Negative perceptions of people with facial disfigurement depend on a general attitude rather than on specific concerns

Dr Anna Stone

University of East London

Corresponding author:

Dr Anna Stone, senior lecturer,

University of East London, Stratford, E15 4LZ

Email: A.Stone@uel.ac.uk

Orcid: 0000-0001-8883-9553

The assistance of Melanie Hinds, Kamile Stankeviciute, Donaleen Johnson, and Chisom Fadeyi (University of East London) in the data collection is gratefully acknowledged.

Conflicts of interest: None.

No financial support was received for the production of this work.

Data are available on application to the corresponding author.

Abstract

The well-established preference for people with typical faces over those with disfigured faces has several potential causes relating to perceptions of attractiveness, health, social skills, emotional stability, or contribution to society. The aim was to compare which of these facets of evaluation would have the stronger impact on the preference for typical faces over disfigured faces. A standard measure of unconscious associations, the Implicit Association Test (IAT), was employed in two experiments (n=110 and n=153) with participants drawn from the local community of a major metropolitan area of the UK. The IAT was implemented with different sets of words relating to the facets of attractiveness, health, social skills, emotional stability, and contribution, to investigate the association between these facets and the preference for typical over disfigured faces. A negative implicit association with facial disfigurement was observed for all facets in both experiments with no overall difference among the facets. There was reduced negativity for participants with personal acquaintance for all facets except attractiveness, suggesting that evaluation of attractiveness follows a more direct route than the other facets. These results suggest a broad, general evaluative negativity associated with facial disfigurement, rather than a negativity focused on particular fears or concerns. This implication is that interventions need not focus on any particular aspect of personality or ability as any positive presentation of people with facial disfigurement would enhance perceptions.

Key words: facial disfigurement; implicit association; contagiousness; social; emotional

Introduction

According to the organisation Changing Faces, which campaigns on behalf of individuals with facial disfigurement, there are over half a million people in the UK with a noticeable disfigurement to their face (Changing Faces, 2017). There are numerous empirical and anecdotal reports of negative reactions from members of the general public. Several factors potentially underlie these negative reactions to individuals with facial disfigurement including implicit perceptions of: disease, unattractiveness, lack of social skills, emotional instability, and inability to contribute in the workplace. Of these, only the fear of disease and contamination has been thoroughly investigated. Consequently, there is a lack of knowledge of which factors may have a greater impact on public attitudes. The present study aimed to fill this knowledge gap. The utility of this research lies in its potential contribution to efforts to persuade the general public to a more positive view of individuals with facial disfigurement. Such efforts could usefully be informed by a more complete picture of the sources of negative attitudes.

Faces are at the centre of social interaction. They provide evidence about individual identity, and about age, gender, emotion, mood, and intention, all of which can influence social interactions (Molnar-Szakacs, Uddin, & Heffernan, 2021). It is hard to hold a conversation in person and not to look at the other person's face. The face is a key component of physical attractiveness, on which society places a premium (e.g., Andreoni & Petrie, 2008). All of these observations highlight the importance of the face, compared to other body parts, in social communication.

Given the importance of the face in social interaction, it follows that facial disfigurement could be expected to have a negative impact on the observer. Previous research suggests that the perception of facial disfigurement elicits negative emotion, including disgust, anxiety, and fear, in the perceiver (e.g., Bradbury, 2012; Rankin & Borah, 2003; Ryan et al, 2012; Shanmugarajah, Gaind, Clarke, & Butler, 2012; Stone & Colella, 1996; Stone & Potton, 2014). These experiences of negative emotions can lead to

avoidance of individuals with facial disfigurement (e.g., Lawrence, Rosenberg & Feuerbach, 2007; Ryan, Oaten, Stevenson, & Case, 2012) and stigmatization (e.g., Parnell, Williamson, Lewis, F., & Slater, 2021). In addition, people with facial disfigurement are assumed to have poor competence on a number of traits (e.g., Bell & Klein, 2001; Hebl, Tickle, & Heatherton, 2000; Rankin & Borah, 2003; Stone & Wright, 2012). These unfavourable trait inferences may be what underlies observations of discrimination in employment (e.g., Madera & Hebl, 2012; Stone & Wright, 2013).

It is important to note that these negative perceptions of people with facial disfigurement are assumptions of the observer and do not reflect reality. Nonetheless, it seems they do influence behaviour, and so it would be useful to understand which factors are more strongly responsible. A number have been proposed: perceived unattractiveness; fear of disease; concerns about poor social skills; assumed emotional instability; and supposed inability to contribute in the workplace. Evidence for these will be considered.

Evaluations of attractiveness depend on the typicality or averageness of a face (e.g., Langlois & Roggman, 1990; Potter & Corneille, 2008; Rhodes, Halberstadt, Jeffery & Palermo, 2005). Since a disfigured face is necessarily atypical, and differs substantially from an average face, a disfigured face is likely to be regarded as low in attractiveness (e.g., Stone & Wright, 2012). Many behavioural studies yield results indicating that in modern society a premium is placed on attractiveness (e.g., Andreoni & Petrie, 2008; Dijker & Koomen, 2001; Judge, Hurst, & Simon, 2009; Solnick & Schweitzer, 1999) which would predict a generally negative attitude towards people with facial disfigurement.

A face may display an indicator of disease, for example, spots, rashes, skin blemishes, and unusual colouration are symptoms of many infectious diseases. Several studies suggest that facial disfigurement is interpreted as a possible indicator of disease (e.g., Ackerman, Becker, & Mortensen, 2009; Kurzban & Leary, 2001; Ryan et al, 2012; Schaller & Neuberg, 2012; Wolfe, Dunavan, & Diamond, 2007). A face with a disfigurement is likely to be asymmetrical, which may also be associated with disease.

