UNIVERSITY OF PLYMOUTH

The Plymouth Student Scientist

Volume 15 | Issue 2 Article 15

2022-12-23

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Recommended Citation

Altun, G. (2022) 'Age differences in facial first impressions of traits associated with trustworthiness', The Plymouth Student Scientist, 15(2), pp. 524-546.

2022

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http://hdl.handle.net/10026.1/20107

*The Plymouth Student Scientist, 2022, **15**, (2), 524-546*

Age differences in facial first impressions of traits associated with trustworthiness

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Abstract

Older adults are more susceptible to becoming fraud victims due to increased generalised trust in others for assistance, leading to deception. Age differences in first impressions of unfamiliar faces on traits associated with trustworthiness was explored in this study. Investigating the various interpretations of trustworthiness across age has not been previously led. Using a data-driven approach, the key traits interpreted from trustworthiness were used in a trait rating task. Older adults provided higher ratings and showed an own-age bias for the traits trustworthy, honest, reliable, and loyal compared to younger adults, but not for the trait considerate. Mean trait ratings from younger adults did not differ across face age however, older faces were perceived as more reliable over younger faces across both age groups. Strong positive correlations were found across all traits. These were consistent with the single dimension found through a principal component analysis, which revealed that across all traits, trustworthiness was the most appropriate label to represent the dimension. Both age groups associated the same faces when rating the traits across both face age categories. The highest and lowest rated face averages were constructed, showing that the highest old and young averages were female and smiling across all traits. These findings highlight some age differences in facial first impressions of trustworthiness as well as the efficacy of the original trustworthiness dimension, based on social evaluations found from previous research.

Keywords: First impressions, trustworthiness, age differences, facial impressions, aging, trait impressions, own-age bias

Introduction

Humans have been accustomed to seeing faces, whether familiar or unfamiliar, throughout the course of their whole lives. There is an underlying consensus that we can rapidly interpret different personality traits such as trustworthiness, from an unfamiliar person's facial features. The processes that are involved in forming sufficient initial impressions of trustworthiness have been known to be as fast as with 100ms of exposure (Willis & Todorov, 2006). Based on brain activity studies, the amygdala automatically processes the trustworthiness of unfamiliar faces, even despite engaging in behaviours that do not require such evaluations (Engell, Haxby, & Todorov, 2007). This implies that judgments are also formed without deliberation. Despite the ongoing debate on the accuracy of social attributions from faces, first impressions of an unfamiliar person are known to strongly affect the motivation of whether we want to form an association with them (Ambady & Skowronski, 2008; Todorov et al., 2015). For example, women are perceived as more trustworthy than men across both genders (Buchan et al., 2008; Shinners, 2009). As well as this, faces that present a smiling expression are perceived as more trustworthy and approachable, compared to faces of neutral expressions (Krumhuber et al., 2007). Taking these into account, trust is a definitive factor when establishing social interactions and forming interpersonal relationships, that promote prosocial behaviour, life satisfaction, and good health (Ferrin et al., 2007; Van Lange, 2015). Based on first impressions of facial characteristics alone, the basis of forming social relations with a person is affected by the ability to judge that individual's level of trustworthiness (Beldad, de Jong, & Steehouder, 2010).

There seems to be a paucity of research investigating age differences in first impressions of trustworthiness and whether these facial evaluations are consistent across ages. Cogsdill et al. (2014) found that children aged across 3-10 demonstrated impressive trait inferences of computer-generated faces of high or low perceived dominance, competence and trustworthiness, reaching the consensus of adults. These inferences were attributed as 'mean' for untrustworhy or 'nice' for 'trustworthy'. Their accuracy of reponses was the highest for judgements of trustworthiness with 91% accuracy, which is significantly higher than chance. This shows that judgements of trusworthiness emerges very early in childhood, suggesting that the ability to evaluate how trustworthy someone appears based on their facial features is a fundamental part of our social and cognitive development.

However, as people reach an older age, the likelihood of physical and cognitive decline becomes more common. Therefore, trust becomes an even more important factor as in order for them to manage effectively, they begin to rely more on other people's aid and assistance (Aartsen et al., 2004). Li and Fung (2013) argue that due to the reduced time perspective in older adults, their likelihood of generalised trust becomes much more frequent. Poor trustworthiness judgments can lead to unreciprocity, risking negative consequences such as exploitation. Looking into age-related differences in trust perception, research from Castle et al. (2012) involved presenting images of faces that conveyed either trustworthy, neutral, or untrustworthy cues to both old and young participants. Findings revealed that older and younger adults rate faces that are high in trust cues similarly. However, faces that express untrustworthy cues are perceived as being significantly more approachable and trustworthy by older adults over younger adults. They also used neuroimaging methodology to identify the neural foundations of these age

differences. Differences were observed in the activation of the anterior insula when evaluating trustworthiness and in response to cues suggestive of untrustworthiness; greater anterior insula activation was shown in younger adults towards untrustworthy faces, whereas older adults showed muted activation. The anterior insula has been seen to play a key role in processing one's emotional experiences and subjective feelings that contribute to decision making (Uddin et al., 2017) These changes in brain circuitry could underly this age difference as older people are more likely to experience less arousal in response to untrustworthy facial cues.

Research exploring age differences in facial first impressions comes from Zebrowitz et al. (2013); they found that older adults have the tendency to judge negatively valenced faces as being significantly less untrustworthy than younger adults. This suggests weak responsiveness to danger in older people based on their lack of sensitivity towards highly untrusworthy facial cues. Older adults had also shown much greater positivity for older faces, indicating an own age bias, which was not expressed by younger adults. However, this study included only male participants, in which the findings cannot be generalisable for older adults across both genders. Supporting findings shown from Castle et al. (2012) included both genders in the study's participants, with 72% being women. That being the case, these studies contribute together to demonstrate reliable findings. All in all, this trust bias in older adults may suggest greater susceptibility to deception, vulnerability to fraud and financial loss. In fact, Bailey et al. (2016) investigated these potential indications by using a social economic trust game; they found that older adults are more likely to trust and invest more of their money with individuals with an untrustworthy facial appearance and unreliable reputation over younger adults. These findings can be seen in as an existing problem in the real world when looking at published crime figures. Reports from England and Wales indicated that approximately 1 in 12 of 800,000 respondents, aged 65 and above, have revealed being a victim of fraud (Age UK, 2019).

Subject to the previously discussed research and statistical figures, there has been research interested in age differences in the ability to rate faces based on the level of threat that they pose. Ruffman, Sullivan, and Edge (2006) presented photos of faces to older and younger adults varying in low, medium and high danger, that was assessed though pilot testing. They found that older adults could not differentiate between low and high dangerous faces to the same degree that younger adults could. This indicates an evident decline in older people's cognitive processes involved in forming sufficient first impressions. Linking to this, Oosterhof and Todorov (2008) developed a model by analysing the underlying dimensions within face evaluation. Using a data driven approach, they collected unprompted trait judgements on faces of neutral emotions. Through a principal component analysis, they found 2 main dimensions of face evaluation; trustworthiness and dominance. Positive judgments such as caring, trustworthy, intelligent, and responsible, had positive loadings, showing that these traits were closely rated to the valence dimension. More importantly, trustworthiness had the highest loading of .94, implying that trust judgements are the best representative for the valence dimension of face evaluation. This trustworthiness by dominance model were similarly replicated by Sutherland et al (2013), further supporting the underlying trait inferences made from unfamilair faces. These dimensions have an important effect on the way in which people evaluate threat (Oosterhof & Todorov, 2008). Thus, if there are clear age

differences in rating threat levels of unfamiliar faces, inferring that the interpretations of dimensions like trustworthiness and dominance may also be distinctive between old and young adults. Again, this suggests that an increase in age leads to less sensitivity towards facial cues like emotional expressions. Related to this implication, older adults have been shown to pay more attention to positive in comparison to negative facial information, such as emotional expression (Mather & Carstensen, 2003), in line with research arguing that a "positivity effect" becomes apparent in adults within their aging process (Carstensen & Mikels, 2005). Perhaps this can also provide another explanation towards why older people are more susceptible to being victims of fraud; judgments of trustworthiness are known to rely on the emotional cues of a face (Todorov, Pakrashi, & Oosterhof, 2009). Therefore, the implicit focus and attention to positive cues in older adults may lead to the loss of propensity in detecting the negative facial cues and subsequently, fall into the dangers of forming associations with people of malicious intent.

