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Preferences and inferences of personality traits following ostracism

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Declaration of scientific integrity

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# Abstract

# Keywords

* Personality
* Big Five
* Social exclusion
* Ostracism
* Person perception
* Faces

# 1. Introduction

In 2018, the United Kingdom appointed a Minister for Loneliness in response to ongoing new evidence on loneliness and health risks (Yeginsu, 2018). Previous research had found that loneliness has similar effects on our health as excessive smoking or drinking (Holt-Lunstad et al., 2010) and increases the risk of Alzheimer's disease (Holwerda et al., 2014), cancer, and cardiovascular disease (Hawkley & Cacioppo, 2003). Thus, this issue is of great interest to our society. One form of loneliness that people experience is exclusion, amongst others in the form of ostracism (K. D. Williams, 2006).

Ostracism – defined in the Oxford English Dictionary as the exclusion from a society or group (Stevenson, 2010) – has been subject to an increasing amount of research in the last two decades (for a review, see K. D. Williams & Nida, 2011). The feeling of being excluded and ignored is known by everyone. Whether it be the exclusion from a game or a conversation. Most often, these experiences can be overcome rather quickly (K. D. Williams, 2009). But what helps us in doing so? And are their strategies or abilities we use in these situations? Within the body of ostracism research lays a topic that investigates the influence of ostracism on an affected individuals' perception of the world and other people. This is important because a changed perception also influences and changes a person's actions. By studying these changes, we can, on the one hand, make better predictions about ostracized individuals and, on the other hand, better help them with adapted interventions.

## **Theory**

The word ostracism originated in ancient Greece, where it referred to the expulsion of a person who had fallen out of favor in society. Today, it is used primarily to refer to the exclusion of a person from a group or population, where the ignoring of that person by others is crucial. When ostracism became popular as a research topic in the nineteen eighties, most studies focused on the process of social exclusion itself and the motivations of the perpetrators (e.g. Alexander, 1986; Gruter & Masters, 1986; Hirshleifer & Rasmusen, 1989; Lancaster, 1986). It was not until the end of the 20th century that the victim's perspective came to the fore, and the psychological and behavioral responses of victims of ostracism were gradually illuminated.

**1.1.1. Perceptional differences in ostracized individuals.** Humans have a universal need to belong, which is satisfied through frequent, non-aversive social interactions (Baumeister & Leary, 1995). When ostracism is experienced, the satisfaction of this need is reduced (K. D. Williams, 2009). The theory of the social monitoring system states that socially excluded people are particularly sensitive to social cues when their need to belong is thwarted (Gardner et al., 2000). This would support their urge and resulting attempts to reintegrate through social interaction to satisfy their need to belong (Gardner et al., 2005). And indeed, it was found that social exclusion has a beneficial impact on the ability to identify facial expressions (Pickett et al., 2004), encode social cues (Kawamoto et al., 2014), concentrate on them (DeWall et al., 2009; Golubickis et al., 2018) and judge the authenticity of smiles (Bernstein et al., 2008).

But to restore the satisfaction of the need to belong, an important requirement is an interaction partner who is approachable and open for social interaction. One aspect that could make a good interaction partner are his personality traits, which, among other things, indicate his social preferences and openness towards new experiences. Since ostracism leads to an altered perception of social and facial cues (Kawamoto et al., 2014), ostracism could also lead to a more salient perception of typical personality traits inferred from a face. Which personality traits might ostracized individuals prefer in a potential interaction partner when seeking reintegration?

**1.1.2. Ostracism and facially communicated personality traits.** In a 2020 study, a cascade of artificial neural networks was trained to predict self-reported Big Five scores based on photos alone. In the end, the network was able to predict Big Five scores with significant accuracy (Kachur et al., 2020). Thus, there appear to be indicators of personality traits in human face that are at least partially indicative of personality. The question is whether people can perceive these indicators as well.

And indeed, this seems to be the case, as shown in a study in which participants who were given a description of a person with a low or high trait expression of agreeableness or conscientiousness showed a higher intention to ostracize the described person with a lower trait expression (Rudert et al., 2021).Similar findings have been made previously, showing that individuals can infer personality traits of the person they are seeing relatively accurately when only facial features are available (Ambady et al., 2000). A study at the University of Basel concluded that participants in two validation studies reliably perceived both Big Two and Big Five traits from facial images and were able to differentiate between these different traits (Walker & Vetter, 2016).

