highly statistically significant difference between face mask colours, in favor of black, was revealed by those findings for both genders. Simultaneously, it was suggested by these findings that people's perceptions of attractiveness and trustworthiness are not impaired by face masks; on the contrary, they are enhanced. This finding is important because it suggests that the new "wardrobe addition" of face masks is more likely to be perceived positively, which fundamentally alters the findings on perceptions of face masks before the pandemic. This is probably related to the higher health protection of people with face masks, protection of the surroundings, higher responsibility, consequently trustworthiness and last but not least attractiveness. Those findings eliminate concerns about social discrimination due to the impact of wearing face masks.

Acute respiratory syndrome, or Covid-19 disease, has become one of the most important issues globally over the past three years. Covid-19 disease is caused by the SARS-CoV-2 virus. The virus is spread through small liquid particles such as larger droplets or smaller aerosols, mainly by coughing, sneezing, talking, singing (Yang et al., 2020), but also by touching contaminated surfaces and then touching the eyes, nose or mouth. As many studies have shown the positive effect of face masks in reducing the risk of virus spread during pandemic, it is expected that they will remain part of everyday life for years to come (Mitze et al., 2020). Covid-19 disease not only has a significant negative impact on the overall health of society, but also on people's work activities, such as business and economic activities or the economy itself.

The disease causes stress and fears among workers and employees about being affected by the disease (Moradi & Barakat, 2020). In the period before the SARS-CoV-2 pandemic, surgical face masks or other respiratory coverings were considered less attractive and credible as they evoked the idea of illness, i.e., attractiveness and trustworthiness were reduced by the so-called hygiene mask effect. It was found that if the face was covered with another object, such as a book, the impression of being sick disappeared (Miyazaki & Kawara, 2016). The purpose of wearing a hygiene mask changed from a perception of being sick to mutual protection of the community from the spread of Covid-19 virus. Seeing other people wearing masks during a pandemic likely encourages mask wearing (Nakayachi et al., 2020). In addition to the positive properties of face masks, their negative impact on the population has also been demonstrated. According to Ribeiro et al. (2020), face masks can cause discomfort, impair vocal communication, and can be a barrier to social interaction (Hung, 2018). In addition, masks prevent key face-to-face interactions between newborns and their parents (Green et al., 2020). At the same time, research has shown that masks impair emotion recognition. A covered face can make people feel distrustful and conceal identity, which can signal collusion and fear (Carbon, 2020).

According to Jones et al. (2004), the occlusion effect prior to the pandemic reduced the attractiveness of attractive individuals in society and made them misjudge their health status. The perception of poor health status can have a negative effect on the perception of facial attractiveness (Jones et al., 2004). The effect of occlusion focusing on the lower face using a face mask has been positively identified for poorly attractive people with, for example, acne, scars, unattractive skin texture, asymmetry, and others (Jaeger et al., 2018; Little & Jones, 2003). Other

negative aspects of wearing face masks include for example poor ability to identify people, impaired nonverbal communication or distorted perceptions of attractiveness (Carragher & Hancock, 2020; Grundmann et al., 2021; Noyes et al., 2021; Zhang et al., 2018).

Kamatani et al. (2021) demonstrated that perceptions of masked face sickness were lower after the Covid-19 pandemic outbreak than before the pandemic. In addition to social responsibility, higher trustworthiness ratings may be associated with ratings associated with professions where facial overlap is a commonly occurring component, e.g., medical professions. In the long term, it is doctors and nurses who show the highest levels of trustworthiness among professions (McCarthy, 2019). Research from the pandemic era suggests that respiratory coverage increases attractiveness (Patel et al., 2020). Medical surgical face masks are considered the most attractive over textile airway coverage and faces without coverage (Hies & Lewis, 2022). The colour of the face masks is considered an important factor, as black tends to be more strongly associated with negative imagery compared to white, the latter, along with blue, being reminiscent of the medical profession (Hies & Lewis, 2022; Lakens et al., 2013; Specker et al., 2018). No significant effects of color on emotion recognition were found, suggesting that mask design may not impair recognition beyond the effect of wearing the mask alone. The majority of participants demonstrated positive attitudes towards wearing masks and preferred unpatterned black and white masks. Preference for white masks was associated with better emotion recognition of masked faces. Interestingly, those with negative attitudes towards masks and those who rated the risk of Covid-19 as lower preferred patterned masks, perhaps viewing masks as an add-on rather than a necessity. Perceptions of attractiveness were affected by wearing a white face mask, whereas wearing a black face mask did not affect perceptions of attractiveness before and during the pandemic.

However, research on attractiveness has so far only been conducted with textile and surgical face masks and book overlays, and only with females assessing the faces of males (Hies & Lewis, 2022). Masculine males are perceived as attractive because a dominant face indicates health and good genes. It also indicates early physical development and strength (Rhodes et al., 2003; Thornhill & Gangestad, 2006). Such traits evolutionarily may have been crucial in combat and thus may have contributed to group protection. This has also been pointed out by Sakuta et al. (2018) when they showed children aged 6 to 8 months pictures of males with varying degrees of facial masculinity. The children preferred trustworthy dominant or masculine faces.

Unsurprisingly, children tend to rate positive masculine traits, as protective parental behaviour may increase the likelihood of the child living to reproductive age. Masculine traits may also be preferred in the professional sphere (Van Vugt & Grabo, 2015). The ability to prefer male leaders is culturally independent and innate (Sakuta et al., 2018). Dominant faces are muscular, with a prominent chin, deep-set eyes, and thick eyebrows. Face shape is oval or rectangular. Conversely, submissive faces are round or narrow (Mazur, 2005). It is advantageous for Caucasians to have a dominant face because their surroundings may consider them as natural leaders. High facial trustworthiness includes the so-called baby face (Zebrowitz & Montepare, 1992), which has a round face shape, larger eyes, and a pointed chin. Conversely, people who look too dominant are perceived as untrustworthy (Oosterhof & Todorov, 2008). Too pronounced masculinity reduces trustworthiness (Graham et al., 2017) and evokes greater aggressiveness (Oosterhof & Todorov, 2008). Childlike traits reduce feelings of threat in majority of society (Livingston & Pearce, 2009). Females are at a disadvantage because of the nurturing stereotype associated with cordiality (Cuddy et al., 2008).

However, cordiality does not help women in managerial positions because they may be perceived as less competent and trustworthy (Cuddy et al., 2004). Therefore, women in leadership positions are also more motivated to show their strength (Livingston & Pearce, 2009). Although women and people with childlike appearance are underestimated, they may actually be more successful because they are more motivated to perform at a higher level. Therefore, they tend to be more intelligent and have different intrinsic qualities than those attributed to them by their surroundings (Graham et al., 2017). Childhood traits further awaken the protective instinct in people (Montepare & Zebrowitz, 1998).

Craniofacial anthropometric research by Farkas (in Mazzaferro et al., 2017) in defining facial attractiveness based on dimensions and proportions has shown that the lower half of the face, particularly the perioral region, is most important for determining attractiveness. This part of the face is also an important area for expressing emotions. Thus, the overlap of the lower half of the face affects not only attractiveness, but also judgments of a range of interpersonal characteristics, such as competence or trustworthiness (Ekman, 1972; Jamrozik et al., 2019; Maestripieri et al., 2017). Examples are courtroom trials, where jurors or specialists are tasked with determining whether defendants are guilty and whether their statements are true or false. As part of this

process, they may rely on nonverbal behaviour and may pay attention to the witness's face (Vrij et al., 2019).