An important factor to consider is whether or not the age of the unfamiliar face has an effect on the judgements of trustworthiness by older and younger adults. It has been theorised that adults that are considered to possess facial features that resemble those of babies, for example, smooth skin, full lips, large eyes, and small nose bridge, are perceived to be more positive, warm, favourable and honest. This would suggest that younger adults are more likely to be perceived as more trustworthy and approachable over older adults. This evolved intrinsic reponse to babies is used as a shortcut when making inferences for adults due to the overgeneralisation of features (Zebrowitz & Berry, 1985). This also applies to emotional expressions, such as smiling and frowning being interpreted as stable characteristic traits, despite it being a changeable facial feature (Oosterhof & Todorov, 2008). However, there has been mixed findings across studies in the effect of facial age on social judgments. Some studies have found that older faces are judged less positively than younger faces, in line with the babyface hypothesis (Ebner, 2008) However, contrasting findings were found by Bailey et al. (2015); using an economic trust game, young and old adults acted in person as both trustees and investors. Both younger and older participants had rated older trustees as having a more trustworthy appearance than younger trustees. However, neither age groups invested more money with older trustees; in fact, averaged across both trustee age groups, older investors were more likely to invest money averaged across trustee age than young investors. This shows similar findings to previously mentioned studies (Bailey, et al., 2016). Most recent research using a similar trust game by Li et al. (2022), found that in general, people are more willing to trust the faces of older people and invest more of their money for them more than they do younger people. Moreover, investment was much higher towards old faces of both low attractiveness and sad expression whereas, young faces of low attractiveness with sad expression had lowest investment. This interaction suggests that facial age does influence judgments of trustworthiness based on facial emotional cues.

The main aim of the present study is to investigate whether there are age differences in facial first impressions of trustworthiness formed by younger adults (18-23 years) and older adults (35 years and above). Within this, the primary objective is to explore the different interpretations of trustworthiness across ages and whether they are related to the trustworthiness dimension found by previous studies (Oosterhof & Todorov, 2008; Sutherland et al., 2013). This will be inquired through a data driven

approach, in which the different perceptions will be collected through a pilot study before using the associated traits and characteristics in a rating task of unfamiliar faces. This present research also aims to understand how younger and older faces are socially evaluated. In other words, how young and old adults perceive other age groups as well as their own. For this, a repeated measures design will be conducted to collect ratings of old and young faces from participants of both age groups. The final aim is to understand what specific facial features are associated with trustworthiness and how this varies with age, using a software that can morph faces of the highest and lowest trait ratings. Within this, the changes in the face that can make a person seem less or more trustworthy across gender can be visually demonstrated.

This study intents to find similar results to studies suggesting that older adults show higher trust than younger adults (Bailey et al., 2015; Bailey et al., 2016; Castle, et al., 2012) The initial hypothesis states that there will be higher ratings overall in the traits associated with trustworthiness by older adults, compared to younger adults, for both face stimulus age categories. It is also predicted that an own-age bias will be shown through higher rates in the traits associated with trustworthiness on older faces by older adult participants, based on the findings of previous research by Zebrowitz et al. (2013). Subject to previous studies, it is further hypothesized that compared to neutral expressions, faces with a smiling expression will be rated as higher in ratings of traits related with trustworthiness (Krumhuber et al., 2007). The fourth and final hypothesis predicts that higher ratings in the traits associated with trustworthiness will be shown in female faces and subsequently male faces will show lower ratings (Buchan, Croson, & Solnick, 2008; Shinners, 2009).

Experiment 1: Interpretations of trustworthiness across age

This experiment was conducted as a pilot study to investigate how people interpret their understanding of trustworthiness as a trait. All participants provided answers to a qualitative questionnaire that included open-ended questions, in order to allow for a wide range of insights across answers.

Methodology

Participants

A total of 118 participants (24 men, 94 women, *M* = 22.3 years, age range: 18-51) took part in this study. Participants were selected through volunteer sampling in response to the study being advertised on various social media platforms, Facebook, Instagram, and Twitter.

Materials

The questionnaire was designed using the software Qualtrics (2022). Upon interest in taking part, participants were given access to the online survey through a web link. All participants were presented with an information sheet followed by a consent form. Once the participants completed the questionnaire, they were provided with a debrief that explained the brief aims and objectives of the present study (see Appendix A for documentation).

Procedure

After reading the information sheet and signing the consent form, participants were able to proceed with the questionnaire. In the first section of the questionnaire,

participants answered questions regarding their demographics, including their age, nationality, and gender. In the second section, the questions involved defining their idea of what a trustworthy person is, what behaviours they associate with being trustworthy, and what other personality traits a trustworthy person would have.

Results

To investigate how people interpret their understanding of trustworthiness, the data was analysed using the process of thematic analysis. Five descriptors were removed from the data as they did not answer the questions. Overall, there were 352 descriptors. Once the data was familiarised with, all the descriptors were classified into broad categories using the software NVivo (QSR International Pty Ltd., 2020). These categories were: Reliable, Honest, Loyal, Considerate, and Genuine. Twenty of the descriptors were classified into more than one category due to the instance that the mentioned traits overlapped in its themes. After reviewing, the categories with the most references in the data were assigned to be selected for the rating study in Experiment 2. The categories and its contents are presented in Figure 1.

The category Reliable covered 23% of the overall data, in which there was a total of 81 descriptors; 74% of the descriptors referred to the trait ‘reliable’, 10% referred to the trait ‘dependable’, and 9% referred to the trait ‘responsible’. The remaining 7.4% was labelled as ‘other’. The category Honest also covered 23% of the overall data, in which there was a total of 82 descriptors. 91.5% of the descriptors referred to the trait ‘honest’ and 8.5% referred to the trait ‘truthful’. The category Loyal covered 19% of the overall data, in which there was a total of 69 descriptors. 43% of the descriptors referred to the trait ‘loyal’. 32% of the descriptors mentioned the act ‘keeps secrets’, along with 18% mentioning the act ‘keeps promises”. The remaining 7% of the descriptors in category Loyal referred to the trait ‘protective’.

The category Considerate covered 30% of the overall data, in which there was a total of 107 descriptors. This category varied the most in its content; 42% of the descriptors referred to the trait ‘kind’ and 17% referred to the trait ‘respectful’. The traits ‘understanding’ and ‘’caring’ were mentioned with the same frequency (14%). 10% of the descriptors referred to the trait “non-judgemental. The remaining 3% mentioned the trait ‘considerate’; despite having the lowest frequency, the descriptors in this category were synonyms for this trait. Based on this, the category name was chosen to be Considerate. Due to the study’s objective of looking into the different aspects of trustworthiness, it was determined that the trait considerate achieves the balance between representing the descriptors included in this category, as well as being related more closely to the perception of trustworthiness. Whereas even though the trait ‘kind’ covered the most descriptors (42% coverage), kindness as a trait was concluded to be a separate independent concept compared to trustworthiness.