Individuals also show preferences for certain facially communicated personality traits. When examining general preferences for such personality traits, subjects in one study showed a preference for higher scores in extraversion and agreeableness and lower scores in neuroticism and conscientiousness (Sacco & Brown, 2018). No general preference emerged for openness; rather, the subject's openness partially predicted his preference for openness in other faces.

The combination of exclusion and preferences for facially communicated personality traits has not been the subject of previous research. However, one study measured subjects' need to belong without prior manipulation and found that a low need to belong was associated with a preference for extraverted faces (Brown & Sacco, 2017).

Furthermore, social exclusion increased categorical perception of social information (Sacco et al., 2011). Participants who had previously experienced social exclusion were better at discriminating between subtle angry and happy faces, but performed worse when discriminating between two happy faces, suggesting an increased yet more homogeneous perception of categories as a result of social exclusion. Accordingly, personality traits inferred through facial cues may also be judged more extremely by socially excluded individuals.

Taken together, these results suggest that personality may be an important social cue when need to belong is low. However, it remains unclear whether individuals with a low need to belong share additional preferences for faces that are indicative of certain personality traits compared to individuals with a high need to belong. Furthermore, it is unclear whether they perceive these traits as more extreme than individuals with a high need to belong.

**1.1.3. The Basel Face Database.** To study differences in facially communicated personality traits, pairs of faces, each with high and low trait expression, are required. The Basel face database (Walker et al., 2018) provides exactly such photographs, in which the individuals depicted are perceived as having either high or low expression of each Big Five personality trait. This resource allows to test the preferences of ostracized individuals for the Big Five personality traits and their accuracy in inferring these traits from prototypical photographs.

In previous research (Brown & Sacco, 2017), a preference for extraverted faces has been found to be related to a low need to belong. This study aims at replicating this finding as well as extending it by examining whether excluded (as opposed to included) individuals hold preferences for agreeableness, conscientiousness, neuroticism, and openness. Hence, this study will include photographs with all Big Five personality traits and analyze the preferences of socially excluded for these traits as well as their inference from manipulated photographs.

## 1.2. Hypotheses

Based on the theory outlined above, six hypotheses are stated. The first five address preferences of socially excluded for faces of others with respect to personality traits. Foreach of the Big Five traits a prediction is made about the preference differences between included and excluded participants. The first four predictions are based on the findings of Sacco & Brown (2018), who found a general preference for more extraverted, more agreeable, and less neurotic faces. I expect socially excluded individuals to show these preferences as well, but since they perceive social information as more categorical (Sacco et al., 2011), they should perceive preexisting preferences as more pronounced. Only for openness no clear preference was found. Therefore, a prediction is made here: For the socially excluded, I expect a preference for more open faces, as this could convey a signal of responsiveness and, theoretically, people with high levels of openness should be more open to new interactions. They are also more resilient to stress (P. G. Williams et al., 2009), which could signal calmness to excluded individuals.

For conscientiousness, a similar prediction is made in that socially excluded individuals will have a stronger preference for more conscientious faces since they may convey more stability and less risk taking. This is the only assumption that was not based on previous research.

The resulting hypothesis is split up into five similar hypotheses that are as follows:

*H1A: On average, socially excluded (vs. included) individuals prefer faces manipulated to display high (vs. low) extraversion by choosing these extremes more often when choosing a potential interaction partner.*

*H1B: On average, socially excluded (vs. included) individuals prefer faces manipulated to display high (vs. low) agreeableness by choosing these extremes more often when choosing a potential interaction partner.*

*H1C: On average, socially excluded (vs. included) individuals prefer faces manipulated to display high (vs. low) openness by choosing these extremes more often when choosing a potential interaction partner.*

*H1D: On average, socially excluded (vs. included) individuals prefer faces manipulated to display high (vs. low) conscientiousness by choosing these extremes more often when choosing a potential interaction partner. [[1]](#footnote-1)*

*H1E: On average, socially excluded (vs. included) individuals prefer faces manipulated to display low (vs. high) neuroticism by choosing these extremes more often when choosing a potential interaction partner.*

Further, I expect socially excluded individuals to make more extreme ratings when judging pictures of individuals with respect to a perceived personality trait. Because the trait expressions on the presented faces are meant to be either high or low, excluded participants may make their ratings more based on categorical perceptions of social information. This argument is further supported by findings that individuals with a thwarted need to belong have a more categorical perception of social information (Sacco et al., 2011). A greater need to belong was also associated with more precision in identifying facial expressions (Pickett et al., 2004), encoding social cues (Kawamoto et al., 2014), concentrating on them (DeWall et al., 2009; Golubickis et al., 2018) and judging the authenticity of smiles (Bernstein et al., 2008).