A major conclusion of research that has analysed hundreds of studies on deception is that wearing a mask should not prevent an observer from detecting deception (Vrij & Hartwig, 2021). In perceiving the face, people judge the degree of honesty of an individual. At the same time, they decide how much they will trust a stranger. This topic is important because trust is the foundation of all relationships (Ben-Ner & Halldorsson, 2010). However, trust can also be interpreted as a voluntary decision to provide a good or service to another party with the future expectation of possible reciprocity (Gunnthorsdottir et al., 2002). An individual's social status is also associated with perceptions of trustworthiness. The choice of a group leader is not random. From the first moment, a dominance hierarchy begins to emerge in the group. The ability to acquire resources, and thus the ability to survive and reproduce, is associated with high social status. Dominance hierarchies have developed among social animals (Mazur, 2005). This hierarchical structure may be seen every day throughout society. It can be found in companies, schools, and smaller groups. The hierarchy was formed during the lifetime of our ancestors. They used vocalization and gesticulation to communicate. In addition to vocalization, it was mainly the perception of the face and the whole body that evolutionarily shaped the communication of our species. This is why facial and whole-body perception is so important to us (Mazur, 2005).

In conclusion, humans are naturally oriented to their immediate surroundings and therefore also tend to gravitate most towards the persons they most frequently come into contact with. Over the course of human evolution, proximity has mainly involved kin, i.e., people with whom humans have shared genes and with whom they have acquired and preserved resources. It is clear that attractiveness has a significant influence on mate choice, but it can also affect other aspects of life. Rhodes (2006) believes that attractiveness affects school performance and employment prospects in addition to mate choice.

Facial attractiveness is characterized by facial proportionality and symmetry. A proportionate and symmetrical face has its own characteristics, for example, it has no obvious deformities and looks younger and healthier (Langlois et al., 2016). The preference for these traits has evolved as an adaptation to find a quality mate (Scheib et al., 1999). Attractive people are evaluated more positively and this is the so-called halo effect where traits such as competence, intelligence and communicativeness are attributed to them. As a result, they may be perceived by others as natural

leaders (Montepare & Zebrowitz, 1998). Factors such as self-confidence and physical attractiveness play a large role in labour market outcomes. When perceiving trustworthiness, people evaluate facial features, such as degree of masculinity or childlike features, as well as socioeconomic status and overall nonverbal communication. Attractiveness can also play a large role in academic success or the selection of a supervisor and partner. The perception of the human face is a very broad topic. People notice not only facial features but also the expression of emotions, nonverbal communication, clothing or socioeconomic status, and these factors affect them in different ways. Since the perception of the human face is closely linked to many attributes of life, it is essential to pay increased attention to research dealing with facial masks. Klucarova (2021) examined consumer perceptions toward social media influencers who wear face masks in the midst of a pandemic. She experimentally demonstrated that masked (compared to unmasked) influencers remind consumers of highly competent healthcare professionals, which in turn leads to more favorable behavioral intentions toward these influencers. She also demonstrated that this effect may not hold for other groups of professionals.

The main objective of this paper was to analyze the effect of different upper airway masking methods on people's perceptions of attractiveness and trustworthiness during the Covid-19 pandemic, focusing on the type and color of the face mask. Individual findings may shed further light on the perceptions and behaviors of people wearing different types and color variations of face masks during business meetings, court hearings, school and university evaluations, or decision-making when choosing a future partner. Subsequently, an investigation was conducted to determine whether opinions about the attractiveness of various color variations among wearers of face masks differed statistically from one another. Additionally, an exploration was carried out to assess whether people's perceptions of trustworthiness during the Covid-19 pandemic were affected by different types and color variants of face masks.

It was hypothesized that individuals wearing face masks that are more effective in preventing the spread of the virus would be rated as more trustworthy and attractive compared to those without overlays. The difference in the evaluation of male models by women and men, as well as the difference in the evaluation of female models by women and men, was observed. Subsequently, the effect of age and status (engaged/unengaged) of respondents on the attractiveness and trustworthiness ratings of these models was examined. The perception of the human face is a rather complex topic, but it only takes a moment to form an initial opinion about the complex

personality of an unfamiliar person. The method of recognizing people's attractiveness and trustworthiness, as well as all aspects related to it, have evolved throughout human history. Therefore, it is essential to examine these changes caused by the prolonged wearing of face masks during the Covid-19 pandemic.

Method

Individual attributes on people of three different attractiveness levels were examined using digitally edited photographs of men and women from the freely available The Chicago Face Database - CFD 3.0 (Ma et al., 2015). Version 3.0 of the database contains high-resolution photographs of male and female individuals of different ethnic backgrounds aged 17-65 years. For the purpose of this work, was selected Europoid race (cumulatively 42 models) male (21 models) and female (21 models). Extensive normalization data are available for each model. These data include physical attributes e.g. attractiveness. Each gender was divided into 3 groups of 7 people each, categorized according to attractiveness, from least attractive to most attractive. The Chicago Face Database contains 183 people of Europoid race, 94 men and 89 women, whose attractiveness is rated from 1.72 - 4.66 for men and 1.62 - 5.47 for women. The first 7 models with the lowest attractiveness ratings and the last 7 models with the highest attractiveness ratings were selected. The moderately attractive models were chosen based on the mean attractiveness values in the group of moderately attractive people. In this way, models who were in borderline positions between the groups were avoided. Each model is represented by the same photograph with a neutral expression (Figure 1). Perceptions of attractiveness and trustworthiness were investigated through a questionnaire survey conducted using Google Forms on digitally edited photographs featuring surgical face masks in blue (42 photographs), face masks in white (42 photographs), face masks in black (42 photographs), and without mask coverage (42 photographs). Each model with different face coverage appeared 4 times in the questionnaire.

Figure 1. Example of the presented models

The questionnaire contained a cumulative 336 photographs with 2 Likert scales with a 7-point scale aimed at assessing attractiveness and trustworthiness. Respondents chose a response on a scale of 1- not very attractive/trustworthy to 7- very attractive/trustworthy. The procedures implemented by the works of Miyazaki and Kawahara (2016) and Kamatani et al. (2021) were utilized. Respondents cumulatively rated 168 women and 168 men. The order of each image in the questionnaire was randomized, provided by Google Forms. In the research, further focus was placed on the gender (male/female), age, and status (engaged/single) of the respondents. The questionnaire was distributed among the respondents using social networking sites and email addresses.

Sample

A total of 209 respondents participated in the survey, 80.9% were female and 19.1% were male. Of these, 42.1% of respondents said they were in a relationship and 57.9% said they were not.

As many as 80.9% of the respondents were aged between 18-25 years, 10% of the respondents were aged between 26-30 years and 9.1% of the respondents were aged above 30 years.