The category Genuine covered 9% of the overall data, in which there was a total of 33 descriptors. 33% of the descriptors mentioned the trait ‘consistent’. Another 33% of the descriptors mentioned the trait ‘genuine’. The remaining 11% referred to the trait ‘authentic’ (6%) and ‘straightforward’ (5%). This category was not used as a measured trait in Experiment 2 due to its low coverage of the data. Among this, some of the descriptors in the Genuine category overlapped with those in the Honest and Considerate category.

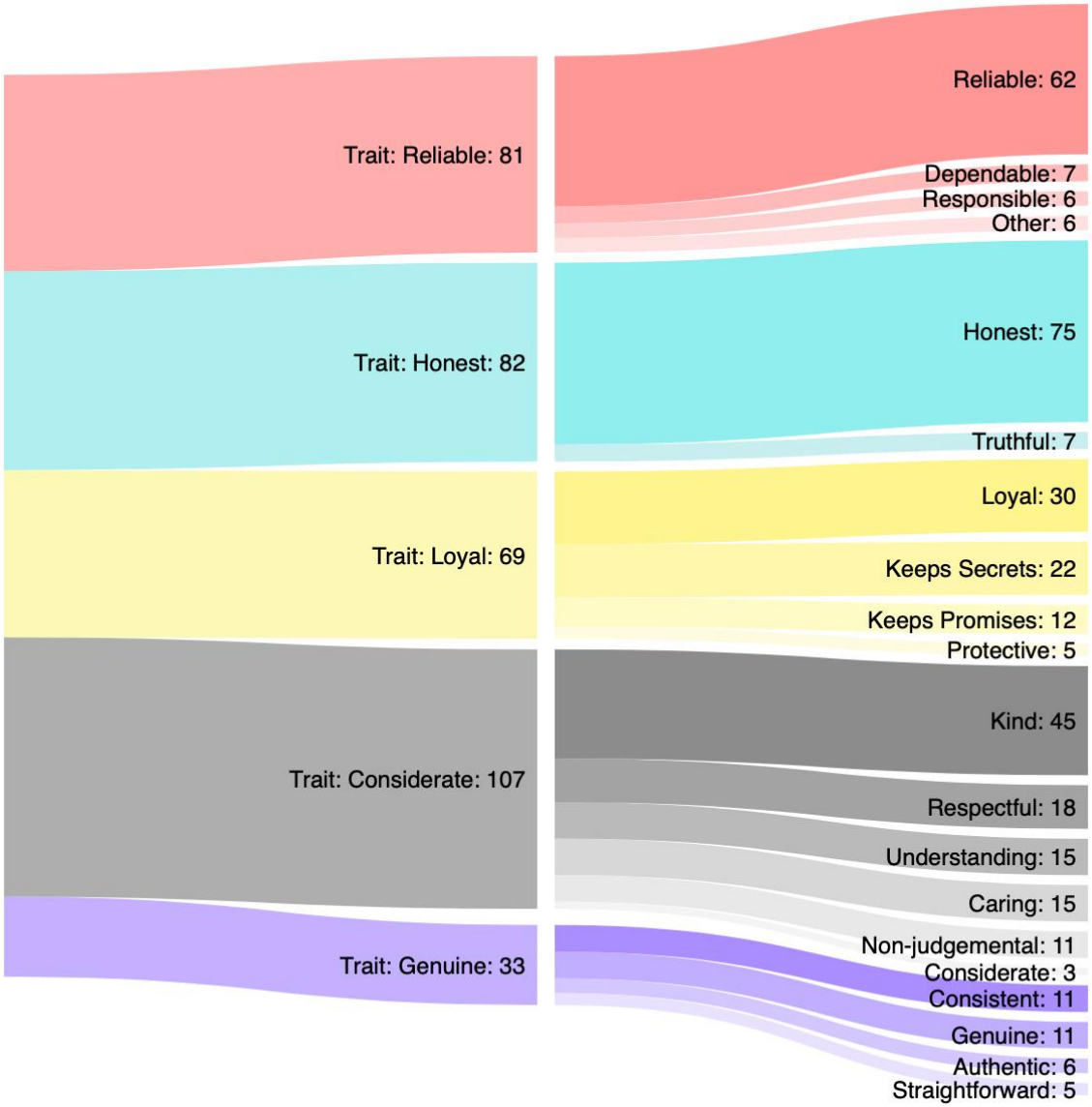

Figure 1: A Sankey diagram, generated using the website https://sankeymatic.com
This diagram shows the content of each category based on the data analysis of Experiment 1.

Experiment 2: Impressions of trustworthiness on unfamiliar faces across age

Based on the findings from experiment 1, the key descriptors that were identified from the data analysis were used in this present experiment. Participants completed a trait rating task of unfamiliar faces based on how honest, loyal, reliable, considerate, and trustworthy each face appeared. This study aims to explore all different interpretations of trustworthiness and therefore, ratings of trustworthiness acted as a control measure alongside the identified descriptors. By having trustworthiness ratings of the same face stimuli, the relationship between each interpretation and the main dimension of trustworthiness can be investigated.

Methodology

Participants

A total of 68 participants (12 men, 55 women, 1 non-binary, *M* = 35.5, age range: 18-67) were recruited for this study. There were two different age groups; 29 young adults aged between 18 and 23, and 39 older adults aged 35 and over. All participants had normal or normal-to-corrected vision. Participants were selected using volunteer sampling, in which majority were undergraduate students from University of Plymouth, in return for 1 participation point from the psychology participation pool. Other participants were recruited in response to the study being advertised on the social media platforms, Facebook, and Instagram.

Materials

A total of 60 face images were used to collect the trait ratings attributed to faces. The facial stimuli had 2 categories: 30 young adult faces and 30 old adult faces. Both categories contained half male, and half female faces, in which all were Caucasian (See Figure 2 for reference). All images were collected from www.thispersondoesnotexist.com, which uses the generative adversarial network StyleGAN2 (Karras, et al., 2020) to create artificial and naturally occurring facial identities that appear to be authentic. All the face images were presented in colour and were resized to 400 x 400 pixels. None of the stimuli included the faces wearing glasses. The experiment was designed and run using the software Qualtrics (2022). Prior to the rating task, all participants were provided an information sheet, followed by them signing a consent form. Once the participants finished the task, they were presented with a debrief explained the brief aims and objectives of the experiment (see Appendix B for documentation).

Figure 2: An example of each stimuli category of both genders, in which the top two represent younger adult faces and the bottom two represent older adult faces. All images were collected from www.thispersondoesnotexist.com.

Design and Procedure

The study involved using a 2x2 mixed experimental design. The between-subjects factor was participant age (young vs. old adults). The within-subjects factor was the face stimulus age (young vs. old faces of adults), in which all participants rated both categories of face stimulus age.

Participants were given access to a web link and the experiment took place on Qualtrics (2022), in which all the data was collected. They were presented with instructions about the task and encouraged to not think too excessively about their answers and rely on their first initial 'gut feeling' when making their trait judgments. There were five traits that were measured in the rating task: trustworthy, reliable, honest, considerate, and loyal. The order of the traits was randomized for each participant, alongside the order of the facial stimuli within each trait category.

For each trait, participants were presented with individual photos of faces and an instruction onscreen throughout the task that read “How X do you think this person is?”, in which X referred to the specific trait being rated. An example of the task can be seen in Appendix C. A Likert scale of 1 (not at all X) to 9 (extremely X) was used for each rating. After completing all 60 ratings of one trait, instructions were presented onscreen to inform the participant that the next set of faces will be rated based on the next trait. In total, each participant provided 300 ratings. Once the participant finished the rating task, they were thanked for their participation and debriefed about the overall aims and objectives of the present study. The experiment lasted between 20 to 30 minutes.