The second hypothesis is as follows:

*H2: Socially excluded (vs. included) individuals make more extreme personality ratings of the manipulated pictures.*

All measurement instruments to measure the necessary variables are mentioned and explained in the method section to guarantee full transparency.

# 2. Methods

## 2.1. Participants

The required sample size was calculated using G\*Power (Faul et al., 2007) using a medium effect size (*d* = 0.5). A t-test with independent means, given α = 0.05, power 1-β = 0.8 yielded a sample size of 102 participants in total. To ensure that the final sample size will have enough participants, the sample size is slightly increased (~10%, *N* = 114, 57 in each condition).

Participants were recruited on the website prolific. For their participation they received 1.25 £ each. This payment was based on a pre-estimated study completion time of 10 minutes.

## 2.2. Design and Procedure

To compare the effects of social exclusion on preferences for personality traits and their inference from photographs, participants will be randomly assigned to one of two conditions: inclusion and exclusion. Both groups are asked for their consent and introduced to the study. Then, they play Cyberball, an online ball-tossing game where participants are either included or excluded (K. D. Williams & Jarvis, 2006). Participants in the inclusion condition get to interact with the other players by receiving an equal share of ball tosses (around 30%), while the exclusion group experiences social exclusion by the other players (they receive the ball only twice in the beginning). Right after, they will report their need satisfaction of the four basic needs: belonging, self-esteem, control, and meaningful existence (K. D. Williams, 2009). Need satisfaction will be measured using a short Need Threat Scale (Rudert & Greifeneder, 2016). It indicates whether the ostracism manipulation was successful.

Thereafter, participants will be presented with 40 different pairs of photographs, each pair displaying the same person. Importantly, the pairs of photographs are manipulated so that they display the same person once enhanced and one reduced on the personality trait of interest. Participants will be asked to choose the picture of the person that they would prefer to interact with. Participants will make in total 40 decisions (40 pairs for five personality traits, resulting in eight pairs per trait). Afterwards, they are presented with 20 individual photographs, each showing a face with either enhanced or reduced characteristics of one of the big five traits. They are asked to rate the depicted individuals on the photograph with respect to the manipulated personality trait (e.g., *not at all neurotic – extremely neurotic*) using a 7-point Likert scale. Participants will make these decisions for 20 faces. The photos presented in both tasks will be shown in a randomized order. The preference task is chosen to come first because there is no mention of personality traits in it, which could otherwise influence the answers in the following task.

Finally, participants answer a short questionnaire with 10 items to record their own trait expressions of the Big Five (Rammstedt & John, 2007). This offers the option to investigate whether their own traits have an influence on their preferences for facially communicated traits in an exploratory manner, since this association has already been found in a previous study (Sacco & Brown, 2018).

## 2.3. Statistical Analysis

To compare preferences for a high or low trait expression among included and excluded individuals, the mean preference for both groups is calculated as a number between 0 and 1 (each participant choosing one of two photos representing the values 0 and 1, respectively). A mean of 0.5 would therefore mean that a participant is indifferent between low or high manipulation on the according trait. With this mean value, an independent t-test can be calculated for each trait. The Holm-Bonferroni method is used to control for family-wise error rates following the calculations of t-tests. Afterwards, the moderating effect of participants’ own personality traits will be controlled for with a linear regression model.

To compare the personality inferences of the exclusion and the inclusion group, the items displaying a low trait expression are first inverted to be included into the analysis of the high trait expression items. Then, an independent t-test is conducted for every trait rating to calculate if the difference in the average rating of both groups is significant.

Additionally, we first run an ANOVA including one factor for the direction of trait manipulation to account for differences in the direction of trait expression.