Results

The statistical set obtained by the analyses did not have a normal distribution. The Shapiro-Wilks test was utilized to determine normality. For better orientation among the results, the results were divided into five separate sections, with the first section addressing attractiveness, the second section addressing trustworthiness, the third section comparing men and women, the fourth section addressing factors influencing the ratings of attractiveness and trustworthiness, and the fifth section addressing the comparison of attractiveness and trustworthiness between men and women and among themselves. In the statistical file, abbreviated labels were employed for gender (F-female, M-male), attractiveness (A-attractive, MA-moderately attractive, UA-unattractive), and face mask color (W-white, Bl-black, B-blue, N-no face mask overlay).

Effect of face masks on the attractiveness of men and women

When assessing the attractiveness of men with different face coverings or without face covering, a maximum attractiveness value of 7 and a minimum value of 1 were obtained. The highest maximum score was achieved by men without face covering. The lowest maximum score was achieved by men with blue face covering. The minimum score was the same for all groups (Table 1).

Table 1.
Comparison of attractiveness of men with different facial coverings.

	M	Min	Max	*SD*
attractiveness W	2.50	1.00	5.62	1.04
attractiveness Bl	2.53	1.00	5.67	1.06
attractiveness B	2.48	1.00	5.48	1.04
attractiveness N	2.39	1.00	7.00	1.02

The mean male attractiveness score without facial overlay was 2.38 which represented the lowest mean of the ratings. Men with a black face mask had the highest attractiveness rating (2.52). The attractiveness of men wearing a blue face coverage (2.47) and a white face coverage (2.49) was approximately the same. It may be concluded that the average attractiveness rating of men with any face covering was higher than the average attractiveness rating of men without face covering (Figure 2).
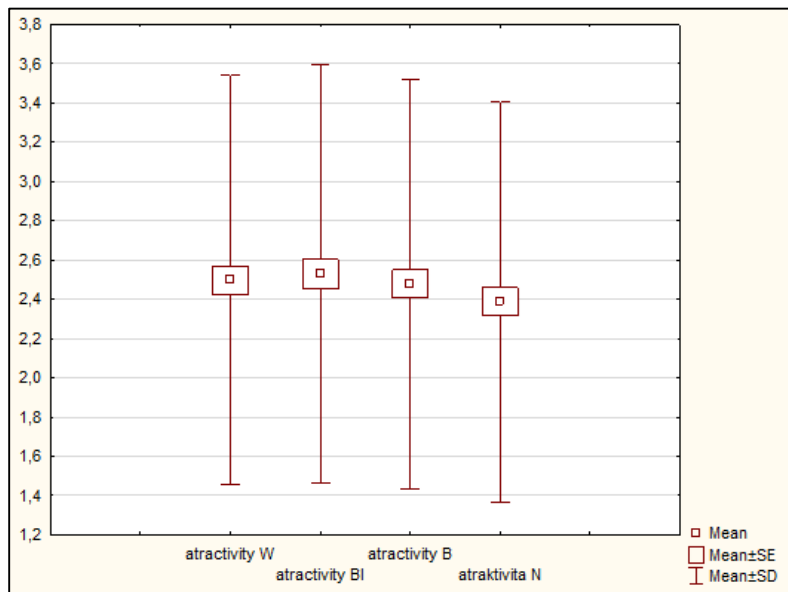
Figure 2. Comparison of attractiveness of men with different facial coverings

A statistically significant difference in men's attractiveness ratings between the data reported by the database (The Chicago Face Database - CFD 3.0) and data obtained in this study was not observed. When rating the attractiveness of men with different facial overlays and from different attractiveness groups, we obtained a maximum value of 7, only in the group of men with no facial overlay. A minimum value of 1 was obtained in each comparison group (Table 2).

Table 2.
Comparison of different attractiveness of men with different facial coverings

	M	Min	Max	*SD*
attractiveness W - B - A	3.35	1.00	6.71	1.41
attractiveness W - B - MA	2.33	1.00	5.57	1.08
attractiveness W - B - UA	1.80	1.00	5.14	0.88
attractiveness Bl - B - A	3.41	1.00	6.42	1.43
attractiveness Bl - B - MA	2.38	1.00	5.71	1.10
attractiveness Bl - B - UA	1.79	1.00	5.00	0.88
attractiveness B - B - A	3.30	1.00	6.57	1.39
attractiveness B - B - MA	2.36	1.00	5.71	1.11
attractiveness B - B - UA	1.77	1.00	5.00	0.88
attractiveness N - B - A	3.32	1.00	7.00	1.35
attractiveness N - B - MA	2.23	1.00	7.00	1.11
attractiveness N - B - UA	1.62	1.00	7.00	0.87

Men rated as highly attractive had an average score of 3.34, moderately attractive men had an average score of 2.32, and unattractive men had an average score of 1.74. Across all

attractiveness groups, men in the black face mask achieved the highest scores (A= 3.41, MA= 2.38, UA= 1.79). Only the group of unattractive men in the white mask achieved a similar mean score (1.80) to the unattractive men in the black mask (1.79) (Figure 3).
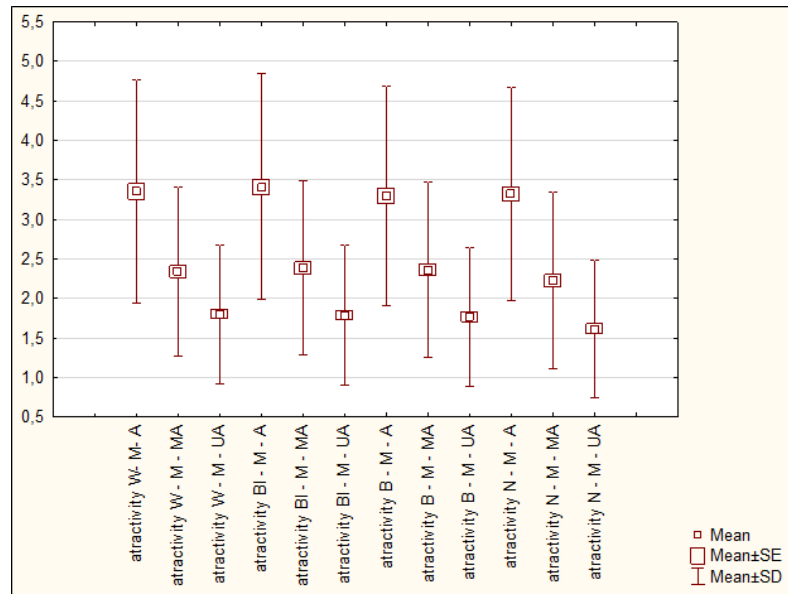

Figure 3. Comparison of different attractiveness of men (M) with different facial coverings

Individual face overlays at different attractiveness levels were compared using the Wilcoxon matched-pairs test. Highly statistically significant differences (p ≤ .01) were observed between all combinations of face mask colors and degrees of attractiveness in men. A statistically insignificant difference (p ≥ .05) was observed in the combinations shown in Table 3.