Results

The analysis of this experiment’s data was processed by averaging the ratings across all participants in both age groups for each separate face stimuli. The mean scores that were generated were used in the analysis.

Effects of Age Group and Face Age

To determine the effect of face age and age group, a 2x2 mixed ANOVA using R Core Team (2021), with factors age group (young adults vs. old adults), manipulated between-subjects and face age (young vs. old adult faces), manipulated within-subjects was performed separately for each trait.

The mean trait ratings across age group and face age for the trait trustworthiness are shown in Figure 3. There was a significant main effect of age group ($F(1,66) = 16.31$, $p < .001$, $\eta_g^2 = .16$, BF = 165.1) with older adults providing higher trustworthiness ratings than younger adults. However, there was not a significant main effect of face age ($F(1,66) = 0.07$, $p > .05$, $\eta_g^2 < .001$, BF = 0.22) or a significant interaction between the factors age group and face age ($F(1,66) = 1.64$, $p > .05$, $\eta_g^2 = .006$, BF = 0.45).

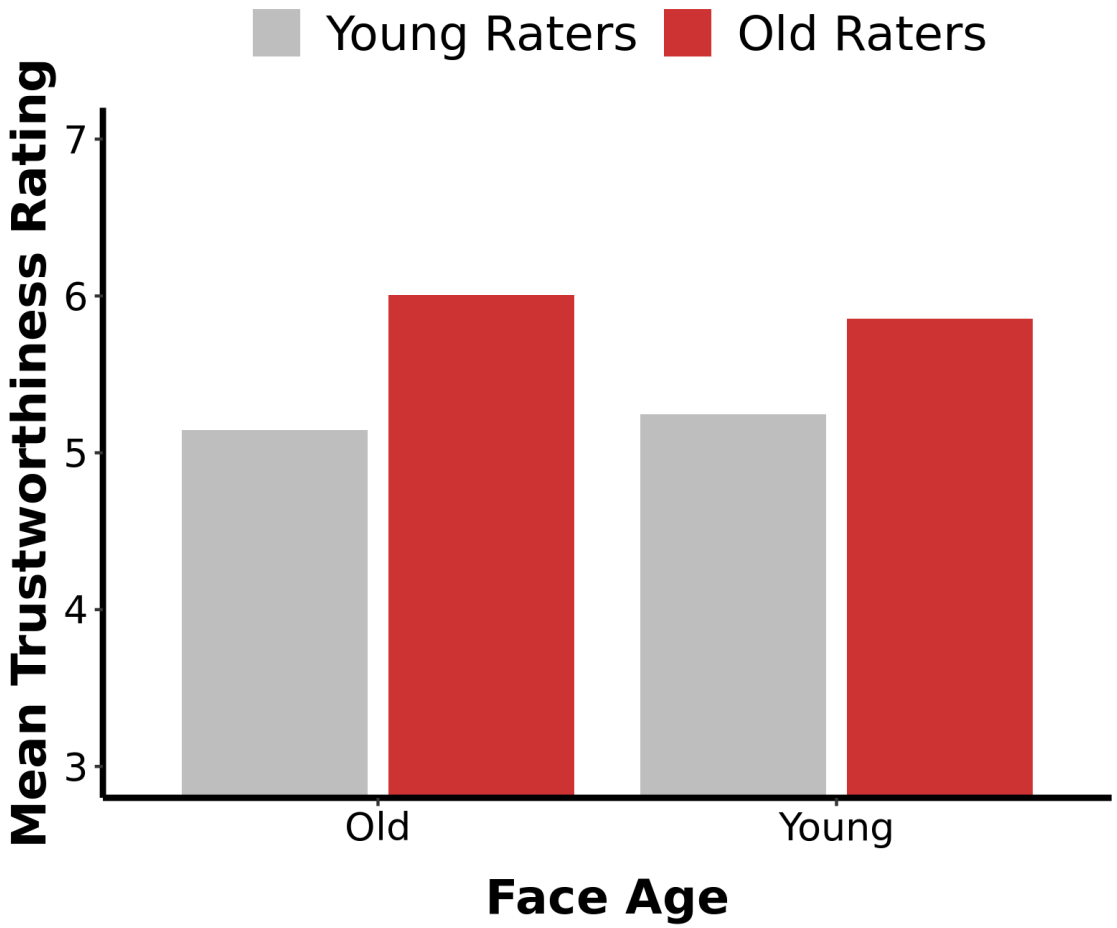

Figure 3: A bar graph to show the mean trustworthiness ratings across the age group (young and old adults) and the face age (old and younger adult faces).

The mean trait ratings across age group and face age for the trait considerate are shown in Figure 4. There was not a significant main effect of age group ($F(1,66) = 5.09$, $p < .05$, $\eta_g^2 = .06$, BF = 2.3) or a significant main effect of face age ($F(1,66) = 0.03$, $p < .05$, $\eta_g^2 < .001$, BF = 0.19) Additionally, there was not a significant interaction between the factors age group and face age ($F(1,66) = 0.77$, $p > .05$, $\eta_g^2 = .002$, BF = 0.33).