Several researchers have reported that viewers have lower expectations of social skills, social confidence, and sociability, in people with facial disfigurement compared to those with typical faces. For example, viewers expected people with a small scar on their face (Bull & David, 1986) or a port-wine stain (Stevenage & McKay, 1999) to be less sociable and confident than those without these features. The presence of extensive scarring or feature displacement (Stone & Wright, 2012) shown in a still photograph led observers to give lower ratings of lower social skills and confidence. In contrast, Stevenage and Furness (2008) reported equivalent ratings of sociability for people depicted with and without a port-wine stain, although this could be due to social desirability motivation; Stone and Potton (2014) offered evidence that social desirability may be a factor in self-reported reactions to individuals with facial disfigurement. It is important to note that it should not be assumed that individuals with facial disfigurement are necessarily lacking in social skills and confidence. This is merely an assumption made by observers.

Emotional stability is another area in which people with facial disfigurement are regarded negatively. For example, Stone and Wright (2012) reported that individuals depicted with a facial disfigurement were evaluated as lower in emotional stability than those without. In contrast, Stevenage and Furness (2008) reported equivalent ratings of emotionality and strength of character for people depicted with and without a port-wine stain, though (as previously noted) an element of social desirability may have been involved.

The ability to contribute in the workplace or to society in general is another area of potential bias. The empirical evidence for this factor is mixed, however. Negative perceptions of employees with disabilities, for example that they are relatively unproductive, incompetent, and dependent, have been reported in several studies (e.g., Louvet, 2007; Louvet, Rohmer & Dubois, 2009). On the other hand, Stone and Wright (2012) reported that individuals with facial disfigurement were evaluated as highly as those without disfigurement on work-related competencies (though lower on social skills and emotional stability). A similar result was reported by Stevenage and McKay (1999). The observation that facial disfigurement

decreased the chances of being offered a job interview only where a high degree of customer contact was involved also offers mixed results (Stone & Wright, 2013). This factor was included in Experiment 1 for exploratory investigation.

An implicit association refers to an association between concepts in memory without the awareness of the individual. It can arise as the result of the repeated pairing of concepts, for example, the pairing of people with facial disfigurement with negative traits, that often occurs in the media (e.g., Wardle & Boyce, 2009). Individuals absorb these repeated pairings and form implicit associations without deliberate intent (e.g. Devine, 1989).These implicit associations can then influence behaviour, potentially leading to the observed negative reactions towards, and evaluations of, individuals with facial disfigurement.

Previous studies have reported negative implicit associations with facial disfigurement (e.g., Stone & Wright, 2012) but these have measured only a general evaluative dimension of good vs. bad, finding that faces with disfigurement are more readily associated with words denoting bad concepts than good. Previous studies have not measured specific factors, for example, facial disfigurement might be strongly implicitly associated with disease, but only weakly implicitly associated with emotional instability.

The present study aimed to investigate the strength of implicit association of facial disfigurement with the facets of attractiveness, health, ability to contribute to society, social skills, and emotional stability. Knowledge in this area could help to inform public campaigns aiming to reduce prejudice and discrimination by targeting those facets of evaluation that are more closely linked to negative attitudes. Alternatively, there may exist instead a broad general negativity, such that all facets of evaluation show equivalent prejudice against individuals with facial disfigurement.

A second question concerned whether participants who have a personal acquaintance with a facial disfigurement might show reduced negativity of their implicit associations. This possibility was suggested by the proposition that contact between an in-group and an out-group can be instrumental in reducing prejudice against the out-group

(e.g., Allport, 1954; Dovidio, Eller & Hewstone, 2011; Miller, Smith, & Mackie, 2004; Pettigrew & Tropp, 2006). The opportunity to observe an individual with facial disfigurement in everyday life, overcoming common challenges, enjoying an active social and romantic life, would likely result in a weakening of the culturally widespread negative associations. Stone and Fisher (2019) observed this phenomenon in an intervention study and it would be useful to provide a replication.

The present study used the Implicit Association Test (IAT) of Greenwald, McGhee and Schwartz (1998) to measure implicit associations between faces with disfigurements and the specific facets under investigation. The facets of attractiveness, health, and contribution to society, were investigated in Study 1. Study 2 replicated the investigation of attractiveness and health and also looked at social skills and emotional stability.

The hypotheses were as follows. H1 predicted that there would be negative implicit associations with facial disfigurement, for all participants and all facets. H2 predicted that the negativity would be reduced in those participants with a personal acquaintance with facial disfigurement. Potential differences among the facets with respect to the magnitude of implicit associations were investigated, but with no firm predictions.

Experiment 1

Method

Participants

Of the 110 participants who finished the experiment, 79 were females, 30 males, and one declined to specify their gender. Ages were specified in ranges: 73 participants were in the 18-24 range, 16 in the 25-31 range, 12 in the 32-38 range, 8 were over 39, and one participant declined to specify their age. There was a range of ethnicities: 33 were Asian, 44 Black, 23 White, 5 mixed ethnicity, and 5 declined to say. Personal acquaintance was roughly balanced with 47 participants declaring a personal acquaintance with a facial disfigurement and 62 having no acquaintance. Those who declared a personal acquaintance comprised: 20 family, 3 neighbours, 10 close friends, 12 distant friends, and 2 work

colleagues. The participants were biased towards younger ages, but note that a large study of 1000 adults reported no effect of gender, age, or socioeconomic status on discrimination against people with facial disfigurement (Goode, Ellis, Coutinho, & Partridge, 2008).

The required sample size to find an Implicit Association Test effect significantly different from zero in a one-sample t-test was calculated at 25 participants, using the mean IAT effect size of 0.6 from Stone and Wright (2012), power = 0.8, and alpha = 0.05. The required sample size to find a significant difference of at least 0.2 in the IAT effect size between different facets was calculated as 64 participants, using standard deviation of 0.35 (from Stone & Wright, 2012), power = 0.8, alpha = 0.5, and 3 paired comparisons. Data collection continued past this point to accommodate all those who volunteered to participate.

Design

There were two independent variables. The between-participants variable of personal acquaintance with an individual with a facial disfigurement was defined by participants and coded as Yes or No. The facet of evaluation was one of Attractiveness, Health, or Contribution, and was varied within participants. The dependent variable was the IAT effect, calculated according to the recommendations of Greenwald, Nosek and Banaji (2003).

