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A glimpse through the lens of ostracism – Preferences for and inferences of facial personality traits following ostracism

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Declaration of scientific integrity

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# Abstract

Ostracism can change a victim’s perception of social information. Particularly, socially excluded individuals were found to differ from included individuals in their perception of personality traits conveyed by faces. Most importantly, their view of various facial personality traits became more differentiated and their preference for the studied trait extraversion changed. This study, conducted in an online design, seeks to answer two main hypotheses that extend the previous literature by including all Big Five traits. The first hypothesis is divided into five parts, each relating to one of the Big Five personality traits, and predicts differences in preference for these traits between socially included and excluded individuals. The second hypothesis states that socially excluded individuals perceive these traits more discriminately than socially included individuals. The results do not support either hypothesis, raising questions about the state of research in this area. These questions are discussed, and ideas for further steps in this area of research are highlighted.

Keywords: Personality, Big Five, Social exclusion, Ostracism, Person perception, Faces.

# 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 topic is of great interest to our society, and it is important to better understand the causes for loneliness, the moderating variables associated with the effects, and the factors that mitigate these effects. Causes for loneliness are numerous and can be divided into five factors: personal inadequacies, developmental deficits, unfulfilling intimate relationships, relocation/significant separations, and social marginality (Rokach & Brock, 1996). An experience that can affect several of these factors is social exclusion, or more specifically, ostracism (K. D. Williams, 2006).

## Ostracism

Ostracism – being excluded from and ignored by 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 being ignored in a group conversation. Ostracism violates the fundamental need to belong (Baumeister & Leary, 1995; K. D. Williams, 2007, 2009) and leads to a range of negative emotions like anger, depression and alienation as well as diminished self-worth and self-esteem experienced by its victim (DeWall & Bushman, 2011; K. D. Williams, 2007; K. D. Williams et al., 2000). Fortunately, 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.

## **Perceptional variation**

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 serves the attempt to eliminate the psychological threat caused by social exclusion, achieved through social interaction to satisfy the thwarted 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.

Further support for perceptual differences between socially included and excluded individuals comes from the Resource and Perception Model (Harber et al., 2008, 2011) which links psychosocial resources to motivated perception. Psychosocial resources are intrapersonal characteristics and interpersonal conditions that promote coping and efforts to maintain, protect, and build resources (Hobfoll, 1989, 2002). Among the important resources are social support, self-affirmation, a sense of control or efficacy, and emotional openness. When these resources are lacking, individuals experience more stress and cope less well with adversity, whereas those with abundant resources show marked resilience (Billings & Moos, 1981; Taylor et al., 2008). Furthermore, research on basic perception found that motives and emotions affect the perception of object sizes (Bruner & Goodman, 1947) and others’ facial expressions (Feshbach, 1963). In particular, the presence of a threat has altering effects on perception, as several studies have found this effect for spiders (Riskind et al., 1995), disturbing images (Mathews & Mackintosh, 2004), heights (Stefanucci & Storbeck, 2009) and steepness (Stefanucci et al., 2008).

The basic assumption of the Resource and Perception Model is that if a threat causes a distorted perception and psychosocial resources buffer the threat, then the perceptual distortions caused by the threat should be moderated by resources. And because social exclusion reduces some of these psychosocial resources, such as feelings of belonging, self-esteem, control, and existential meaning (K. D. Williams, 2007, 2009), the victims' perception should be altered according to the model.

As we have seen, the literature provides strong support for the assumed relation between social exclusion and changes in perception. But how might this change in perception benefit the ostracized individual?

## **Facially communicated personality traits**[[1]](#footnote-1)

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 the human face that are at least partially indicative of personality. The question is whether people can perceive these indicators as well.

This is exactly what has been found in previous research, 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).This perception is not only unconscious, but can also be actively accessed, as shown in a study in which subjects could relatively accurately infer personality traits of the person they were looking at when only facial features were available (Ambady et al., 2000). Furthermore, 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 facial personality traits. When examining general preferences for such personality traits, subjects 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 facial personality traits has not yet been the subject of 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. Moreover, it is unclear whether they perceive these traits as more extreme than individuals with a high need to belong.

## **The** **Basel** **Face Database**

To study differences in facial 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, a preference for extraverted faces has been found to be related to a low need to belong (Brown & Sacco, 2017). 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 individuals for these traits as well as their inference from manipulated photographs.