Because the preference for certain personality traits may depend on participants’ own expression of that personality trait, participants additionally answer a short questionnaire with 10 items assessing their own trait expressions of the Big Five (Rammstedt & John, 2007). The potential moderating effect of the participants’ personality will be controlled for with a linear regression model.

# 3. Results

The online survey was conducted on July 28 and the set number of participants was reached on the same day. Of the initial 131 participants, who attempted the online study survey that day, 17 refused consent. Furthermore, seven participants failed the attention check, and one advised against the use of his data without giving a specific reason. This resulted in a total number of 106 participants whose results were included in the analysis. Of these 106 participants, 79 (74%) were female and 26 were male, while one person reported being non-binary. The mean age was 25.4 years with a standard deviation of 7.5 years. After completion of the selection process, 50 participants were in the inclusion condition and 56 were in the exclusion condition.

To measure the effectiveness of Cyberball in inducing feelings of social exclusion in the experimental group, all need threat items were summed and an average score was calculated for each participant. With this new variable, a t-test was conducted, which confirmed the effectiveness of Cyberball. Participants in the experimental group (*M* = 2.67, *SD* = 2.06) showed significantly lower need threat scores than participants in the control group (*M* = 6.28, *SD* = 1.68), *t*(100) = -9.85, *p* < .001, *d* = -1.95.

First, the mean preference was calculated for each Big Five trait and both groups, included and excluded, as a number between zero and one, whereby zero stands for the low trait expression image and one for the high trait expression image. The resulting means as well as standard deviations are stated in Table 1 below.

For the overall effect of the exclusion condition in the preference task, an ANOVA was computed across all traits, but found no significant effect, F(3, 334) = 0.66, p = .59, η2 = 0.005. Table 1 summarizes the individual analysis for each trait, in which the preferences of the included group were compared with those of the excluded group for each Big Five trait. An independent t-test was chosen for this purpose because the data were normally distributed across all conditions. Unfortunately, none of the t-test analyses yielded a significant result.

Correction of the p-values using the Holm-Bonferroni method was neither necessary, since the results were far from significant, nor would it have resulted in different figures.

Table 1

*Descriptive and inferential statistics results of the preference task analyses.*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Trait** | **Preferences**  **M (SD)** | | **Effect size (Cohen’s *d*)** | **95% CI** | **Independent t-test** |
| **Inclusion** | **Exclusion** |
| Agreeableness | 0.75 (0.19) | 0.78 (0.20) | *d* = 0.12 | -0.051,  0.097 | *t*(102) = 0.61,  *p* = .54 |
| Conscientiousness | 0.50 (0.23) | 0.52 (0.20) | *d* = 0.11 | -0.060,  0.106 | *t*(98) = 0.56,  *p* = .58 |
| Extraversion | 0.73 (0.24) | 0.76 (0.17) | *d* = 0.16 | -0.048,  0.116 | *t*(89) = 0.83,  *p* = .41 |
| Neuroticism | 0.40 (0.23) | 0.36 (0.20) | *d* = 0.19 | -0.125,  0.043 | *t*(98) = -0.97,  *p* = .33 |
| Openness | 0.68 (0.21) | 0.69 (0.21) | *d* = 0.04 | -0.075,  0.089 | *t*(101) = 0.18,  *p* = .86 |

For the rating task, an ANOVA across all traits also showed no significance, F(4, 416) = 0.81, p = .52, *η2* = 0.006. The results of each t-test for each trait can be seen in Table 2. Again, the ratings of the included group were compared to the ratings of the excluded group for every Big Five trait using t-tests for independent groups. These analyses yielded no significant results as can be seen in Table 2.

Table 2

*Descriptive and inferential statistics results of the rating task analyses.*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Trait** | **Ratings**  **M (SD)** | | **Effect size (Cohen’s *d*)** | **95% CI** | **Independent t-test** |
| **Inclusion** | **Exclusion** |
| Agreeableness | 4.12 (0.68) | 4.08 (0.66) | *d* = 0.06 | -0.297,  0.223 | *t*(101) = -0.28,  *p* = .78 |
| Conscientiousness | 4.32 (0.80) | 4.23 (0.65) | *d* = 0.13 | -0.378,  0.191 | *t*(94) = -0.65,  *p* = .52 |
| Extraversion | 4.57 (0.81) | 4.74 (0.64) | *d* = 0.24 | -0.110,  0.462 | *t*(93) = 1.22,  *p* = .23 |
| Neuroticism | 4.08 (0.70) | 3.94 (0.80) | *d* = 0.17 | -0.423,  0.162 | *t*(102) = -0.89,  *p* = .38 |
| Openness | 3.77 (0.74) | 3.88 (0.70) | *d* = 0.15 | -0.171,  0.391 | *t*(100) = 0.77,  *p* = .44 |