Materials and Measures

Affective attitude towards individuals with facial disfigurement was measured using the Implicit Association Test (IAT) created by Greenwald et al (1998). The IAT has the advantage that it is difficult for naïve participants to intentionally manipulate their performance in the test (e.g., Banse, Seise, & Zerbes, 2001; Pruett & Chan, 2006; Steffens, 2004). A recent meta-analysis has calculated the test-retest reliability of the IAT as alpha = 0.79, which is satisfactory (Hofmann, Gawronski, Gschwender, Le, & Schmitt, 2005). Previous studies have employed the IAT to investigate negative implicit associations towards a variety of out-groups, including gay men (e.g., Banse et al., 2001) ethnic minorities (e.g., Baron & Banaji, 2006) and people with facial disfigurement (Stone & Wright, 2012).

The IAT is a standardised test in which two types of words, positive and negative, and two types of images, in this case disfigured and non-disfigured faces, are presented to participants for a binary categorisation. Each block of trials contains all the stimuli such that one type of words and one type of images share a response key and the other type of words and the other type of images share a different response key. The consistent finding in the IAT is that a block in which one response key is shared by positive words and members of an advantaged social group (and the other response key is shared by negative words and members of a disadvantaged social group) generates relatively fast responses. In contrast, a block in which a response key is shared by positive words and members of a disadvantaged social group generates relatively slow responses. This is a robust and reliable effect when participants are generally drawn from the advantaged social group, as in the present study. The IAT effect is calculated from the difference in response times in the two types of block according to a standard formula (Greenwald, Nosek, & Banaji, 2003). The magnitude of the IAT effect is believed to reflect the implicit associations held by the participant and is interpreted as a measure of implicit affective attitude,

In the present study, the TP-DN block presented stimuli so that the typical faces and positive words shared one response key, and the distinctive faces and negative words shared the other response key. The converse arrangement applied in the TN-DP block. Words and faces were presented alternately in each block in a randomised sequence. The face categories were defined by the terms “typical” and “distinctive” to avoid using the word “disfigured” that might have biased participants’ responses.

Attractiveness related words were: attractive, handsome, beautiful, pretty, repulsive, unsightly, hideous, ugly. Health related words were: healthy, vigorous, thriving, well, unhealthy, diseased, sick, poorly. Contribution related words were: useful, helpful, effective, valuable, useless, hindrance, ineffective, burden. In each condition the positive and negative words were balanced on word length and number of syllables.

The faces portrayed four individuals: two female and two male; two with displacement to the eye and two with scarring on the cheek. The faces have been used previously in other studies (Stone & Wright, 2012; Stone & Potton, 2014). The faces were created by morphing together photographs of individuals with facial disfigurement with other faces in order to disguise their identity. Please refer to Figure 1.

Figure 1 about here

Procedure

Participants were invited to take part in the experiment via social media (Facebook and email) and were given a description of the study. If they agreed to participate they were emailed the link to the website on which the study could be accessed. After giving informed consent, participants answered demographic questions, indicated whether they had an acquaintance with a facial disfigurement, and then completed the IAT. Each participant performed three versions of the IAT for the three facets of evaluation in a counterbalanced sequence. The project was given ethical approval by the Research Ethics Committee of the institution and it complied with the ethical principles of the APA.

The sequence of blocks in the IAT was always the same: (1) a practice set for categorisation of the words, (2) a practice set for categorisation of the faces, (3) a combined experimental set of words and faces, (4) another practice set with the response keys reversed for the faces, and (5) a second experimental block of words and faces. If the first experimental block was the TP-DN block then the second experimental block was the TN-DP block, and vice versa, counterbalanced over participants. In the practice blocks, participants were immediately informed if they made an error and invited to select the correct response key. Errors were accepted without notification in the experimental blocks. Participants were asked to respond quickly without making too many errors.

Results

The raw data were inspected and any participant with zero accuracy in any block (n = 26) was excluded. The distribution of these blocks with zero accuracy is as follows: one each in the Attractiveness, Health, and Contribution stereotypical blocks; 14 / 13 / 14 in the Attractiveness, Health, and Contribution counter-stereotypical blocks, respectively. The numbers do not sum to 26 because some participants had multiple blocks with zero accuracy. It is apparent that some participants failed to associate distinctive faces with positive words, making consistent errors throughout an entire block, despite having performed a set of practice trials with feedback. The errors were distributed evenly throughout the first and second experimental blocks (22 and 23, respectively).

The IAT effect was calculated according to the method recommended by Greenwald et al (2003). All the data from the experimental blocks were used. Three participants were excluded who had more than 10% of trials with responses faster than 300ms. Trials with a response time more than 10,000 were omitted (none). The mean of correct latencies was calculated for each block, and each error latency was replaced by the block mean of the correct latencies plus 600ms. The pooled standard deviation was calculated over the two experimental blocks. The IAT effect was calculated as the mean response time of the TN-DP block minus the TP-DN block, divided by the pooled standard deviation.

The IAT effect differed significantly from zero in a one-sample t-test for all three facets and for participants with and without personal acquaintance: all $t(109)>=3.38$, $p<0.005$. Please refer to Table 1 and Figure 2.

Anova was run with two factors: one within-participant factor of facet (Attractiveness, Health, Contribution), and one between-participant factor of acquaintance with a person with facial disfigurement (Yes or No). The dependent variable was the IAT effect. There was a main effect of facet, $F(2,106) = 5.20$, $p<0.01$, and the post-hoc contrast comparing Attractiveness against the other two facets revealed a significantly larger mean IAT effect for

Attractiveness, $F(1,107) = 10.35$, $p<0.005$. The contrast of Health with Contribution was non-significant, $F<1$. The main effect of acquaintance was significant, $F(1,107) = 6.07$, $p<0.02$, showing that participants who had an acquaintance with a disfigurement showed a weaker IAT effect than those without personal acquaintance. Please refer to Figure 2 and Table 1.