Table 3.
Combined comparison of individual male face coverings for different degrees of attractiveness

Combinations of facial overlays	*p*
attractiveness W - B - A & attractiveness B - B - A	.173
attractiveness W - B - A & attractiveness B - B - A	.173
attractiveness W - B - MA & attractiveness B - B - MA	.258
attractiveness W - B - UA & attractiveness Bl - B - UA	.546
attractiveness W - B - UA & attractiveness B - B - UA	.261
attractiveness Bl - B - MA & attractiveness B - B - MA	.680
attractiveness Bl - B - UA & attractiveness W - B - UA	.546
attractiveness Bl - B - UA & attractiveness B - B - UA	.451
attractiveness B - B - A & attractiveness W - B - A	.173
attractiveness B - B - A & attractiveness N - B - A	.938
attractiveness B - B - MA & attractiveness W - B - MA	.258
attractiveness B - B - MA & attractiveness Bl - B - MA	.680
attractiveness B - B - UA & attractiveness W - B - UA	.261
attractiveness B - B - UA & attractiveness Bl - B - UA	.451
attractiveness N - B - A & attractiveness W - B - A	.062
attractiveness N - B - A & attractiveness B - B - A	.938

When assessing the attractiveness of women (F) with different face coverings or without face coverings, a maximum attractiveness score of 7 was obtained only in the group without face coverings, and a minimum value of 1 was obtained in each group (Table 4).

Table 4.
Comparison of attractiveness of women with different facial coverings

	M	Min	Max	*SD*
F attractiveness W	3.03	1.00	5.81	1.11
F attractiveness Bl	3.12	1.00	5.57	1.15
F attractiveness B	3.02	1.00	5.76	1.14
F attractiveness N	2.91	1.00	7.00	1.04

The mean attractiveness score of women without facial coverage was 2.90, which represents the lowest mean of the ratings. Women with a black face mask had the highest attractiveness rating (3.12). The attractiveness of women wearing a blue face coverage (3.02) and a white face coverage (3.02) was approximately the same. It can be concluded that the mean attractiveness ratings of women with any facial covering were higher than the mean attractiveness ratings of women without facial covering (Figure 4).
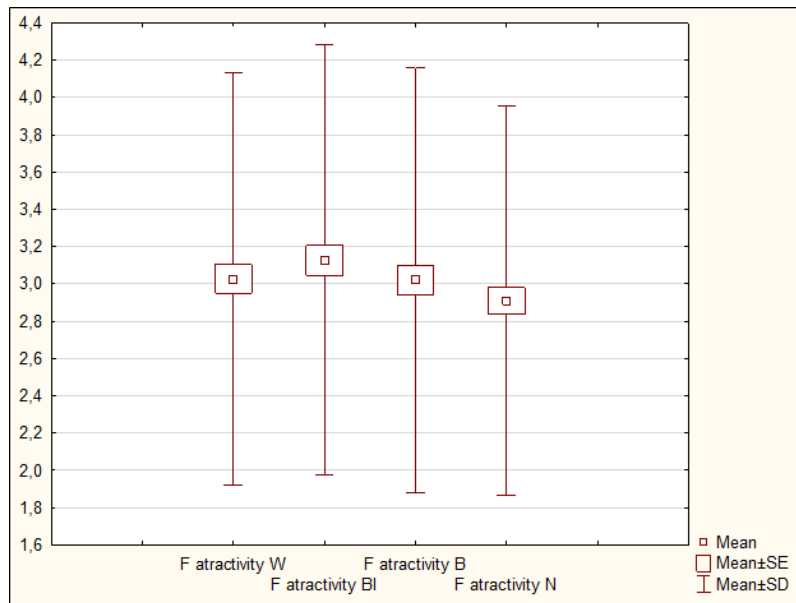
Figure 4. *Comparison of attractiveness of women with different face coverings*

A statistically significant difference in women's attractiveness ratings between the data reported by the database (The Chicago Face Database - CFD 3.0) and data found in this study was not observed. When assessing the attractiveness of women with different face coverings and from different attractiveness groups, a maximum score of 7 was obtained in the group of women with no face coverings, in each attractiveness group, and in the group of only the most attractive women with black, white, and blue face coverage. A minimum value of 1 was obtained in each comparison group (Table 5).

Table 5.
Comparison of different attractiveness of women with different facial coverings

	M	Min	Max	*SD*
attractiveness W - F - A	4.17	1.00	7.00	1.46
attractiveness W - F - MA	3.17	1.00	6.29	1.30
attractiveness W - F - UA	1.74	1.00	5.14	0.87
attractiveness Bl - F - A	4.17	1.00	7.00	1.48
attractiveness Bl - F - MA	3.26	1.00	6.57	1.32
attractiveness Bl - F – UA	1.95	1.00	5.00	0.94
attractiveness B - F – A	4.03	1.00	7.00	1.43
attractiveness B- F - MA	3.12	1.00	6.57	1.33
attractiveness B - F - UA	1.91	1.00	5.00	0.95
attractiveness N - F – A	4.13	1.00	7.00	1.37
attractiveness N - F - MA	2.85	1.00	7.00	1.18
attractiveness N - F - UA	1.74	1.00	7.00	0.99

Women rated as highly attractive had an average rating of 4.12, moderately attractive women had an average rating of 3.09, and unattractive women had an average rating of 1.83. Across all groups, women in black respirators achieved the highest ratings (A= 4.16, MA= 3.26, N= 1.95). Only the most attractive women in the white face mask (4.17) achieved similar mean scores to the most attractive women in the black face mask (4.16) (Figure 5)
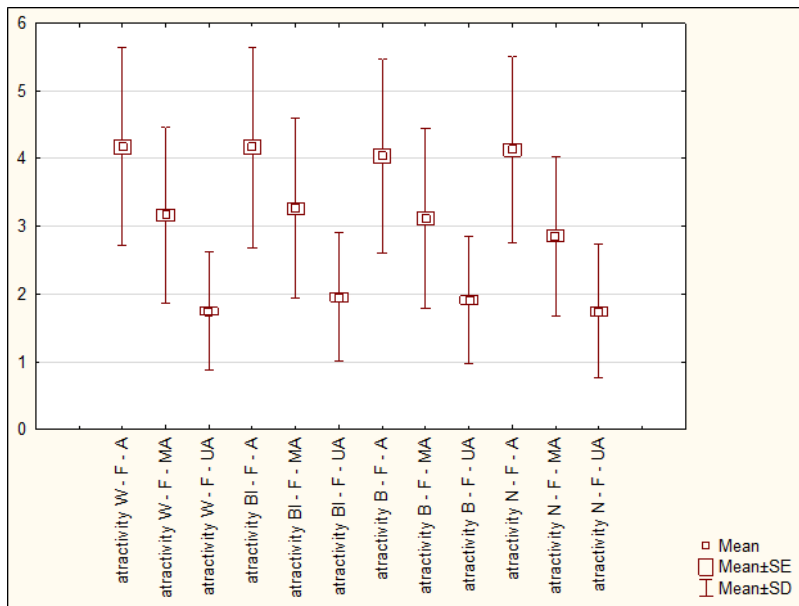

Figure 5. Comparison of different attractiveness of women (F) with different facial coverings

Individual face overlays at different attractiveness levels were compared using the Wilcoxon matched-pairs test. Highly statistically significant differences (p ≤ .01) were observed between all combinations of face mask colors and degrees of attractiveness in females, and a statistically insignificant difference (p ≥ .05) was observed in the combinations shown in Table 6.