## Hypotheses

Based on the theory outlined above, six hypotheses are put forward. The first five address preferences of socially excluded individuals for Big Five personality traits conveyed by faces, and the sixths relates to their inference. For each of the Big Five traits a prediction is made about the preference differences between included and excluded participants. The first three 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 express preexisting preferences as more pronounced.

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.

The resulting hypotheses 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. [[2]](#footnote-2)*

*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 images 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). On this basis, the sixth hypothesis is stated 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 listed and explained in the method section to guarantee full transparency.

# Methods

## Participants

The required sample size was calculated using G\*Power (Faul et al., 2007) and 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 would have enough participants, the sample size was 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.

## Design and Procedure

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

Thereafter, participants were presented with 40 different pairs of photographs, each pair displaying the same person. Importantly, the pairs of photographs were manipulated so that they display the same person once enhanced and once reduced on the personality trait of interest. Participants were asked to choose the image of the person that they would prefer to interact with. Participants made 40 decisions in total (40 pairs for five personality traits, resulting in eight pairs per trait). Afterwards, they were presented with 20 individual photographs, each showing a face with either enhanced or reduced characteristics of one of the big five traits. They were asked to rate the depicted individuals on the photograph with respect to the manipulated personality trait using a 7-point Likert scale. To consider that participants may not know the exact Big Five terms, two synonyms that are common in everyday language were chosen to describe each trait instead (e.g., not at all sociable, chatty – extremely sociable, chatty). The exact terms were provided in an online article that covered this very topic (Lima, 2020; accessed June 13, 2021).

Participants made these decisions for 20 faces. The photos presented in both tasks were shown in a randomized order. The preference task was chosen to come first because there is no mention of personality traits in it, which could otherwise influence the answers in the second task.

Finally, participants answered 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 had an influence on their preferences for facial personality traits in an exploratory manner, since this association has already been found in a previous study (Sacco & Brown, 2018).

## Statistical Analysis

To compare preferences for a high or low trait expression among included and excluded individuals, the mean preference for both groups was 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 was calculated for each trait. The Holm-Bonferroni method was chosen to optionally control for family-wise error rates following the calculations of t-tests but was not put into practice. Afterwards, the moderating effect of participants’ own personality traits were 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 were first inverted to be included into the analysis of the high trait expression items. Then, an independent t-test was conducted for every trait rating to determine if the difference in the average rating of both groups was significant.

Additionally, we first ran 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 answered 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 were controlled for with a linear regression model.

# 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 exclusion condition, all need threat items were summed and an average score was calculated for each participant. With this new variable, a Welch two sample t-test was conducted, which confirmed the effectiveness of Cyberball. Participants in the inclusion condition (*M* = 6.28, *SD* = 1.68) showed significantly higher need threat scores than participants in the exclusion condition (*M* = 2.64, *SD* = 2.02), *t*(103.44) = -10.11, *p* < .001, *d* = -1.95.

## Confirmatory Analysis

First, the mean preference was calculated for each Big Five trait and both conditions, included and excluded, as a number between zero and one, whereby zero stands for a low trait expression image and one for a high trait expression image. The resulting means as well as standard deviations are stated in Table 1 below.[[3]](#footnote-3)

For the overall effect of the ostracism condition on mean preferences 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 analyses for each trait, in which the preferences of the inclusion group were compared with those of the exclusion group for each Big Five trait. An independent t-test was chosen for this purpose because the data were normally distributed across both conditions but 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 analysis, Welch two sample t-test.*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Trait** | **Preferences**  ***M* (*SD*)** | | **Effect size (Cohen’s *d*)** | **95% CI** | **Independent**  **t-test** |
| **Inclusion** | **Exclusion** |
| Agreeableness | 0.75 (0.19) | 0.78 (0.19) | *d* = 0.14 | [-0.05, 0.10] | *t*(103.4) = 0.72,  *p* = .47 |
| Conscientiousness | 0.50 (0.23) | 0.52 (0.20) | *d* = 0.10 | [-0.06, 0.10] | *t*(97.78) = 0.49,  *p* = .62 |
| Extraversion | 0.73 (0.24) | 0.77 (0.17) | *d* = 0.20 | [-0.04, 0.12] | *t*(88.41) = 0.99,  *p* = .33 |
| Neuroticism | 0.40 (0.23) | 0.35 (0.20) | *d* = -0.20 | [-0.13, 0.04] | *t*(98.51) = -1.02,  *p* = .31 |
| Openness | 0.68 (0.21) | 0.69 (0.21) | *d* = 0.02 | [-0.08, 0.09] | *t*(102.97) = 0.12,  *p* = .90 |