Table 1 about here

Although the interaction of acquaintance with facet was only marginally significant in the multivariate test, $F(2,106) = 2.53$, $p<0.09$, it was investigated for its potential theoretical significance. Figure 2 suggests that the effect of acquaintance, i.e. reduced negativity, was weaker for the Attractiveness facet than the other facets. Independent samples t-tests confirmed this: the effect of acquaintance was small and non-significant in the Attractiveness facet, $t(107)= 0.61$, ns, compared to a significant effect of acquaintance in the Contribution facet, $t(107)=2.86$, $p=0.005$, and the Health facet, $t(107)=2.08$, $p=0.02$ (all one-tailed tests). Please refer to Table 1. Thus, it appears that personal acquaintance with someone with a disfigurement resulted in reduced implicit negativity on the Health and Contribution facets. In contrast, implicit negativity for Attractiveness was not affected by personal acquaintance.

Figure 2 about here

A potential explanation is that perceptions of attractiveness depend on the similarity of a face to the generic face norm; a face closer to the norm is perceived to be more attractive. The generic face norm is based on a lifetime's experience with all encountered faces and would not differ according to acquaintance with individuals with facial disfigurement. This implies that perceptions of attractiveness would be the same for participants with and without personal acquaintance. Of course, attractiveness depends on a broader judgment of the whole person, including their words and actions as well as their appearance, but it cannot be denied that facial appearance plays a role.

It follows that an attractiveness judgment would be an easy and therefore a rapid decision. This predicts that responses on the attractiveness version of the IAT should be

faster than on the other facets. To investigate this possibility, the actual mean response times were examined (the IAT effect uses the difference between mean response times in the stereotypical and counter-stereotypical blocks). Anova revealed a main effect of facet, $F(2,108) = 6.02$, $p<0.005$, such that responses in the Attractiveness facet (M = 1168, SE = 26.8) were faster than Health (M = 1252, SE = 29.2) or Contribution (M = 1248, SE = 29.8).

To investigate the possible effect of age, gender, or ethnicity, separate Anova were performed with one factor of facet (Attractiveness, Health, Contribution) and a second factor of participant age, sex, or ethnicity. Age was recoded into 18-25 and 25+ to achieve roughly balanced numbers in each category. Ethnicity was recoded as Asian, Black, or White, and participants not fitting into one of these categories (mixed, other) were too few in number and were dropped. The main effect of facet remained: Attractiveness showed a stronger IAT effect than either Health or Contribution, which did not differ from each other. There was no main effect and no interaction involving any of the variables of age, sex, or ethnicity.

Discussion

The implicit association was negative for all facets, and for participants with and without any personal acquaintances with facial disfigurement, supporting Hypothesis 1. This suggests that there is a broad general negativity associated with facial disfigurement. There was reduced negativity in the group of participants with acquaintance, for the facets of health and ability to contribute to society, as predicted by Hypothesis 2. This is consistent with previous research showing that contact between in-group and out-group members results in lower levels of prejudice and negative attitudes.

In contrast, the IAT effect on the attractiveness facet was similar for participants with and without acquaintance, suggesting that perhaps evaluations of attractiveness depend little on familiarity with facial disfigurement. Responses were generally faster for the attractiveness facet, consistent with the explanation that the attractiveness evaluation is made relatively quickly by simple comparison of the perceived face to the face norm.

It is interesting to note the lack of any interaction with participant age, gender, or ethnicity. This supports the findings of Goode et al (2008) that attitudes towards facial disfigurement are ubiquitous and consistent in the general population.

Experiment 2

Experiment 2 aimed to replicate Experiment 1 with a new participant sample and some changes to the facets. The facet of Attractiveness was retained to investigate whether the similarity in implicit negativity between participants with and without personal acquaintance, observed in Experiment 1, would be replicable. The facet of Health was also retained as this facet has been most widely reported in the literature. The words in these two facets were changed to confirm that the IAT effects were specific to the facet and not to the particular words used. The facet of Contribution was dropped and was replaced with two new facets of Social, measuring social skills and confidence, and Emotion, measuring emotional strength and resilience. These last two facets were selected because of the empirical support for differential evaluation of disfigured and non-disfigured faces.

Another change in Experiment 2 was to vary the facet between participants, in order to remove any possible practice effects. Although the IAT is hard to fake for naïve participants (Banse et al, 2001; Pruett & Chan, 2006; Steffens, 2004) the repetition in Experiment 1 might have enabled some participants to gain control of their reactions.

Hypothesis 1 was that there would be a negative IAT effect for all facets of evaluation. Hypothesis 2, following the results of Experiment 1, was that there would be a reduced negativity of the IAT effect for participants who had a personal acquaintance with facial disfigurement for all facets except Attractiveness.

Method

Participants

153 participants finished the experiment: 33 females, 119 males, and one declined to specify. Ages were in ranges: 23 participants (15%) in the 18-24 range, 52 (34%) in the 25-

31 range, 34 (22%) in the 32-38 range, and 44 (29%) were over 39. There was a range of ethnicities: 14 were Asian, 7 Black, 120 White, 9 mixed ethnicity, and 3 declined to specify.

Some participants were recruited from the Changing Faces website in order to achieve a good balance of participants with and without acquaintance with facial disfigurement. There were 78 participants without acquaintance and 75 participants with, including family members (28), neighbours (6), close friends (10), distant friends (22), work colleagues (8), and one declined to specify.

Design

There were two independent variables, both varied between participants. Personal acquaintance with an individual with a facial disfigurement was defined by participants and coded as Yes or No. Facet was one of Attractiveness, Health, Social, and Emotion. The dependent variable was the IAT effect, calculated according to Greenwald et al (2003).

Materials and Measures

The IAT was used as in Experiment 1.

Attractiveness relevant words were: attractive, good-looking, beautiful, pretty, unattractive, unsightly, hideous, ugly. Health relevant words were: healthy, vigorous, wholesome, fit, infectious, diseased, sickly, ill. Social relevant words were: sociable, assertive, out-going, warm, unfriendly, timid, introverted, cold. Emotion relevant words were: stable, contented, secure, cheerful, unstable, bitter, needy, unhappy. In each facet the positive and negative words were balanced on word length and number of syllables. Words were selected with the aid of a thesaurus to represent the central concepts of each facet.