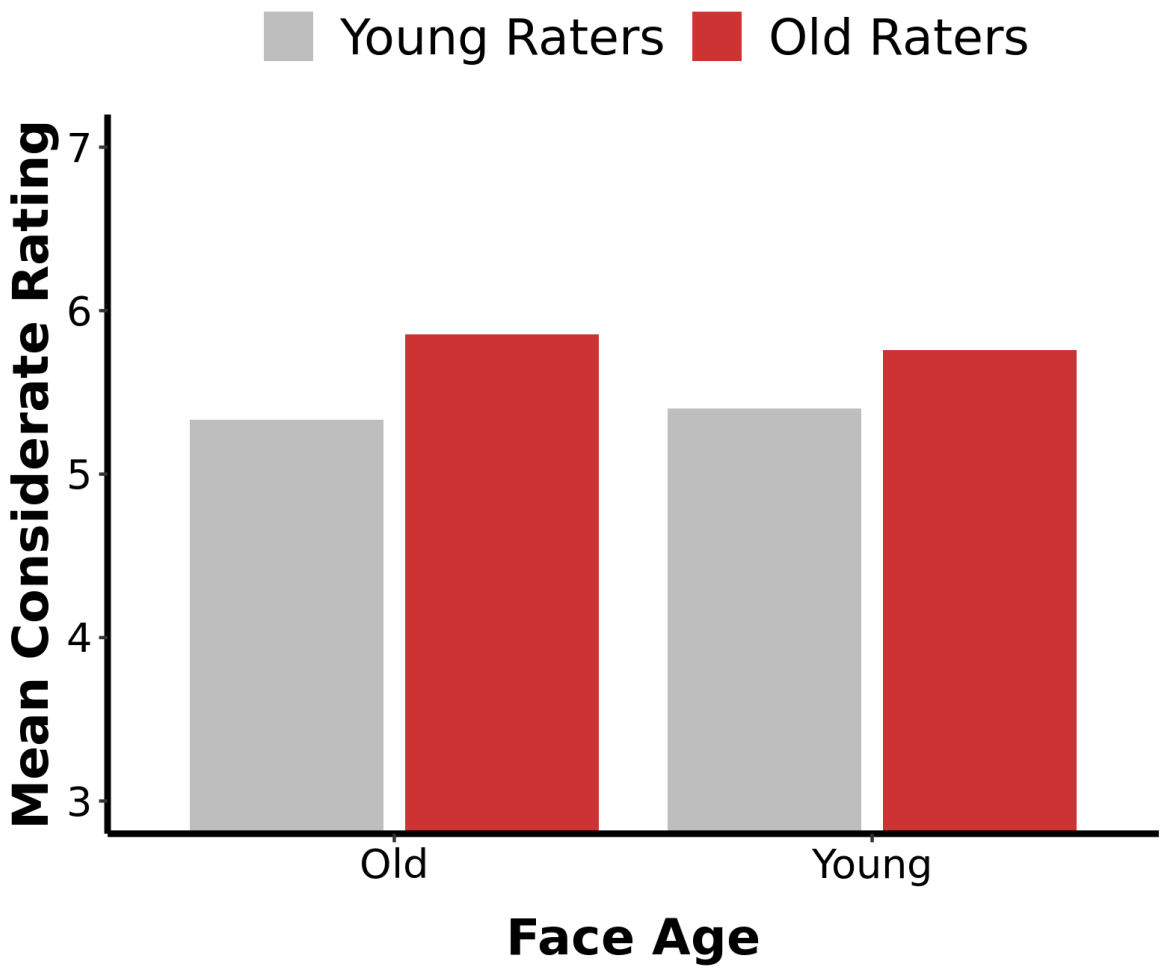

Figure 4: A bar graph to show the mean considerate ratings across the age group (young and old adults) and the face age (old and younger adult faces).

The mean trait ratings across age group and face age for the trait loyal are shown in Figure 5. There was a significant main effect of age group ($F(1,66) = 8.5$, $p < .05$, $\eta_g^2 = .08$, BF = 8.9), in which older adults provided higher loyal ratings than younger adults. Similar to the analyses of the traits trustworthiness and considerate, there was not a significant main effect of face age for the loyal trait ($F(1,66) = 1.9$, $p > .05$, $\eta_g^2 = .008$, BF = 0.61) Moreover, there was not a significant interaction between the factors face age and age group ($F(1,66) = 2.5$, $p > .05$, $\eta_g^2 = .01$, BF = 0.73).

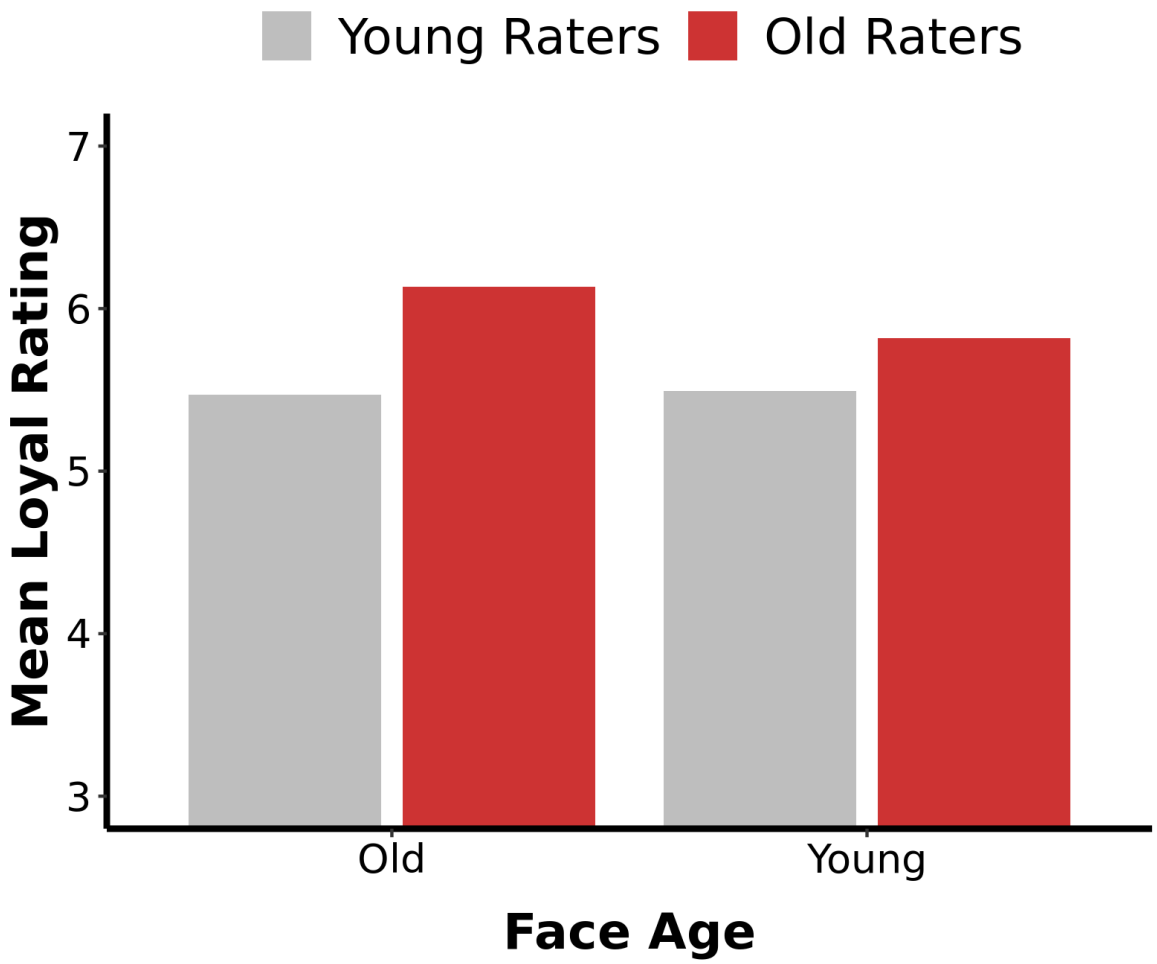

Figure 5: A bar graph demonstrating the mean loyal ratings across the age group (young and old adults) and the face age (old and younger adult faces).

For the trait honest, the mean trait ratings across the factors age group and face age are shown in Figure 6. There was a significant main effect of age group ($F(1,66) = 14.1$, $p < .001$, $\eta_g^2 = .01$, BF = 74.0), in which older adults provided higher honest ratings than younger adults. There was not a significant main effect of face age for the loyal ratings ($F(1,66) = 1.4$, $p > .05$, $\eta_g^2 = .006$, BF = 0.44), which corresponds with the previous traits, trustworthiness, considerate and loyal. There was also not a significant interaction between the factors face age and age group ($F(1,66) = 0.9$, $p > .05$, $\eta_g^2 = .004$, BF = 0.45).