For the rating task, the same approach was chosen as for the preference task, testing for the overall effect of the ostracism condition on the ratings using an ANOVA. This analysis 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 analysis, Welch two sample t-test.*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Trait** | **Ratings**  ***M* (*SD*)** | | **Effect size (Cohen’s *d*)** | **95% CI** | **Independent**  **t-test** |
| **Inclusion** | **Exclusion** |
| Agreeableness | 4.12 (0.68) | 4.08 (0.65) | *d* = -0.05 | [-0.29, 0.22] | *t*(101.29) = -0.27,  *p* = .79 |
| Conscientiousness | 4.32 (0.80) | 4.23 (0.64) | *d* = -0.13 | [-0.37, 0.19] | *t*(93.43) = -0.65,  *p* = .52 |
| Extraversion | 4.57 (0.81) | 4.72 (0.64) | *d* = 0.22 | [-0.13, 0.44] | *t*(92.54) = 1.11,  *p* = .27 |
| Neuroticism | 4.08 (0.70) | 3.94 (0.79) | *d* = -0.18 | [-0.42, 0.15] | *t*(104) = -0.92,  *p* = .36 |
| Openness | 3.77 (0.74) | 3.88 (0.69) | *d* = 0.16 | [-0.16, 0.39] | *t*(100.62) = 0.82,  *p* = .42 |

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 corresponding results are depicted in Table 3. None of them were significant, suggesting that the direction of trait manipulation had no effect on the ratings.

Table 3

*Inferential statistics results of the trait manipulation direction analysis, 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 their preferences was calculated for each trait of the rating task. The results of the corresponding moderator analyses are provided in Table 4. None of the linear models yielded significant numbers, so participants' own personality trait can be discarded as a moderator variable for the effect of exclusion on participants’ preferences for facial personality traits.

Table 4

*Inferential statistics results of the moderator (participants’ self-reported personality traits) analysis, multiple linear regression model.*

|  |  |  |  |
| --- | --- | --- | --- |
| **Trait** | **Effect size**  **(Adjusted *R2)*** | ***F*-statistic** | ***p*-value** |
| Agreeableness | *R2* = -.02 | *F*(3, 102) = 0.31 | *p* = .82 |
| Conscientiousness | *R2* = -.02 | *F*(3, 102) = 0.22 | *p* = .88 |
| Extraversion | *R2* = -.01 | *F*(3, 102) = 0.68 | *p* = .56 |
| Neuroticism | *R2* = -.02 | *F*(3, 102) = 0.42 | *p* = .74 |
| Openness | *R2* = -.02 | *F*(3, 102) = 0.25 | *p* = .86 |

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 turned out to be 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 facial personality traits.

## Exploratory Analysis

The main findings on which this study is based are the significant inferences people make about facial personality traits (Ambady et al., 2000; Walker & Vetter, 2016). As a final step in the analysis, this effect was examined in the present sample. One one-sided one-sample t-test was conducted for the images with the enhanced trait manipulations and one for the images with the reduced trait manipulations. The exclusion manipulation was not included in this analysis because all previous results regarding it were not significant, suggesting that the condition variable would also have no effect in this analysis.

In addition, a two-sided one-sample t-test was calculated for each trait and the direction of the trait manipulation. The results are provided 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 significantly differed from the mean.[[4]](#footnote-4)

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

Table 5

*Descriptive and inferential statistics results of the trait rating accuracy analysis for enhanced trait manipulations, one-sample t-test.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Trait** | **Ratings**  ***M* (*SD*)** | **Effect size (Cohen’s *d*)** | **95% CI** | **Two-sided**  **t-test** |
| Agreeableness | 4.52 (1.06) | *d* = 0.49 | [4.31, 4.72] | *t*(105) = 5.02, *p* < .001\* |
| Conscientiousness | 4.90 (0.96) | *d* = 0.94 | [4.72, 5.09] | *t*(105) = 9.67, *p* < .001\* |
| Extraversion | 5.05 (1.08) | *d* = 0.97 | [4.84, 5.25] | *t*(105) = 9.99, *p* < .001\* |
| Neuroticism | 4.17 (1.21) | *d* = 0.14 | [3.94, 4.41] | *t*(105) = 1.49, *p* = .14 |
| Openness | 3.16 (1.05) | *d* = -0.80 | [2.95, 3.36] | *t*(105) = -8.26, *p* < .001\* |