Procedure

The procedure was the same as Experiment 1, except that each participant performed only one version of the IAT for one of the facets. Each facet was presented to roughly equal numbers of participants in the Attractiveness, Health, Social, and Emotion conditions.

Results

The raw data were inspected and any participant with zero accuracy for words or faces in a block was excluded (n=25) due to the suspicion that the instructions had not been followed. No participants failed the exclusion criterion of having more than 10% of trials in which the response was faster than 300ms. Two trials with a response time more than 10,000 were omitted. The IAT effect was calculated according to the method recommended by Greenwald et al (2003), as in Experiment 1.

The IAT effect differed significantly from zero in a one-sample t-test for all four facets and for participants with and without personal acquaintance: all $t>=2.16$, $p<0.05$. Means and SDs are shown in Table 1.

Anova was run with two between-participant factors: facet (Attractiveness, Health, Social, or Emotion) and acquaintance with a facial disfigurement (Yes or No). There was no main effect of facet, $F(3,145) = 1.19$, ns, but there was a main effect of acquaintance, $F(1,145) = 16.89$, $p<0.001$, qualified by an interaction between facet and acquaintance, $F(3,145) = 2.73$, $p<0.05$, please refer to Figure 3 and Table 1.

Independent samples t-tests revealed that in the Attractiveness facet there was no difference in the magnitude of the IAT between those participants who had an acquaintance with a facial disfigurement and those who did not. In the Health, Social, and Emotion facets there was a significantly smaller IAT effect in the group of participants with acquaintance than the group without acquaintance, please see Table 1 and Figure 3. This supports hypothesis 2, which predicted that the IAT effect would be reduced for participants who had an acquaintance with facial disfigurement, except for the facet of attractiveness.

Figure 3 about here

Similar to Experiment 1, the actual mean response times were compared between the attractiveness facet and the other facets. Anova was performed using the Helmert

method to compare the Attractiveness facet against the other three facets combined. The specific contrast between the attractiveness facet and the others was significant, contrast estimate = -219, $p<0.02$, such that responses in the Attractiveness facet (M = 1217, SE = 73.5) were faster than in the Health facet (M = 1381, SE = 77.4) or the Social facet (M = 1478, SE = 80.5) or the Emotional facet (M = 1446, SE = 77.3).

Discussion

The results of Experiment 2 offered a replication of the results of Experiment 1. The Implicit Association Test effect was negative for all facets and for participants with and without acquaintance with facial disfigurement, supporting Hypothesis 1. There was a lower IAT effect for participants who had a personal acquaintance with facial disfigurement for the facets of Health, Social, and Emotion, but not for Attractiveness, supporting Hypothesis 2.

General Discussion

Experiment 1 suggested that implicit associations with facial disfigurement were negative for all three facets relating to attractiveness, health, and ability to contribute to society, and for participants with and without acquaintance with facial disfigurement. Experiment 2 found a similar result for the four facets relating to attractiveness, health, social skills and confidence, and emotional stability and resilience. That is, across the two experiments, participants showed a broad, general negativity associated with facial disfigurement covering a wide range of facets of evaluation.

In both experiments the magnitude of the negative implicit association was reduced in those participants with personal acquaintance, for all facets except attractiveness. This suggests that the ameliorating effect of acquaintance on negative implicit associations applies to a wide range of character trait inferences, but not to evaluations of attractiveness. This pattern supports the interpretation that participants responded to the particular facet under evaluation. Had they simply responded with a general affective attitude then the implicit association test (IAT) effect would have been similar across all the facets. At the

same time, the similarity of the IAT effect among the facets relating to trait inferences suggests that negative trait inferences are global rather than specific.

It is interesting to note the implicit associations were still negative even in these participants with personal acquaintance. This supports the general observation that in modern society a premium is placed on attractiveness. It would be difficult for anyone to overcome a widespread and persistent association of facial disfigurement with negative traits and outcomes that is prevalent in popular culture (e.g., Wardle & Boyce, 2009).

It appears that Attractiveness differs from the other facets of evaluation relating to inferred character traits. Attractiveness measures the degree of deviation from the facial norm, which is pronounced in a face with a disfigurement. A face with a disfigurement is likely to be asymmetrical, and asymmetrical faces are reliably evaluated as less attractive than symmetrical faces (e.g., Scheib, Gangestad, & Thornhill, 1999). This would imply a direct evaluation of attractiveness on a perceived face, consistent with the relative speed of evaluation of attractiveness that was observed in the present study. This interpretation is supported by several experiments which have reported that facial attractiveness is a rapid and spontaneous judgment (e.g., Halit, de Haan, & Johnson, 2000; Luo, Rossion, & Dzhelyova, 2019; Werheid, Schacht, & Sommer, 2007; Zhang & Deng, 2012) including EEG studies (e.g., Huffmeijer, Barak-Levy, & Rinne, 2020; Parsons, Young et al, 2013). The Bruce and Young (1986) model of face processing explains that the face is perceptually encoded before semantic information is retrieved.

The face norm will be based on a lifetime of experience in perceiving faces in the general population, and so is unlikely to differ according to personal acquaintance with an individual with a facial disfigurement. In contrast, the inferences of character traits of people with facial disfigurement can be more easily challenged by observations of personal acquaintances. This line of reasoning explains why the negative implicit association with

facial disfigurement was reduced in those participants with personal acquaintance for the facets corresponding to character traits, but not for the facet of Attractiveness.

The magnitude of the IAT effect was similar for all facets other than Attractiveness in both experiments, suggesting a broad, general negativity on inferred character traits. It is useful to consider the process by which inferred character traits are retrieved. The perceptual process starts with the encoding of a perceived face, which gives rise to categorisation, which then enables the retrieval from semantic memory of expected traits associated with members of the category. A recent paper (Stone, 2021) has offered evidence that disfigured faces form a distinct perceptual category along with gender, age, ethnicity, and emotional expression (e.g., Calder, Young, Etcoff, & Rowland, 1996; Levin & Beale, 2000; Angeli, Davidoff, & Valentine, 2008). In the present study, the allocation of the perceived face to the category “disfigured” resulted in the retrieval of negative associations built up through repeated exposures to stereotypes prevalent in popular culture.