Table 6.
Combined comparison of individual face coverings of women at different levels of attractiveness

Combinations of facial overlays	*p*
attractiveness W - F - A & attractiveness Bl - F - A	.691
attractiveness W - F - MA & attractiveness B - F - MA	.382
attractiveness W - F - UA & attractiveness N - F - UA	.097
attractiveness Bl - F - A & attractiveness W - F - A	.691
attractiveness B - F - A & attractiveness N - F - A	.407
attractiveness B - F - MA & attractiveness W - F - MA	.382
attractiveness N - F - A & attractiveness B - F - A	.407
attractiveness N - F - UA & attractiveness W - F - UA	.097

The highest rated attractiveness was observed for both sexes when the face was covered with a black respirator. Only the group of unattractive men in white masks achieved a similar mean score (1.80) to the unattractive men in black masks (1.79). Further, the most attractive women in the white respirator (4.17) achieved a similar mean score to the most attractive women in the black respirator (4.16). A difference in maximum values between males and females was observed. The maximum value for men (7) was obtained in all three attractiveness groups without face covering. Similarly, the maximum value for women (7) was obtained in all three groups of attractiveness without facial overlay, mirroring the results for men. Simultaneously, the maximum value was achieved for all types of facial overlay for the most attractive women. Men rated as the most attractive did not achieve the maximum score (7) for any facial overlay, even though the cumulative average of men without facial overlay achieved the lowest attractiveness values, as did women.

The impact of face masks on the trustworthiness of men and women

The next part of the present work was to evaluate the impact of face masks on people's trustworthiness. When assessing the trustworthiness of men with different facial overlays or without facial overlays, a maximum attractiveness score of 7 and a minimum score of 1 were obtained. The highest maximum scores were achieved by men with no face covering and men with a black respirator. The lowest maximum score was achieved by men with a blue face covering. The minimum score was the same for all groups (Table 7).

Table 7.
Comparison of the trustworthiness of men with different face coverings

	M	Min	Max	*SD*
trustworthiness W	2.83	1.00	6.81	1.22
trustworthiness Bl	2.86	1.00	7.00	1.26
trustworthiness B	2.80	1.00	6.14	1.17
trustworthiness N	2.76	1.00	7.00	1.12

The average trustworthiness rating of men without face coverings was 2.76, which represented the lowest average rating. Men with a black respirator over their face had the highest trustworthiness rating (2.85). The trustworthiness of men wearing a blue face shield (2.79) and a white respirator (2.82) was approximately the same. It may be concluded that the average trustworthiness rating of men with any face covering was higher than the average trustworthiness rating of men with no face covering.
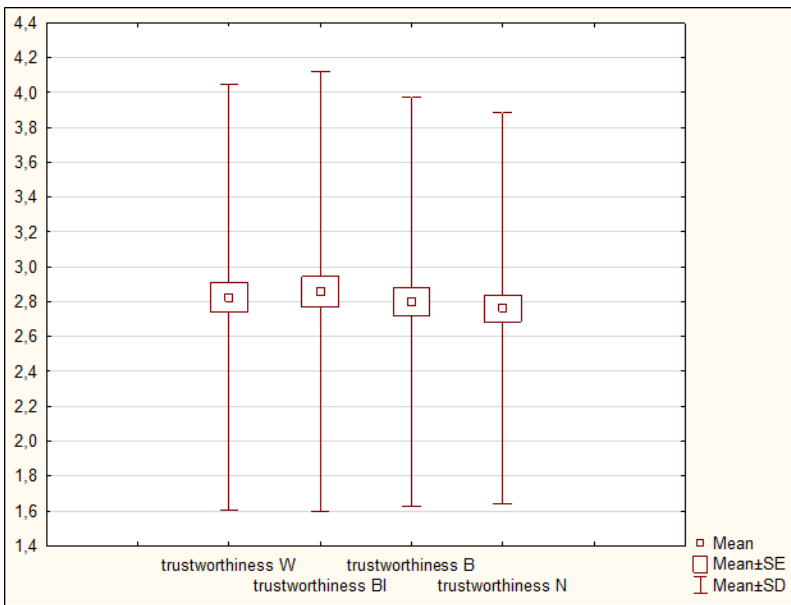
Figure 6. Comparison of the trustworthiness of men with different face coverings

When assessing the trustworthiness of men with different face coverings and from different attractiveness groups, a maximum score of 7 was obtained in each group except for unattractive men with white respirators and for all categories of men with blue face coverings. A minimum score of 1 was achieved in each comparison group (Table 8).

Table 8.
Comparison of trustworthiness of differently attractive men with different face coverings

	M	Min	Max	*SD*
trustworthiness W - M - A	3.50	1.00	7.00	1.49
trustworthiness W - M - MA	2.85	1.00	7.00	1.31
trustworthiness W - M - UA	2.13	1.00	6.43	1.10
trustworthiness Bl - M - A	3.53	1.00	7.00	1.49
trustworthiness Bl - M - MA	2.82	1.00	7.00	1.31
trustworthiness Bl - M - UA	2.23	1.00	7.00	1.20
trustworthiness B - M - A	3.44	1.00	6.57	1.40
trustworthiness B - M - MA	2.82	1.00	6.29	1.27
trustworthiness B - M - UA	2.14	1.00	6.00	1.10
trustworthiness N - M - A	3.42	1.00	7.00	1.33
trustworthiness N - M - MA	2.72	1.00	7.00	1.20
trustworthiness N - M - UA	2.15	1.00	7.00	1.07

Men rated as the most attractive had the highest average trustworthiness score (3.47). Moderately attractive men achieved a score of 2.80 and unattractive men achieved a score of 2.16. Further, the highest average scores were achieved by men in black respirators, in each attractiveness

group. Similarly high mean scores were achieved by moderately attractive men in the black respirator. The lowest confidence scores in each attractiveness category were achieved by unattractive men in white respirator (2.12), moderately attractive men without respirator (2.72), and attractive men without respirator.
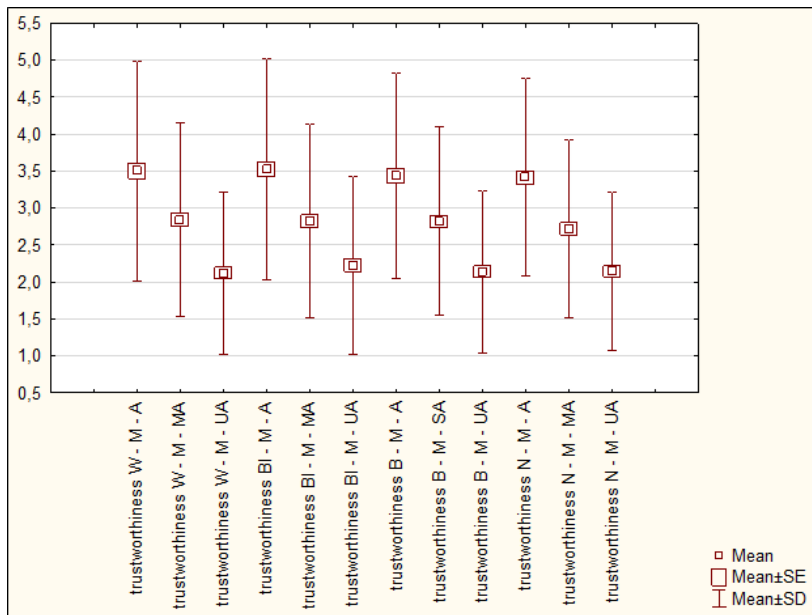

Figure 7. Comparison of trustworthiness of differently attractive men (M) with different face covering

The individual face overlays were compared with each other using the Wilcoxon matched pairs test when observing the confidence. Highly statistically significant differences ($p \leq .01$) were observed between all combinations for males, and a statistically insignificant difference ($p \geq .05$) was not observed in the combinations reported in Table 9.