\* p-value < 0.05

With respect to the enhanced trait manipulation images, the t-tests for agreeableness, conscientiousness, and extraversion yielded significantly correct inference of the facial personality traits. For neuroticism, the rating mean was found to be not significantly different from the scale mean. Surprisingly, inferences for openness were also significant, but opposite to the trait manipulation, indicated by the negative Cohen’s *d*, with participants rating images 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

*Descriptive and inferential statistics results of the trait rating accuracy analysis for reduced trait manipulations, one-sample t-test.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Trait** | **Ratings**  ***M* (*SD*)** | **Effect size (Cohen’s *d*)** | **95% CI** | **Two-sided**  **t-test** |
| Agreeableness | 4.32 (1.11) | *d* = 0.28 | [4.10, 4.53] | *t*(105) = 2.92, *p* = .004\* |
| Conscientiousness | 4.36 (1.14) | *d* = 0.32 | [4.14, 4.58] | *t*(105) = 3.24, *p* = .002\* |
| Extraversion | 3.75 (1.03) | *d* = -0.24 | [3.55, 3.95] | *t*(105) = -2.50, *p* = .01 |
| Neuroticism | 4.17 (1.06) | *d* = 0.16 | [3.96, 4.37] | *t*(105) = 1.60, *p* = .11 |
| Openness | 3.50 (1.21) | *d* = -0.42 | [3.26, 3.73] | *t*(105) = -4.28, *p* < .001\* |

\* p-value < 0.05

The results of the t-tests for images with reduced trait manipulation yielded very similar results in terms of significance to the analysis of increased trait manipulation. However, the direction in which they deviated from the mean is surprising. For the traits extraversion and openness, the numbers reached significance in the direction of the intended trait manipulation. The t-tests for Agreeableness and Conscientiousness also yielded significant results, but the means deviated in the wrong direction, opposite to the intended trait manipulation direction. Basically, this means that participants were actually very bad in their inferences of these two traits and performed worse than they would have by pure chance. Overall, participants were better able to infer high trait manipulations than low ones. The results are discussed in more detail in the next section.

# Discussion

Despite previous research findings providing promising support for the hypotheses tested in this study, none of them reached significance. There was no difference in the preference for facial personality traits between socially excluded and included subjects when choosing repeatedly between two facial images displaying two extremes of a trait. When they rated the facial personality traits on a Likert-scale, their estimations did not differ significantly from included individuals. Further, a moderator analysis for participants' own personality traits showed no significant results, 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 simplest reason would be that the effects described in the hypotheses do not exist. However, this would imply that previous research in both areas - preference for and inference of facial personality traits - has arrived at significant results by chance. With regard to preference for facial personality traits, this concerns Brown & Sacco's (2017) extraversion study, which found a significant relationship between a thwarted need to belong and a preference for extraverted faces. No such relationship was observed in the present study; more specifically, said relationship was far from significant, with a p-value of only 0.41. There is little reason to believe that this was due to bad luck, and in nineteen other cases the results would reach significance. The numbers at hand are far too unequivocal for that assumption.

One way to explain these contradictory results is to assume that the effects are present but too small to be empirically significant, and that both the present study and that of Brown & Sacco represent the two extremes of the overall distribution of results that can be expected from repeated testing. However, because the results of the two studies are very far apart, this probability is exceptionally low.

Another explanation for the discrepant results could be the limitations of the present 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 106 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. For one thing, we cannot be sure how attentively participants answered the questions or whether they just clicked through the study half-heartedly – even though there was an attention test, albeit one that only filters out the most inattentive subjects. For another, 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 have differed in size and resolution. All these differences lead to a variety of possible experimental conditions, which is an important limitation of the present study design.

Further discrepancies exist between the present study and the findings of Ambady et al. (2000) and Walker & Vetter (2016). Both studies have shown that individuals are able to correctly infer facial personality traits. These results are only partially supported by the present study, in which participants' personality ratings were significantly correct only for increased trait manipulations of agreeableness, conscientiousness, and extraversion and for reduced trait manipulations of extraversion and openness. Surprising results were found for ratings of images manipulated to convey high openness and for images that conveyed low agreeableness and conscientiousness. In all these cases, the subjects' estimates were not only far from the actual trait manipulation values, their inferences were even significantly in the wrong direction, assuming low values for images with high openness manipulations and high values for images with low agreeableness and low conscientiousness manipulations. The best performance was for the trait extraversion, where scores were significantly correct regardless of the direction of trait manipulation.