The effect of personal acquaintance is to add a layer of experience on top of the learnt associations. This personal experience is activated alongside the learnt associations and will modify them, so the inferred character traits are less negative. The results of the present study are substantially in agreement with the contact hypothesis of Allport (1954). This states that under appropriate conditions, interpersonal contact can help to reduce prejudice and discrimination by providing the opportunity to replace generalisations and over-simplifications (stereotypes) with more nuanced and positive information. Similarly, the dual process model of Devine (1989) explains that the perception of a stimulus activates the traits frequently associated with the stimulus in the media and popular culture, but the automatic evaluation can be overridden by a controlled cognitive response (and see also Pryor, Reeder, Yeadon, & Hesson-McInnis, 2004; Gawronski & Bodenhausen, 2006).

The contact hypothesis refers to appropriate conditions for the reduction in prejudice. In the present study the type of interpersonal contact included family members, friends, work

colleagues, and neighbours, but it was not explored in depth and so there could have been considerable variation. Nonetheless, it seems likely that at least some of the contact would have involved shared goals and an opportunity to consider different perspectives. This is the type of contact theorised to promote more positive views of out-group members.

The pattern of results was similar between Experiment 1, in which participants were ethnically diverse and tended to fall into younger age groups, and Experiment 2, in which participants were spread over a range of ages but were less ethnically diverse. This suggests that negative implicit associations with facial disfigurement are widespread in the general population (see Goode, et al, 2008).

The magnitude of the IAT effects for inferred traits ranged from 0.35 to 0.49 in the participants with personal acquaintance, and from 0.75 to 1.22 for participants without personal acquaintance. These appear large compared to previous studies: 0.43 for wheelchair users (Stone & Wright, 2012), 0.35 for older workers compared to younger workers (Kleissner & Jahn, 2020), and 0.22 for gender associations with brilliance (Storage, Charlesworth, Banaji, & Cimpian, 2020). However, they were broadly similar to the effect size of 0.60 in Stone and Wright 2012). The observation of relatively large effects of facial disfigurement may reflect the premium placed on attractiveness (e.g., Andreoni & Petrie, 2008; Dijker & Koomen, 2001; Judge et al, 2009; Solnick & Schweitzer, 1999).

The reduced negativity of associations observed in participants with personal acquaintance with facial disfigurement suggests that campaigns aimed at providing virtual contact could be effective in improving attitudes and reducing negative stereotypes. One previous study investigating the effectiveness of a brief intervention, focusing specifically on evaluations of social skills and emotional resilience, produced positive results (Stone & Fisher, 2019). This study suggested that even a short (90 second) video or audio clip in which a person with facial disfigurement introduced themself and talked about their life, their work, and their relationships, could effect a change in attitudes. It may be that people with

facial disfigurement have so little representation in the media (Wardle & Boyce, 2009) and in popular culture (Pausch, Herzberg, Wirtz, Hemprich, Dhanuthai, Hierl, & Pitak-Arnnop 2012) except in a negative way that a small positive representation can have a large effect.

The observation of a broad, general negativity arising from the perception of facial disfigurement suggests that presenting any positive image of people with facial disfigurement could be effective in improving attitudes and reducing negative stereotypes. The positive image could be focused on any aspect of health, social skills, emotional stability and resilience, or ability to contribute to society, or on any other inferred character trait, since the effect of acquaintance was similar across all these traits.

One specific application is in employment. Discrimination in the job application process was reported by Stone & Wright (2012) but this is illegal in the UK since severe disfigurement was classed as a disability under the Equality Act (2010). Better provision of information to employers on how to avoid unconscious bias in the recruitment process could help to prevent discrimination. Campaigning organisations might work with major employers to help to combat implicit associations that are likely to be present.

The best way to reach large numbers of people would be via the popular media. Garrisi, Janciute and Johanssen (2018) note the “general stereotypical and sensationalised manner” (p7) in which people with facial disfigurement are portrayed. This could be improved by employing more people with facial disfigurement as reporters to improve their visibility in a role not specific to their facial disfigurement. In a fictional setting people with disfigurement should be shown as ordinary characters with everyday concerns not specifically focused on their disfigurement. These actions would help to normalise disfigurement and emphasise the personality of the individual, not only their appearance. The sense of “otherness” could be reduced so that people with facial disfigurement are perceived to be “one of us”.

When facial disfigurement is the central issue, the individuals depicted could be given more control over how they are portrayed, and journalists and reporters could receive

training in how to portray disfigurement in a sensitive and respectful manner. More effort could be made to present disfigurement as a mismatch between the appearance of an individual and the expectations of others, rather than an intrinsic property of the individual.

Changing Faces, in their Face Equality on Television campaign, asked that programme makers and writers should stop using facial disfigurement as a lazy plot device to establish a character as a bitter and twisted individual. This plays into the implicit association of beauty with goodness (e.g., Eagly et al, 1991).

Future research could investigate the effect of closeness of the personal acquaintance with facial disfigurement. It might be predicted that a closer acquaintance, perhaps a family member or close friend, would have more impact on beliefs and attitudes than a more distant acquaintance. It may be the case that a measure of time spent in proximity, or undertaking a joint task, would have an effect on implicit associations. Alternatively, the number of personal acquaintances may prove to be the crucial factor.

Some limitations should be noted. A set of four faces with disfigurement were used in the present study, representing significant scarring on the check or the displacement of the position of one eye. Other types of disfigurement could be investigated to establish the generality of the effects and their possible dependence on the magnitude of the facial disfigurement. Only five facets of evaluation were examined so it is possible that other facets may give rise to different results, though these were the main facets found in the literature. One potentially interesting facet is warmth, on which people with facial disfigurement have been observed to score more highly than those without (e.g., Stone & Wright, 2012).

In conclusion, these two experiments confirmed that implicit associations with facial disfigurement are negative, across a wide range of character traits and abilities and for perceivers with and without personal acquaintance with facial disfigurement. This negativity is reduced for perceivers who have a personal acquaintance with facial disfigurement for a wide range of traits but not for attractiveness.