Additionally, to the main analyses of hypotheses, a two-way ANOVA analysis was conducted for the rating task, with the direction of trait manipulation as one factor. The results are depicted in Table 3. None of them were significant, suggesting that the trait manipulation had no effect on the ratings.

Table 3

*Inferential statistics results of the two-way ANOVA.*

|  |  |  |  |
| --- | --- | --- | --- |
| **Trait** | **Effect size (*η2*)** | **F-statistic** | **p-value** |
| Agreeableness | *η2* = 0.007 | *F*(1, 208) = 1.36 | *p* = 0.24 |
| Conscientiousness | *η2* = 0.00009 | *F*(1, 208) = 0.02 | *p* = 0.89 |
| Extraversion | *η2* = 0.009 | *F*(1, 208) = 1.93 | *p* = 0.17 |
| Neuroticism | *η2* = 0.005 | *F*(1, 208) = 1.05 | *p* = 0.31 |
| Openness | *η2* = 0.002 | *F*(1, 208) = 0.45 | *p* = 0.50 |

Finally, a linear model analysis was computed to control for the moderator variable in form of participants’ own Big Five personality traits. To this end, the influence of participants' personality trait on the effect of condition (included vs. excluded) on rating accuracy was calculated for each trait in the rating task. Table 4 contains the moderator analysis results.

Only for the personality trait Openness a significant result was found. Namely, the main effect of participants’ own openness value had a significant effect on rating accuracy, F(3, 100) = 1.68, p = 0.04. The interaction effect of condition and openness did not reach significance, F(3, 100) = 1.68, p = 0.08, as did the main effect of condition, F(3, 100) = 1.68, p = 0.07. Because both main effects are closer to significance, there seems to be little correlation between these two variables. Surprisingly, participants’ own openness trait value had more influence on the rating accuracy than did the condition of being excluded versus included.

Table 4

*Inferential statistics results of the moderator analysis. Influence of participants’ own personality traits and interaction with condition on the preference task.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Trait** | **Adjusted R2** | **F-statistic** | **Participants’ personality trait** | **Interaction effect with condition** |
| Agreeableness | *R2* = -.02 | *F*(3, 100) = 0.24 | *p* = .82 | *p* = .59 |
| Conscientiousness | *R2* = -.02 | *F*(3, 100) = 0.24 | *p* = .99 | *p* = .63 |
| Extraversion | *R2* = -.01 | *F*(3, 100) = 0.60 | *p* = .78 | *p* = .36 |
| Neuroticism | *R2* = -.02 | *F*(3, 100) = 0.39 | *p* = .93 | *p* = .69 |
| Openness | *R2* = -.02 | *F*(3, 100) = 0.25 | *p* = .43 | *p* = .45 |

The analysis could not provide significant support for hypotheses H1A to H1E, nor for H2, thus refuting all hypotheses. The results are relatively far from significant; thus, mere chance can be ruled out as an explanation for the lack of significance. It can be concluded that in the form in which the hypotheses were formulated, none of them is true, at least not according to the data.

The same conclusion can be drawn from the moderator analysis. The participants' own expression of personality traits had no significant effect on their preferences in facially communicated personality traits. Neither the main effect nor the interaction effect with the condition yielded a significant result.

The main findings on which this study is based are the significant inferences people make about facially communicated personality traits (Ambady et al., 2000; Walker & Vetter, 2016). As a final step in the analysis, this effect was examined in the current sample. One t-test was conducted for the images with the enhanced traits and one for the images with the reduced traits.

On the one hand, participants were able to evaluate images with increased trait manipulation (M = 4.36, SD = 0.53) with significant accuracy, t(105) = 6.94, p < .001, d = 0.67. On the other hand, inferences were not significantly correct for images with reduced trait manipulation (M = 4.02, SD = 0.52), t(105) = 0.34, p = 0.63, d = 0.03.