In conclusion, there is a large discrepancy between previous studies and the present one. Based on the present results alone, the statement that individuals can reliably and correctly infer personality traits conveyed by faces would have to be rejected. For neuroticism, no significant inference was found, and for three other traits’ directions, the inferences were towards the incorrect extreme. Overall, the trait ratings appear to be rather chaotic, but the fact that most inferences across both trait manipulation directions point to the high end of the scale suggests that assessing faces with high trait manipulations may be easier or more familiar to us than with low trait manipulations.

This difference could be due to the conspicuousness of individuals with high traits, as they are often more noticeable and prominent (e.g., high extraversion).

A different explanation worth considering is a general positivity bias that we humans have (Augustine et al., 2011; Dodds et al., 2015). Because we tend to describe others with positive traits (Sears, 1983), participants may have been reluctant to assign lower trait values to images. Even though lower values on all Big Five traits do not actually have a negative meaning, a positivity bias may have affected ratings nevertheless because the choice of words used to describe the Big Five traits in the questionnaire was, in retrospect, unfavorable. They were mostly evaluative in either a positive or negative direction and therefore could have signaled to participants that the trait had a positive connotation on one side of the scale and a negative connotation on the other. However, the data do not clearly support this assumption, because the only trait described by words with negative connotations was neuroticism (anxious, pessimistic), and for pictures intended to convey both high and low neuroticism levels, a slightly higher rating was given on average. This means that participants were not hesitant to give higher ratings for negative characteristics. The opposite was true for openness, as this trait was explained by two positive words (imaginative, spontaneous), and lower ratings were selected on average for all pictures conveying openness, regardless of the direction of manipulation. This suggests a limited influence of positivity bias at best. However, the descriptive words for the Big Five traits should be as neutral as possible to minimize influence on participants' choices and represent an important weakness in the present study.

Another explanation for the ratings leaning towards the high scale end is pure chance, as a product of a small sample size coupled with bad luck on certain personality inferences. Or they could have resulted from the study’s other limitations mentioned earlier. Regardless, there appears to be a need for further research on facial personality traits.

## Future Research

Although the present 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 obtain a more accurate representation of the actual correlations.

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 traits agreeableness and conscientiousness, for which all images had a high average trait rating, and openness, for which all images had a low average trait rating, regardless of the direction of manipulation. Overall, trait ratings tended to be in the upper half of the scale, suggesting that individuals are better at assessing high trait manipulations than low ones. Future research could clarify whether this was just a random result or if facial personality traits are generally perceived as higher in respective scale scores and whether a general positivity bias is responsible for this or some other effect that we do not yet know.

The sample size of the present 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 relation. Previous research has found a relation that the present 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 supports the conclusion that an influence of one's personality on facial preference for certain personality traits is likely, which could be elucidated by future research.

In summary, none of the predicted effects were found. On the contrary, the results are surprisingly non-significant and partially contradictory, calling the previous literature into question. How much of the discrepancy is due to chance or weaknesses in the study design and how much is due to bias in the publication of previous research results cannot be conclusively determined. However, the results point to a gap in the literature that remains to be filled.

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1. Facial cues conveying personality traits are, of course, neither universally valid nor predictive. They are merely clues to guide us, but not reliable indicators of our personality. When words referring to facially communicated personality traits are used in the following, they are to be interpreted in the above manner, i.e., they are to be understood as subjectively perceived indicators of these traits, not as objective indicators. All evaluative expressions regarding the topic, e.g., correct vs. wrong inference, are also to be understood in this context. [↑](#footnote-ref-1)
2. This hypothesis was accidently misstated in the preregistration, where a preference for low rather than high conscientiousness scores following ostracism was predicted. [↑](#footnote-ref-2)
3. Because a lot of tests were computed during the analysis, their results are listed in tables to give a better overview. For some tables, a main analysis is explained in the text to provide a comprehensive picture of the corresponding table. [↑](#footnote-ref-3)
4. The sign in front of Cohen’s *d* indicates whether the group mean is greater (positive sign) or lesser (negative sign) than the scale mean (4). This indicates whether a significant result points to the upper or lower extreme of the rating scale and helps determine whether the result is in the "correct" direction, considering the direction of trait manipulation. [↑](#footnote-ref-4)