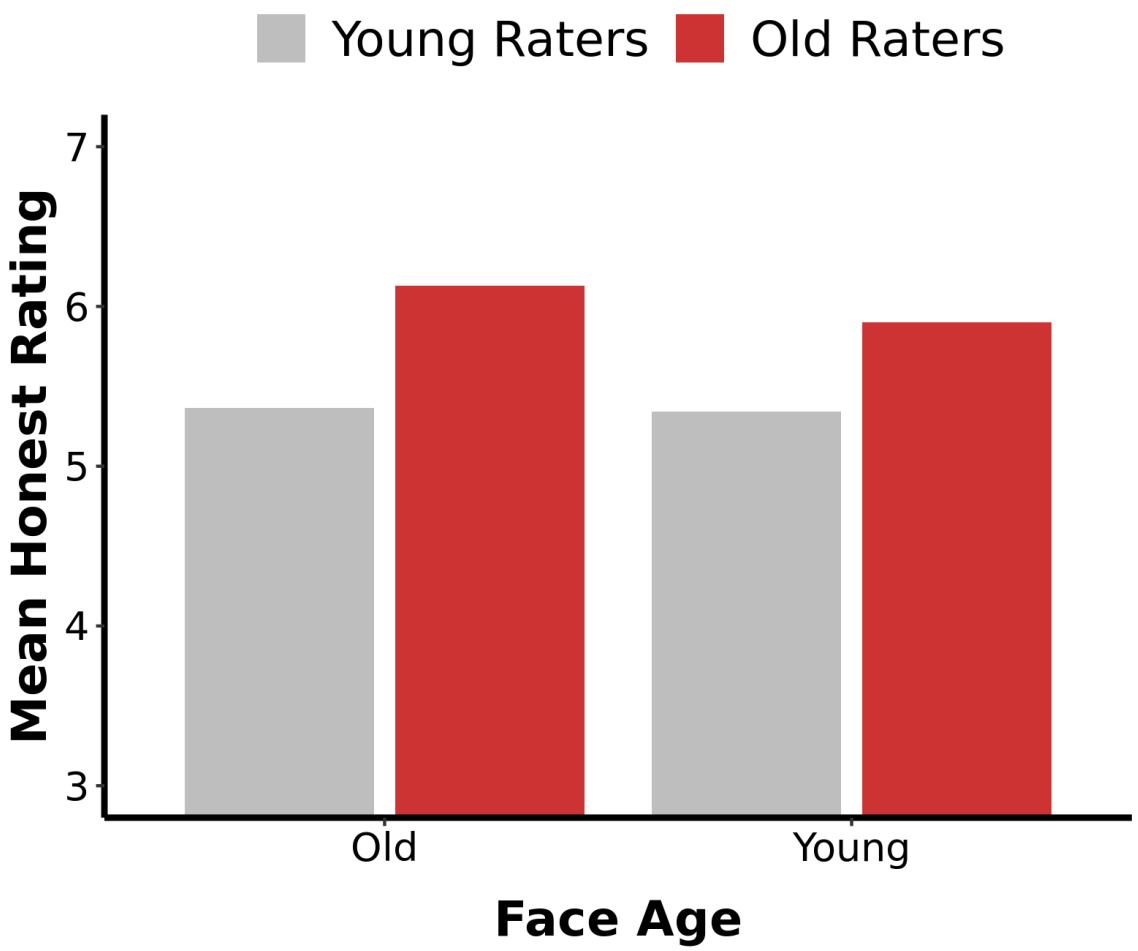

Figure 6: A bar graph to show the mean honest ratings across the age group (young and old adults) and the face age (old and younger adult faces).

The mean trait ratings across age group and face age for the trait reliable are presented in Figure 7. There was a significant main effect of age group (F(1,66) = 16.7, p < .001, η_g^2 = .16, BF = 190), showing that older adults provided higher loyal ratings than younger adults. Interestingly, there was a significant main effect of face age (F(1,66) = 8.6, p < .05, η_g^2 = .03, BF = 10.9), indicating that older adult faces are perceived as more reliable than younger adult faces. However, similar to the other traits, no interaction was found between the factors face age and age group (F(1,66) = 0,8, p > .05, η_g^2 = .003 BF = 0.38) for the trait reliable.

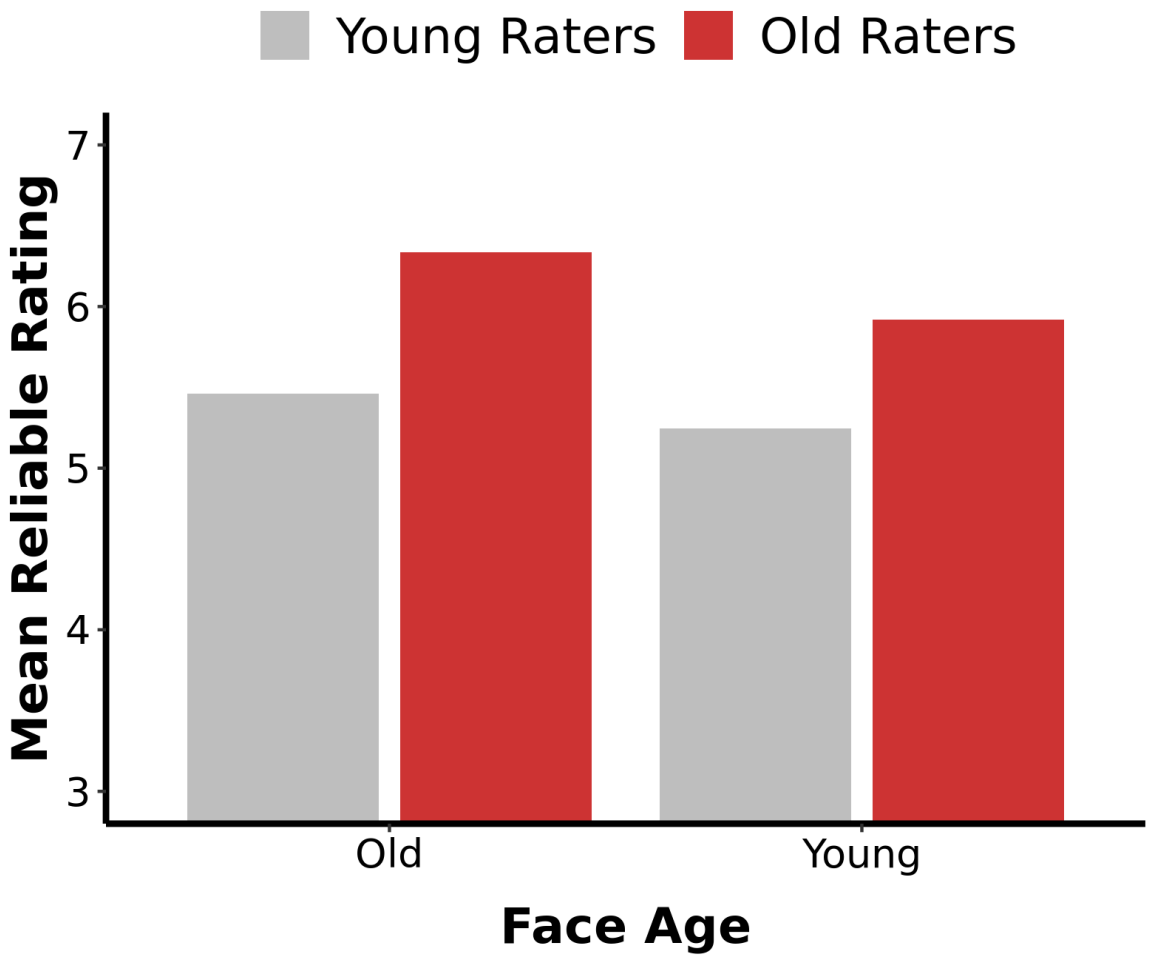

Figure 7: A bar graph to demonstrate the mean reliable ratings across the age group (young and old adults) and the face age (old and younger adult faces).

Pearson Correlation Co-efficient

Pearson's *r* was computed to measure the statistical associations between all traits, which can be seen in Table 1. Across all the variables, there were very strong positive correlations. The highest positive correlations were between the traits considerate and trustworthy, $r(58) = .962$, $p < .001$ as well as the traits considerate and loyal, $r(58) = .961$, $p < .001$.

Table 1: Pearsons Correlation across all traits from Experiment 2

	Trustworthy	**Considerate**	**Honest**	**Loyal**	**Reliable**
Trustworthy	–				
Considerate	.962***	–			
Honest	.956***	.942***	–		
Loyal	.954***	.961***	.956***	–	
Reliable	.920***	.872***	.908***	.912***	–

Note. N = 60, *** $p < .001$

Principal Component Analysis

To investigate the underlying structure of the trustworthiness dimension, a principal component analysis was conducted. By using the data from the present experiment, this analysis explores whether the trait trustworthiness is a single dimension with different interpretation that are closely related to one another, or whether there are distinct components in its dimension.