Table 9.

Combined comparison of individual male face coverings for different degrees of attractiveness

Combinations of facial overlays	p
trustworthiness W - M - A & trustworthiness Bl - M - A	.936
trustworthiness W - M - A & trustworthiness B - M - A	.578
trustworthiness W - M - A & trustworthiness N - M - A	.080
trustworthiness W - M - MA & trustworthiness Bl - M - MA	.264
trustworthiness W - M - MA & trustworthiness B - M - MA	.938
trustworthiness W - M - UA & trustworthiness B - M - UA	.142
trustworthiness W - M - UA & trustworthiness N - M - UA	1.00
trustworthiness Bl - M - A & trustworthiness W - M - A	.936
trustworthiness Bl - M - A & trustworthiness B - M - A	.173
trustworthiness Bl - M - MA & trustworthiness W - M - MA	.264
trustworthiness Bl - M - MA & trustworthiness B - M - MA	.936
trustworthiness Bl - M - UA & trustworthiness B - M - UA	.193
trustworthiness B - M - A & trustworthiness W - M - A	.578
trustworthiness B - M - A & trustworthiness Bl - M - A	.173
trustworthiness B - M - A & trustworthiness N - M - A	.362
trustworthiness B - M - MA & trustworthiness W - M - MA	.938
trustworthiness B - M - MA & trustworthiness Bl - M - MA	.936
trustworthiness B - M - UA & trustworthiness W - M - UA	.143
trustworthiness B - M - UA & trustworthiness Bl - M - UA	.193
trustworthiness B - M - UA & trustworthiness N - M - UA	.710
trustworthiness N - M - A & trustworthiness W - M - A	.080
trustworthiness N - M - A & trustworthiness B - M - A	.362
trustworthiness N - M - UA & trustworthiness W - M - UA	1.00
trustworthiness N - M - UA & trustworthiness B - M - UA	.710

When assessing the trustworthiness of women (F) with different face coverings or no face coverings, a maximum attractiveness score of 7 was obtained only in the group of women with a white respirator, and a minimum score of 1 was obtained in each group. (Table 10).

Table 10.

Comparison of the trustworthiness of women with different face coverings

	M	Min	Max	*SD*
F trustworthiness W	3.30	1.00	7.00	1.31
F trustworthiness Bl	3.45	1.00	6.90	1.35
F trustworthiness B	3.34	1.00	6.14	1.27
F trustworthiness N	3.32	1.00	6.14	1.18

The mean trustworthiness rating of women without face covering was 3.32, which represented the lowest mean rating. Women with a black respirator over their face had the highest trustworthiness rating (3.45). The trustworthiness of women wearing a blue face covering was 3.34 and white face covering was 3.29. It can be concluded that the average trustworthiness

rating of women with any face covering was higher than the average trustworthiness rating of women without face covering (Figure 8).
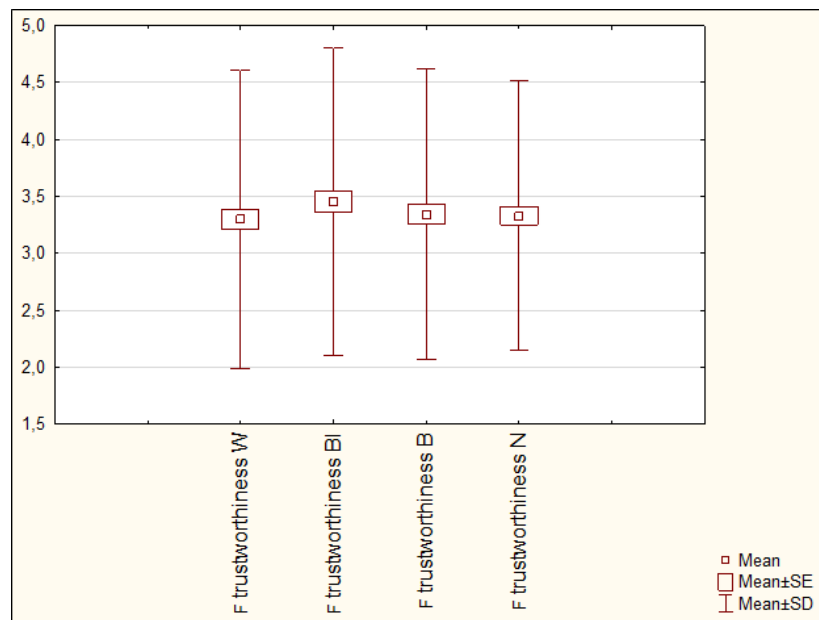

Figure 8. Comparison of the trustworthiness of women with different face coverings

When assessing the trustworthiness of women with different facial overlays and from different attractiveness groups, we obtained a maximum score of 7 in each group except for blue-veiled women regardless of attractiveness and moderately attractive women with no facial overlay (Table 11).

Table 11.
Comparison of trustworthiness of differently attractive women with different face coverings

	M	Min	Max	SD
trustworthiness W - F - A	4.11	1.00	7.00	1.55
trustworthiness W - F - MA	3.57	1.00	7.00	1.47
trustworthiness W - F - UA	2.22	1.00	7.00	1.20
trustworthiness Bl - F – A	4.10	1.00	7.00	1.54
trustworthiness Bl - F - MA	3.60	1.00	7.00	1.47
trustworthiness Bl - F - UA	2.67	1.00	7.00	1.29
trustworthiness B - F - A	3.96	1.00	6.86	1.47
trustworthiness B - F - MA	3.46	1.00	6.86	1.41
trustworthiness B - F - UA	2.60	1.00	6.14	1.17
trustworthiness N - F - A	4.01	1.00	7.00	1.44
trustworthiness N - F - MA	3.55	1.00	6.43	1.33
trustworthiness N - F - UA	2.42	1.00	7.00	1.18