In addition, a t-test was calculated for each trait and the direction of the trait manipulation. All results can be seen in Table 5 (for enhanced trait manipulations) and Table 6 (for reduced trait manipulations). For all t-tests, the actual Likert scale scores (1 - 7) were compared to the scale mean (4). This provides information about which of the participants' specific personality ratings were significantly accurate.

Table 5

*Inferential statistics results of the one-sample t-test on the trait ratings accuracy (for enhanced trait manipulations).*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Trait** | **Mean & Standard deviation** | **Effect size (Cohen’s *d*)** | **95% CI** | **One-sample**  **t-test** |
| Agreeableness | *M* = 4.52,  *SD* = 1.06 | *d* = 0.49 | 4.347301  Inf | *t*(105) = 5.02,  *p* < .001\* |
| Conscientiousness | *M* = 4.90,  *SD* = 0.96 | *d* = 0.94 | 4.746253  Inf | *t*(105) = 9.67,  *p* < .001\* |
| Extraversion | *M* = 5.05,  *SD* = 1.08 | *d* = 0.97 | 4.873238  Inf | *t*(105) = 9.99,  *p* < .001\* |
| Neuroticism | *M* = 4.17,  *SD* = 1.21 | *d* = 0.14 | 3.980264  Inf | *t*(105) = 1.49,  *p* = .07 |
| Openness | *M* = 3.16,  *SD* = 1.05 | *d* = -0.80 | 2.986111  Inf | *t*(105) = -8.26,  *p* = 1 |

With respect to the improved manipulation images, the t-tests for agreeableness, conscientiousness, and extraversion yielded significantly correct inference of the personality traits, and for neuroticism the result is nearly significant. Surprisingly, inferences for openness were opposite to the trait manipulation, with participants rating pictures with increased openness lower than the scale mean of 4. It appears that the enhanced openness conveyed in faces is much more difficult to infer than the other Big Five traits.

Table 6

*Inferential statistics results of the one-sample t-test on the trait ratings accuracy (for reduced trait manipulations).*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Trait** | **Mean & Standard deviation** | **Effect size (Cohen’s *d*)** | **95% CI** | **One-sample**  **t-test** |
| Agreeableness | *M* = 4.32,  *SD* = 1.11 | *d* = 0.28 | -Inf  4.495499 | *t*(105) = 2.92,  *p* = 1 |
| Conscientiousness | *M* = 4.36,  *SD* = 1.14 | *d* = 0.32 | -Inf  4.541849 | *t*(105) = 3.24,  *p* = 1 |
| Extraversion | *M* = 3.75,  *SD* = 1.03 | *d* = -0.24 | -Inf  3.916192 | *t*(105) = -2.50,  *p* = .007\* |
| Neuroticism | *M* = 4.17,  *SD* = 1.06 | *d* = 0.16 | -Inf  4.336227 | *t*(105) = 1.60,  *p* = .94 |
| Openness | *M* = 3.50,  *SD* = 1.21 | *d* = -0.42 | -Inf  3.69096 | *t*(105) = -4.28,  *p* < .001\* |

The results of the t-tests for images with reduced manipulation were less significant. Only for the traits extraversion and openness did they reach significance. This is interesting in that the images for openness were consistently rated as less open regardless of the direction of the trait manipulation. Overall, participants were better able to infer high trait manipulations than low ones. The results for openness are discussed in more detail in the Discussion section.

# 4. Discussion

Despite previous research findings providing promising support for the hypotheses tested in this study, none of them reached anywhere near significance. There was no difference in the preference for facially communicated personality traits between excluded and included subjects, nor did they perceive them significantly different. Further, a moderator analysis for participants' own personality traits showed no significant numbers, contradicting the assumption that people prefer faces that convey personality traits similar to their own.

This raises the question of why there were no significant results. The simpler reason could be that the effects described in the hypotheses are not present. Where there is nothing, nothing can be found. However, this would imply that previous research has come to significant results by chance, which concerns the extraversion study by Brown & Sacco (2017), who found a significant relationship between a thwarted need to belong and a preference for extraverted faces. In the current study, no such relationship was observed; more specifically, the aforementioned relationship was far from significant, with a p-value of only p = .41. There is no reason to believe that this is due to bad luck, and in nineteen other cases the results would reach significance. The numbers are far too clear for that.