Bartlett's test of sphericity measured whether the traits included in the study's analysis are sufficiently related to each other. The Bartlett's test of sphericity indicated that the correlations between each trait were large enough that a principal component analysis is appropriate for the data; $X^2(3) = 575.26$, $p = .000$.

A Principal Axis Factor Analysis without rotation was carried out to determine the number of factors, also known as dimensions. The criteria used to determine this was a scree test (see Figure 8). The analysis indicated that all the traits belong to a single dimension.

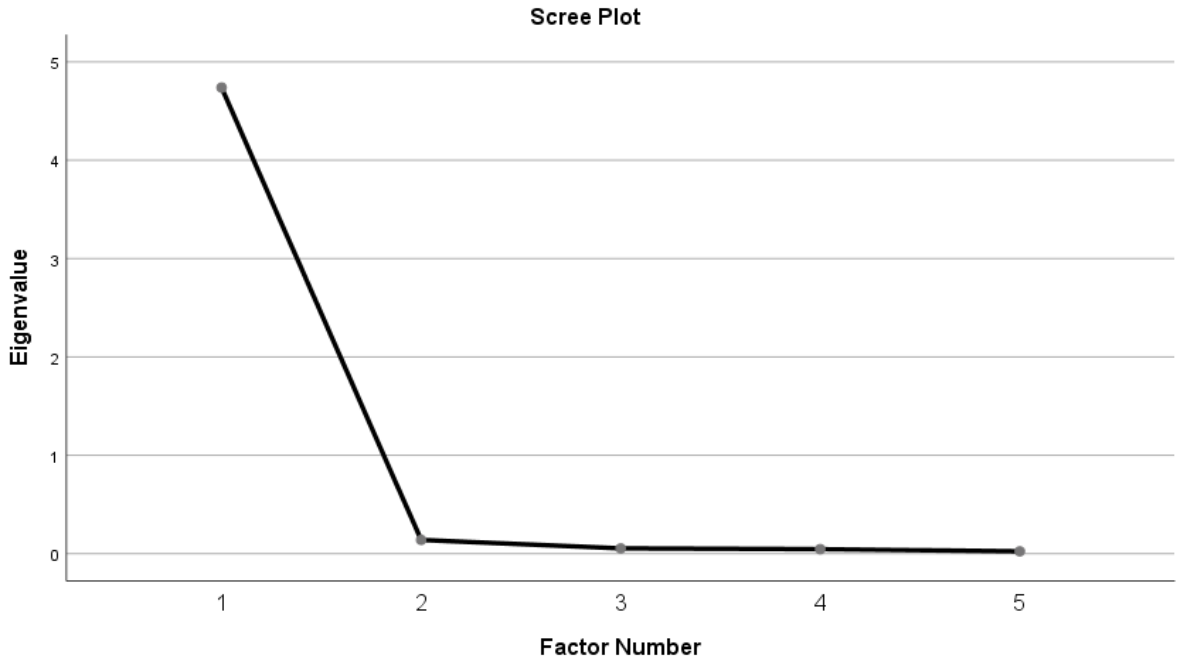

Figure 8: A scree plot generated from the Principal Axis Factor Analysis without rotation to determine the number of factors within the traits.

A Factor Matrix was also extracted from the Principal Axis Factor Analysis (see Table 2 below). The Factor Matrix shows how closely each trait is related to the dimension based on their factor loadings. Based on the analysis, it can be seen that the trait trustworthiness is the most related to the dimension.

Table 2: Factor Matrica from Principal Axis Factor Analysis

	Factor 1
Trustworthy	.985
Loyal	.982
Honest	.975
Considerate	.967
Reliable	.924

a. 1 factors extracted. 4 iterations required.

The overall variance that was captured by the dimension describes how much of the data from the present experiment is explained by the single dimension found from the scree test. The single dimension, also known as the extracted factor, explains 94.8% of the total variance (see Table 3). This means that a significantly large amount of the data is covered by this dimension.

Table 3: Total Variance Explained

	Initial Eigenvalues		
Factor	**Total**	**% of Variance**	**Cumulative %**
1	4.74	94.76	94.77
2	.14	2.78	97.55
3	.05	1.07	98.62
4	.04	.90	99.53
5	.02	.47	100.00

Extraction Method: Principal Axis Factoring

Face Averages

To visually demonstrate any age differences in facial perception of the traits measured in the experiment, 5 of the face images that received the highest ratings and 5 that received the lowest ratings were morphed to create an average low and high face. This was generated for each of the traits that were rated as well as each face age group category. The face averages were created using the software InterFace (Kramer, Jenkins, & Burton, 2016). Overall, 4 averages were created for each trait and therefore in total, 20 face averages were produced (see Figure 9).

Looking at the morphed average face images of each trait for each category, it can be seen that the majority look very similar. This indicates that many of the facial stimuli that was obtained to create the averages were the same across the traits. In fact, shown in Figure 10.B, 5 of the lowest rated face images were the exact same stimuli used to create the considerate, trustworthy, honest, and loyal older adult average face. The category with the most variation of stimuli across the traits are the highest rated older adult face averages, seen in Figure 10.D.