References

Allport, G. (1954). *The nature of prejudice*. Oxford: Addison-Wesley.

Ackerman JM, Becker DV, Mortensen CR, Sasaki T and Neuberg SL (2009) A pox on the mind: Disjunction of attention and memory in the processing of physical disfigurement. *Journal of Experimental Social Psychology,* 45: 478-485

Andreoni, J. & Petrie, R. (2008). Beauty, gender and stereotypes: evidence from laboratory experiments. *Journal of Economic Psychology,* 29, 73–93.

Angeli, A., Davidoff, J., & Valentine, T. (2008). Face familiarity, distinctiveness, and categorical perception. *The Quarterly Journal of Experimental Psychology*, 61(5), 690-707.

Banse, R., Seise, J., & Zerbes, N. (2001). Implicit attitudes towards homosexuality: Reliability, validity and controllability of the IAT. *Experimental Psychology*, 48, 145–160.

Baron, A. S. & Banaji, M. R. (2006). The development of implicit attitiudes. *Psychological Science*, 17, 53-58.

Bell, B. S., & Klein, K. J. (2001). Effects of disability, gender, and job level on ratings of job applicants. *Rehabilitation Psychology*, 46, 229–246.

Bradbury, E. (2012). Meeting the psychological needs of patients with facial disfigurement. British Journal of Oral and Maxillofacial Surgery, 50(3), 193-196.

Bruce, V. & Young, A. (1986). Understanding face recognition. *British Journal of Psychology*, 77, 305-327.

Bull, R., & David, I. (1986). The stigmatizing effect of facial disfigurement. *Journal of Cross-Cultural Psychology*, 17, 99–108.

Calder, A. J., Young, A. W., Perrett, D. I., Etcoff, N. L., & Rowland, D. (1996). Categorical perception of morphed facial expressions. *Visual Cognition*, *3*(2), 81-117.doi:10.1080/713756735

Changing Faces (retrieved from the www August 2015). http://www.changingfaces.org.uk/downloads/media campaign card website.pdf

Connor, K.M., Davidson, J., & Churchill, L.E.(2000) Psychometric Properties of the Social Phobia Inventory. *British Journal of Psychiatry*,176, 379-386.

Devine, P. G. (1989). Stereotypes and prejudice: Their automatic and controlled components. *Journal of Personality and Social Psychology*, 56, 5-18.

Dijker, A. J. & Koomen, W. (2001). The influence of perceived suffering and vulnerability on the experience of pity. *European Journal of Social Psychology*, 31, 659-676.

Dovidio, J. F., Eller, A., & Hewstone, M. (2011). Improving intergroup relations through direct, extended, and other forms of indirect contact. *Group Processes and Intergroup Relations*, 14, 147-160.

Duncan, L. A., Schaller, M., & Park, J. H. (2009). Perceived vulnerability to disease: Development and validation of a 15-item self-report instrument. *Personality and Individual Differences*, *47*, 541-546.

Eagly, A.H., Ashmore, R.D., Makhijani, M.G. & Longo, L.C.. (1991) What Is Beautiful Is Good, But…: A Meta-Analytic Review of Research on the Physical Attractiveness Stereotype. *Psychological Bulletin*, 110(1), 109–128.

Garrisi, D., Janciute, L. & Johanssen, J. (2018) *Appearance, Discrimination and the Media: Portraying Facial Disfigurement Fairly in the News*. London: University of Westminster Press.

Gawronski, B. & Bodenhausen, G. V. (2006). Associative and propositional processes in evaluation: an integrative review of implicit and explicit attitude change. *Psychological Bulletin*, 132, 692-731.

Goode, A., Ellis, R., Coutinho, W., & Partridge, J. (2008). *The Face Equality Campaign – The Evidence: Public Attitudes Survey*. London, England: Changing Faces. Retrieved from http://www. changingfaces.org.uk/downloads/FE Campaign, Public Attitudes survey.pdf

Greenwald, A. G., McGhee, D. E. & Schwartz, J. L. K. (1998) Measuring individual differences in implicit cognition: The implicit association test. *Journal of Personality and Social Psychology*, 74, 1464-1480.

Greenwald, A.G., Nosek, B.A. & Banaji, M.R. (2003). Understanding and using the Implicit Association Test: I. An improved scoring algorithm. *Journal of Personality and Social Psychology*, 85, 197-216.

Halit, H., de Haan, M, & Johnson, M.H. (2000). Modulation of event-related potentials by prototypical and atypical faces. *Neuroreport*, 11, 1871-1875.

Hebl, M. R., Tickle, J., & Heatherton, T. F. (2000). Awkward moments ininteractions between nonstigmatized and stigmatized individuals.In T. Heatherton, R. Kleck, M. Hebl, & J. Hull (Eds.), *The social psychology of stigma* (pp. 275–306). New York, NY: Guilford Press.

Hofmann, W., Gawronski, B., Gschwendner, T., Le, H., & Schmitt, M. (2005). A meta-analysis on the correlation between the Implicit Association Test and explicit self-report measures. *Personality and Social Psychology Bulletin*, 31, 1369-1385.

Huffmeijer, R., Barak-Levy, Y., & Rinne, R.C.A. (2020) Attractiveness and neural processing of infant faces: Effects of facial abnormality but not dopamine. *Physiology and Behaviour*, 222, doi:10.1016/jphysbeh.2020.112937

Molnar-Szakacs, I., Uddin, L.Q., & Heffernan, M.B. (2021) The face behind the mask: The future of interpersonal interaction. *Neuron*, 109, 1918-1920. ISSN 0896-6273, https://doi.org/10.1016/j.neuron.2021.05.030.

Judge, T. A., Hurst, C. & Simon, L. S. (2009). Does it pay to be smart, attractive, or confident (or all three)? Relationships among general mental ability, physical attractiveness, core self-evaluations, and income. *Journal of Applied Psychology*, 94, 742-755.