One possibility to render both studies (the current one and the one from Brown & Sacco, 2017) viable in their results is the assumption that the effects are there, but too small for empirical significance, and were found in the previous study due to luck. But with the results of both studies being very far apart this probability is diminishingly low.

Another explanation for the discrepant results could be the limitations of the current study. First, although the sample size required for a medium effect size had been calculated in advance, it was just short of the calculated limit, with only 104 participants, and was therefore rather small. Second, the study was conducted online, which offers no possibility to standardize the experimental conditions, apart from the fact that the tasks were all completed on screen. On the one hand, we cannot be sure how attentively participants answered the questions or whether they simply clicked carelessly through the study. On the other hand, the environment in which they completed the tasks - at home or elsewhere - could have had an impact on their answers, as could any disturbances to which they were exposed. And the screens they viewed the study on could differ in size and resolution. All these differences lead to a variety of possible experimental conditions, which is an important limitation of the current study design.

Further discrepancies exist between the current study and the findings of Ambady et al. (2000) and Walker & Vetter (2016). Both studies have shown that individuals are able to correctly infer facially communicated personality traits. These results are only partially supported by the current study, in which participants' personality ratings were significantly correct only for increased manipulations of agreeableness, conscientiousness, and extraversion and for reduced manipulations of extraversion and openness. The most surprising result was for ratings of pictures manipulated to convey high openness. Here, participants not only performed the worst, but their inferences were also in the wrong direction, assuming a lower value for openness rather than a higher one. This suggests that openness is the most difficult Big Five personality trait to infer from facial cues alone. The best performance was for the extraversion trait, where ratings were significantly correct regardless of the direction of the manipulation.

These results raise the question of why there is a discrepancy between previous studies and the current study. They could have arisen by pure chance, as a product of a small sample size coupled with bad luck on certain personality inferences. Or they could be due to the study’s limitations mentioned earlier. Regardless, there appears to be a need for further research on facial personality traits.

## Future Research

Although this study was unable to confirm any of the hypotheses stated, important conclusions can be drawn from the findings. In part, the results call into question the strong support that previous studies had found for participants' ability to accurately perceive personality traits conveyed by the face. This is an indication that the actual effects may be smaller than suggested in the literature. In any case, further research on facial personality traits is needed to provide a more accurate picture.

The individual t-tests for the ratings of each trait with respect to manipulation direction revealed some interesting patterns that could serve as a basis for more detailed research. This is particularly true for the trait openness, for which all images had a high trait rating on average, regardless of manipulation direction. In other words, the question arises as to why openness is always perceived as high, regardless of whether this is the intended effect of the manipulated image. Future research could ensure whether this was just a random result or whether facial openness is generally perceived as high.

In addition, the current results suggest that individuals are better at assessing high trait manipulations than low ones. One explanation for this difference could be that high trait expressions are more salient, as high trait individuals are often more noticeable and prominent.

The sample size of the current study was large enough for statistical measurement, but still quite small. However, the effects are so far from significant that a larger sample size has little chance of producing significant effects. Thus, there is little reason to believe that the results would be significantly different in a replication study with a larger sample and a laboratory rather than an online design.

Although this study could not confirm a link between an individual's personality traits and their preference for personality traits in the faces of others, more extensive research may reveal this link. Previous research has found a relation that the current study was unable to establish (Sacco & Brown, 2018), and other studies have found that perceived similarities positively influence adult trust, prosociality, selection of potential mates, and perceived attractiveness (Bailenson et al., 2008; Berscheid et al., 1971; Bressan & Zucchi, 2009; DeBruine, 2002; DeBruine et al., 2008; Giang et al., 2012; Jones et al., 2004; McPherson et al., 2001). This strong support for similarity preference leads to the conclusion that an influence of one's personality on facial preference for certain personality traits is very likely, which could be elucidated by future research.

* Summarize results
* Problems with study/limitations
  + Small sample size
  + Data quality/online study
  + Small effects
* No effects of previous studies found
  + Correlation between exclusion and preference for extraverted faces
* Future research

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1. This hypothesis was misstated in the preregistration, where a preference for low rather than high conscientiousness scores following ostracism was predicted. [↑](#footnote-ref-1)