Women rated as the most attractive had the highest average trustworthiness score (4.04). Moderately attractive women scored 3.54 and unattractive women scored 2.47. Further, women in white respirator (4.10) and women in black respirator (4.08) achieved the highest mean scores. The lowest confidence scores in each attractiveness category were achieved by unattractive women in white respirator (2.21).
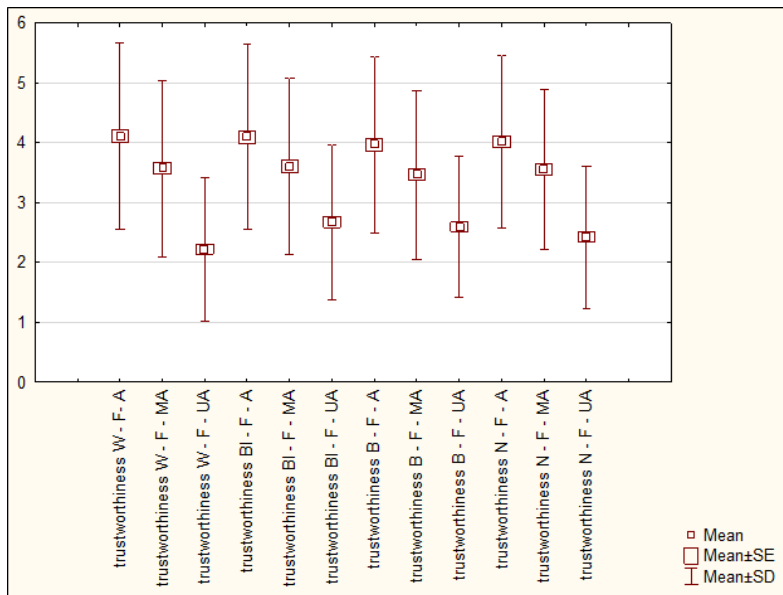

Figure 9. Comparison of trustworthiness of differently attractive women (F) with different face coverings

The individual face overlays were compared with each other using the Wilcoxon matched-pairs test when observing confidence. Highly statistically significant differences (p ≤ .01) were observed between all combinations for females, and a statistically insignificant difference (p ≥ .05) was not observed in the combinations reported in Table 12.

Table 12.

Combined comparison of individual face coverings of women, at different degrees of attractiveness

Combinations of facial overlays	p
trustworthiness W - F - A & attractiveness W - F - A	.195
trustworthiness W - F - A & attractiveness Bl - F - A	.427
trustworthiness W - F - A & attractiveness B - F - A	.512
trustworthiness W - F - A & attractiveness N - F - A	.613
trustworthiness W - F - A & trustworthiness Bl - F - A	.585
trustworthiness W - F - MA & trustworthiness Bl - F - MA	.270
trustworthiness W - F - MA & trustworthiness N - F - MA	.122
trustworthiness Bl - F - A & attractiveness W - F - A	.108
trustworthiness Bl - F - A & attractiveness Bl - F - A	.350
trustworthiness Bl - F - A & attractiveness B - F – A	.309
trustworthiness Bl - F - A & attractiveness N - F – A	.351
trustworthiness Bl - F - A & trustworthiness W - F – A	.585
trustworthiness Bl - F - MA & trustworthiness W - F - MA	.270
trustworthiness Bl - F - MA & trustworthiness N - F – MA	.258
trustworthiness Bl - F - UA & trustworthiness B - F – UA	.474
trustworthiness B - F - A & attractiveness B - F – A	.703
trustworthiness B - F - A & attractiveness N - F – A	.561
trustworthiness B - F - A & trustworthiness N - F – A	.939
trustworthiness B - F - UA & trustworthiness Bl - F – UA	.474
trustworthiness N - F - A & attractiveness B - F – A	.166
trustworthiness N - F - A & attractiveness N - F – A	.550
trustworthiness N - F - A & trustworthiness B - F – A	.939
trustworthiness N - F - MA & trustworthiness W - F – MA	.122
trustworthiness N - F - MA & trustworthiness Bl - F – MA	.258

Factors influencing the assessment of attractiveness and trustworthiness

In the questionnaire survey, focus was placed on factors that may have influenced respondents' ratings, namely gender, age, and relationship status (engaged/unengaged). The above factors were analysed using the Mann-Whitney U-test. No statistically significant difference (p ≥ .05) was found in any of the observed factors that could have influenced the respondents' assessment of attractiveness and trustworthiness. It is concluded that the selected factors do not influence the respondents' assessment of people's attractiveness and trustworthiness.

Comparison of trustworthiness and attractiveness between men and women

Next, we focused on the difference in attractiveness and trustworthiness between men and women with face masks. The genders were compared using the non-parametric Wilcoxon Matched Pairs test. In Figure 10, the results from the comparison of attractiveness between men and women are presented, and a highly statistically significant difference in favor of women was observed in each of the categories compared (p ≤ .01). It can be concluded that women are rated

more attractive with any facial overlay or no facial overlay. Additionally, a highly statistically significant difference was observed between the top-rated female group and the top-rated male group (p ≤ .01), in favor of females. It can be concluded that the least attractive women appear more attractive than the most attractive men.
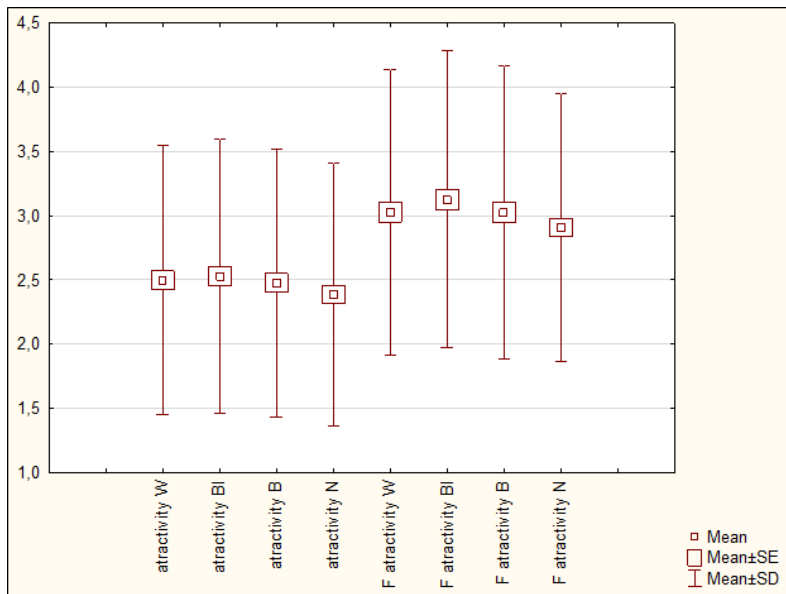

Figure 10. Comparison of attractiveness between males and females with different face coverings