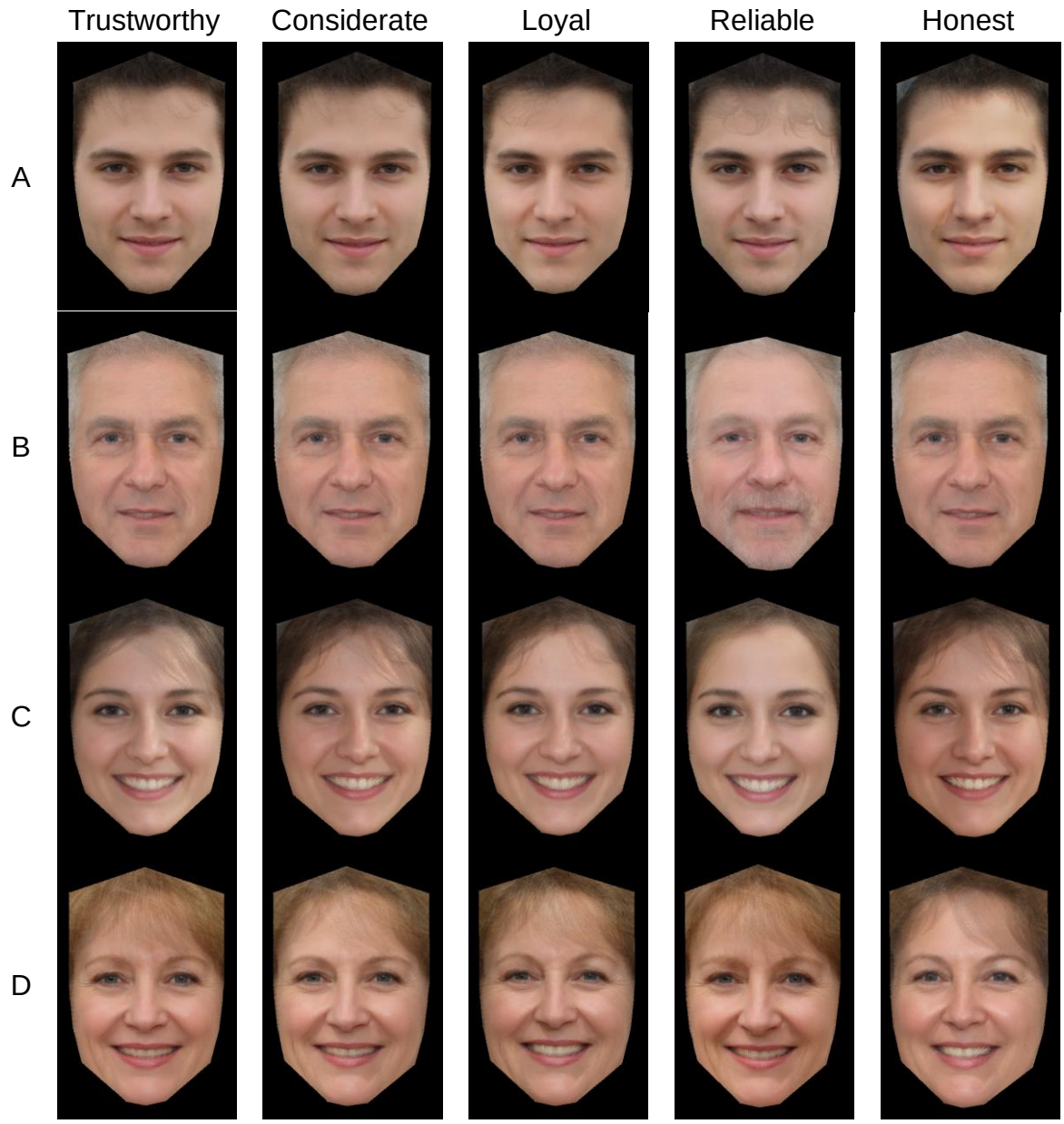

Figure 9: A model to represent the face averages that were generated using 5 of the highest rated and 5 of the lowest rated faces for each trait in Experiment 2. In each trait, there were 4 categories: (A) lowest younger adult face. (B) lowest older adult face. (C) highest younger adult face. (D) highest older adult face.

Discussion

The aim of this research was to investigate whether there are age differences between younger adults, aged 18 to 23, and older adults, aged 35 and above, in their first impressions of trustworthiness. Experiment 1 showed that participants had associated their understanding of trustworthiness to the following traits: reliable, loyal, considerate, and honest. In Experiment 2, these traits were applied together with the trait trustworthiness, as a measure for the unfamiliar faces in the rating task.

Data analysis of Experiment 2 revealed that there was a significant main effect of rater age for the traits honest, reliable, loyal, and trustworthy. This indicates that in

older adults provide higher overall ratings for these traits than younger adults, as well as showing an own-age bias, supporting the initial hypothesis. This finding is in line with previous research from Zebrowitz et al. (2013) and Castle et al. (2012), providing evidence to show that there are age differences in the way older and younger adults make trustworthiness judgements on faces. The study's indication thar older people are more prone to positively perceiving unfamiliar faces, reflects the understanding that increasing in age leads to the tendency to rely on others, due to their limited perspective of time. Therefore the likelihood of generalised trust in older adults becomes more frequent (Li & Fung, 2013). However, there was no significant effect of rater age for the trait considerate, in which this finding does not reflect the hypothesis that higher ratings will be shown in older compared to younger adults.

There was a significant main effect of face age for the trait reliable, showing that older faces were perceived as more reliable than younger faces across both age groups. Other studies by Bailey et al. (2015) and Li, Chen, Liu, and Qi (2022) have also demonstrated that older adult faces are perceived as more trustworthy than younger adult faces. It is interesting to see that within this research, the effect of face age was only found for the trait reliable. As well as this, based on the mean reliable ratings, this effect was more apparent within older adults. This is partially in line with the hypothesis that predicts higher rates in the traits associated with trustworthiness on older faces by older adult participants. No interaction was found for any of the traits, showing that the effects of face age and age group are independent from one another. The significantly strong positive correlations that were shown across all the traits, suggests that the way in which the traits are judged are similar and related to one another.

Validating the findings of previous research, the factor loadings from the Principal Component Analysis for Experiment 2, indicated that across all the traits, trustworthiness is the most appropriate label and best used to represent the dimension (Oosterhof & Todorov, 2008; Sutherland et al., 2013). The high positive correlations that were found between the different traits are also consistent with the Principal Components Analysis, showing a single particular dimension. This supports the validity of the trustworthiness interpretations from Experiment 1, as it alludes that the same type of judgement is made when rating unfamiliar faces for the traits associated with trustworthiness, as opposed to a series of distinct judgements.

The constructed face averages revealed that participants associated the same face when rating majority of the traits within each face age. That is to say, the highest and lowest rated older and younger adult faces across majority of the traits were similar. All of highest rated face averages for both older and younger adults were female and with a smiling expression, within all the traits. Alongside this, the lowest rated face averages for older and younger adults within the traits were all male with a neutral facial expression. This goes in line with previous research showing that female faces and faces with a smiling expression are perceived as being more trustworthy (Buchan, Croson, & Solnick, 2008; Krumhuber et al., 2007; Shinners, 2009). Contrary to this, it could be argued that these findings are a result of emotion overgenerlisation since the smiling faces are interpreted as more trustworthy, honest, reliable ecetera, despite the expression being a changeable feature (Oosterhof & Todorov, 2008). Therefore, using facial stimuli of only netural

expressions when replicating this study can help to see what fixed features are related to the traits associated with trustworthiness.

It is also important to consider why a large majority of the same faces were associated across all the traits measured in Experiment 2. One possible reason could be due the repeated exposure of the facial stimuli; this may have impacted the way in which participants socially evaluated each face. The order of the facial stimuli within each trait rating was randomised. However, due to the fact that each face was rated 5 times, participants may have started to recognise the facial stimuli. As a results, the association of one trait interpretation could have been associated with the judgement of another trait. This outcome could have affected the study's internal validity as the trait measurements would not be a reflection of a realistic first impression evaluation. In attempts to eliminate this order effect, future studies could allow a delay between the different trait ratings, which can reduce the occurrence of participants remembering the facial stimuli. This could be achieved having a distractor task in between each trait rating. In regards to further suggestion to collect more accurate judgments of trustworthiness in future research, the methodology of this study can be replicated with the addition of including a short video of each unfamiliar face, which can present the faces moving to capture them in different angles, reflectances and ambience. Through this, the processing from the participants becomes more realistic as it would replicate the actual experience of meeting an unfamiliar person. Relying on face portraits may lack mundane realism, which is the degree to which the study's approach is comparable to real world events.

Conclusions

In conclusion, there are some age differences between older and younger adults on their facial first impresssions of traits associated with trustworthiness, in line with related studies. Overall, older adults provide higher ratings and show an own age bias for the traits honest, reliable, loyal and trustworthy compared to younger adults. There was a consistent finding that the mean ratings from younger adults across the traits did not differ across face age. This suggests that this age difference stems from the cognitive and physical decline of older adults, which can lead to their increasing tendency to trust. Across both age groups, older faces are perceived as being more reliable than younger faces. The traits associated with trustworthiness found in Experiment 1 show very strong positive correlations from their measurements in Experiment 2. These are consistent with the single dimension found in the Principal Component Analysis; these findings are important as they highlight the efficacy of the original trustworthiness dimension based on social judgments found from previous research.

Acknowledgements

I would not have been able to complete this project without the priceless support and enthusiasm from my amazing supervisor, Mila. You have encouraged me from the very beginning to the very end. Your selflessness during this past year is something that I will forever be grateful for. I want to thank my parents for being my rocks even when we were facing difficulties whilst navigating the past year. Both of you believing the best of me has made this all worth it. A massive thank you to my housemates, cousins, and friends for allowing me to rant to them about my stresses. I am so

appreciative for all of you and your continuous reassurance and encouragement. You have all uplifted me during my weakest moments. And lastly, I want to thank my brother. I know that if he was here with us today, he would be screaming to say that he is proud of me. Rest in power Mehmet.

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