Applying the same procedure, trustworthiness between men and women was also compared. A highly statistically significant difference in favor of females was observed in each of the categories compared (p ≤ .01). It is assessed that women are rated as more trustworthy with or without any facial overlay. Furthermore, a highly statistically significant difference was observed between the lowest-rated group of women and the highest-rated group of men (p ≤ .01). The data suggest that women are perceived as more attractive and trustworthy than men, regardless of facial overlay and degree of attractiveness.
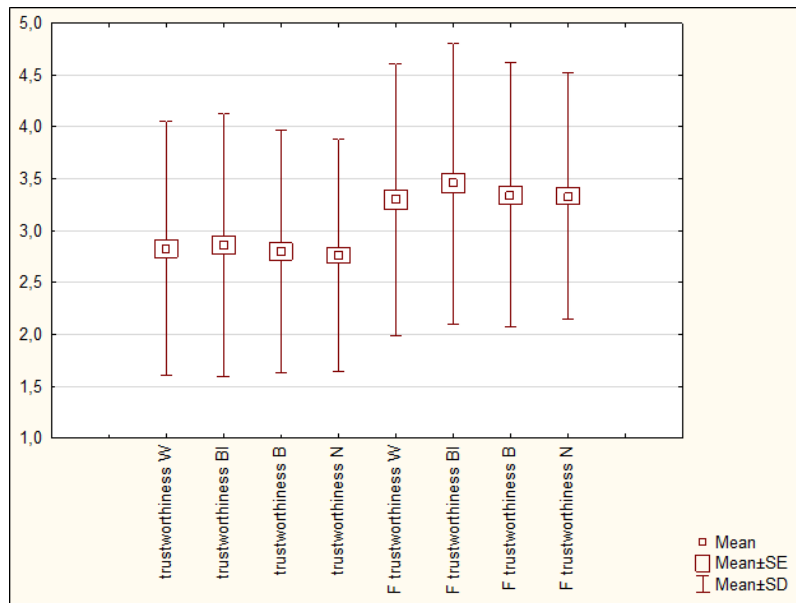
Figure 11. Comparison of trustworthiness between men and women with different face coverings

Discussion

In the present work, the effect of different face masks on people's attractiveness and trustworthiness was investigated. Furthermore, the influence of various factors that may have affected the respondents' evaluation was explored. Facial occlusion increases facial attractiveness regardless of which features are occluded and what the underlying facial attractiveness is (Sadr & Krowicki, 2019).

This data confirmed that face masks increase attractiveness in unattractive people, as demonstrated by Kamatani et al. (2021), Miyazaki and Kawahary (2016), and Hies and Lewis (2022). Further, we have shown that they also increase attractiveness in attractive people, which is inconsistent with the finding of Kamatani et. al. al (2021).

Facial overlap increases attractiveness for people rated as having "unattractive faces" and "moderately attractive faces". Based on these data, it could be concluded that the average attractiveness and trustworthiness ratings of men and women with any facial overlay were highly statistically significantly higher than the average attractiveness and trustworthiness ratings of men and women without facial overlay, which is inconsistent with the findings of Patel et al. (2020).

People rated as attractive are perceived to be equally attractive when their face is covered (Patel et al., 2020).

It has been demonstrated that women are rated as more attractive and trustworthy, with or without any face covering, than men, irrespective of the degree of attractiveness. Ekman (1972), Maestripieri et al. (2017), and Jamrozik et al. (2019) find that perceptions of trustworthiness are related to perceptions of the lower face. Data acquired by this study showed higher trustworthiness ratings for people when any face overlay was present, compared to faces without overlay, which refutes these concerns. At the same time, the Covid-19 pandemic in particular can be considered as a significant factor influencing this, with people perceiving greater trustworthiness in people who protected themselves and their surroundings by covering their airways. Vrij and Hartwig (2021) have shown that face masks do not affect the perception of deception, which is consistent with the perception of trustworthiness and supports findings presented in this study.

The effect of mask colour was also found to be significant according to Kamatani et al. (2021) was minimal, which is not consistent with the findings of Ito and Kawahara (2019). Hies and Lewis (2022), Lakens et al. (2013), and Specker et al. (2018) consider the perception of a blue surgical mask and a white respirator to be positive, as the aforementioned colours are reminiscent of the medical profession. However, according to Miyazaki and Kawara (2016), in the period before the SARS-CoV-2 pandemic outbreak, surgical drapes or other respiratory coverings were considered less attractive and credible as they evoked the idea of illness, i.e. attractiveness and trustworthiness were reduced by the so-called hygiene mask effect.

The data revealed that individuals, both men and women, with a black respirator on their face scored the highest in both attractiveness and trustworthiness across all attractiveness and trustworthiness groups. The attractiveness and trustworthiness of men and women wearing blue face veil and white respirator were approximately the same. The influence of colour in assessing the attractiveness and trustworthiness of people with a face covering was demonstrated. According to Ito and Kawahara (2019), the perception of black face mask wearers is generally more negative compared to the perception of white face mask wearers both before and during the pandemic in Japan. These data confirmed the opposite when looking at both genders in perceptions of both trustworthiness and attractiveness.

From the results of Hies et al. (2022) show that faces are perceived to be most attractive when covered by medical masks, and significantly more attractive when covered by cloth masks than when not covered, which is consistent with findings acquired by the time of doing this study . However, these data showed higher attractiveness ratings when the face was covered with a respirator, compared to when the face was covered with a surgical drape.

The results of Patel et al. (2020) found that unattractive and moderately attractive faces were rated as significantly more attractive when masked compared to unmasked. Similarly, Pazhoohi and Kingstone (2022) found that the face mask increases the perceived attractiveness of relatively unattractive faces, but has no effect on highly attractive faces. This effect was largest for faces in unattractive condition for both men and women, data attained in this study support the findings. The results further suggest that the higher attractiveness models achieve, the more trustworthy they are perceived to be.

A statistically significant difference was not found for any of the observed factors (gender, age, relationship status) that may have influenced the respondents' ratings. A limitation of this research is considered to be the inability to generalize the data to the entire population, as the research was not conducted with respect to racial differences from the perspective of the raters and the perspective of the models who were selected for this research. Additionally, eye and hair color and shape, or other physical characteristics that might affect overall attractiveness and trustworthiness were not addressed.

Conclusion and Future Research Suggestions

It can be concluded that face masks have become part of hygiene habits, similar to hand washing, with a positive impact on attractiveness and trustworthiness for both genders. Black respirators can be considered significantly positively rated in tracking attractiveness and trustworthiness for both genders. The present work may suggest that increased personal protection from infections using face masks is currently perceived as attractive with a positive impact on people`s trustworthiness.

From the results presented here and previous research, there appear to be at least three effects at work in the interaction between face masks, attractiveness, and trustworthiness. The first is the health mask effect, which reduces facial attractiveness caused by the association between mask and illness. This effect appears to have been suppressed by the compulsory wearing of face

masks due to the Covid-19 pandemic, and has been replaced by the occlusion effect, which increases attractiveness by covering the lower part of the face. This effect can be induced by any object and is not mask-dependent. And another medical mask effect, where medical masks can increase facial attractiveness, perhaps because of the association of masks with medical or nursing professions and also protection from infection. This effect has been demonstrated for both sexes, and it may only occur during the COVID-19 pandemic. Therefore, we propose that the research be replicated in the post-pandemic period. The combination of these three different effects may explain these findings and also previous research in this area.

In the broader context of this research, the wearing of masks is established as a new form of nonverbal communication - the face mask as a complement to the overall appearance that indicates a display of trustworthiness and influences people's perception of attractiveness. At the same time, face masks affect commonly perceived nonverbal expressions-Parada-Fernández et al. (2022) found that emotion recognition was worse when wearing masks, except for the emotion of surprise. This topic deserves further investigation, whether from a social or behavioral perspective.

Concerns about social discrimination due to the impact of wearing face masks are eliminated by findings of this research paper.

List of abbreviations
F-female
M-male
A-attractive
MA-moderately attractive
UA-unattractive
W-white respirator
Bl-black respirator
B-blue drape
N-no face mask overlay
Availability of data and material
The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

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Competing Interests
 The authors have declared that no competing interests exist.

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