Kleissner, V. & Jahn, G. (2020) Dimensions of Work-Related Age Stereotypes and In-Group Favoritism. *Research on Aging*, 42,126-136. https://doi.org/10.1177%2F0164027519896189

Kurzban, R. & Leary, M.R. (2001) Evolutionary origins of stigmatization: The functions of social exclusion. *Psychological Bulletin*, 127, 187-208.

Langlois, J.H. & Roggman, L.A. (1990) Attractive Faces Are Only Average. *Psychological Science,* 1,115-121.

Lawrence JW, Rosenberg LE and Fauerbach JA (2007) Comparing the body esteem of pediatric survivors of burn injury with the body esteem of an age-matched comparison group without burns. *Rehabilitation Psychology* 52: 370–379.

Levin, D. T., & Beale, J. M. (2000). Categorical perception occurs in newly learned faces, other-race faces, and inverted faces. *Perception & Psychophysics*, 62(2), 386-401.

Louvet, E. (2007). Social judgment toward job applicants with disabilities: Perception of personal qualities and competences. *Rehabilitation Psychology*, 52, 297–303.

Louvet, E., Rohmer, O., & Dubois, N. (2009) Social judgment of people with a disability in the workplace: how to make a good impression on employers. *Swiss Journal of Psychology*, 68, 153-159.

Lundgren, J.D., Anderson, D.A., & Thompson, J.K. (2004) Fear of negative appearance evaluation: Development and evaluation of a new construct for risk factor work in the field of eating disorders. *Eating Behaviours*, 5, 75-84.

Luo, Q., Rossion, B., & Dzhelyova, M. (2019) A robust implicit measure of facial attractiveness discrimination. *Social Affective and Cognition Neuroscience*, 14, 737-746.

Madera, J. M., & Hebl, M. R. (2012). Discrimination against facially stigmatized applicants in interviews: An eye-tracking and face-to-face investigation. *Journal Of Applied Psychology*, *97*(2), 317-3301. doi:10.1037/a0025799

Miller, D. A., Smith, E. R., & Mackie, D. M. (2004). Effects of intergroup contact and political predispositions on prejudice: Role of intergroup emotions. *Group Processes & Intergroup Relations*, *7*, 221–237.

Parnell, J., Williamson, H., Lewis, F., & Slater, A. (2021). Children's attitudes and friendship behaviours towards socially stigmatised appearances: Do attitudes vary according to type of difference?. Stigma and Health, 6, 344-353. https://doi.org/10.1037/sah0000287

Parsons, C.E., Young, K.S., Mohseni, H., Woolrich, M.W., Thomsen, K.R., Joensson, M., Murray, L., Goodacre, T., Stein, A., & Kringelbach, M.L. (2013) Minor structural abnormalities in the infant face disrupt neural processing: A unique window into early caregiving responses, *Social Neuroscience*, 8, 268-274.

Pausch, N.C., Herzberg, P.Y., Wirtz, C., Hemprich, A., Dhanuthai, K., Hierl, T. & Pitak-Arnnop, P. (2012) German amimal terms for oral cleft deformity: A Leipzig survey. *Journal of Cranio-Maxillo-Facial Surgery*, 40, 236-242.

Pettigrew, T. F., & Tropp, L. R. (2006). A meta-analytic test of intergroup contact theory. *Journal of Personality and Social Psychology*, *90*, 751–783.

Potter, T. & Corneille, O. (2008) Locating attractiveness in the face space: Faces are more attractive when closer to their group prototype. *Psychonomic Bulletin & Review* **15,** 615–622.

Pruett, S. R., & Chan, F. (2006). The development and psychometric validation of the disability attitude implicit association test. *Rehabilitation Psychology*, 51, 202–213.

Pryor, J.B., Reeder, G.D., Yeadon, C. & Hesson-McInnis, M. (2004). A dual-process model of reactions to perceived stigma. *Journal of Personality and Social Psychology*, 87, 436-452.

Rankin, M., & Borah, L. B. (2003). Perceived functional impact of abnormal facial appearance. *Plastic and Reconstructive Surgery*, 111, 2140-2146.

Rhodes, G., Halberstadt, J., Jeffery, L., & Palermo, R. (2005). The Attractiveness of Average Faces is not a Generalized Mere Exposure Effect. *Social Cognition, 23*, 205-217.

Ryan, S., Oaten, M., Stevenson, R. J., & Case, T. I. (2012). Facial disfigurement is treated like an infectious disease. *Evolution and Human Behavior*, 33(6), 639-646.

Schaller M and Neuberg SL (2012). Danger, disease and the nature of prejudice(s). In J.M. Olson & M.P. Zanna (Eds) *Advances in Experimental Social Psychology,* 46: 1-54.

Scheib, J.E., Gangestad, S.W., & Thornhill, R. (1999) Facial attractiveness, symmetry, and cues of good genes. *Proceedings of the Royal Society of London (B)*, 266, 1939-1917.

Shanmugarajah, K., Gaind, S., Clarke, A., & Butler, P. M. (2012). The role of disgust emotions in the observer response to facial disfigurement. *Body Image*, *9*(4), 455-461. doi:10.1016/j.bodyim.2012.05.003

Solnick, S. J. & Schweitzer, M. E. (1999). The influence of physical attractiveness and gender on ultimatum game decisions. *Organizational Behaviour and Human Decision Processes*, 79, 19-215.

Steffens, M. C. (2004). Is the Implicit Association Test immune to faking? *Experimental Psychology*, 51, 165–179.

Stevenage, S.V. & Furness, C. (2008). The influence of disfigurement on conversational recall. *Journal of Health Psychology*, 13, 1113-1118.

Stevenage, S. V. & McKay, Y. (1999). Model applicants: The effect of facial appearance on recruitment decisions. *British Journal of Psychology, 90*, 221-234.

Stone, A. (2021) Facial disfigurement, categorisation, and disgust sensitivity. *Visual Cognition*, 29, 73-90.

Stone, D. L., & Colella, A. (1996). A model of factors affecting the treatment of disabled individuals in organizations. *Academy of Management Review*, 21, 352–401.

Stone, A. & Fisher, V. (2019). Changing negative perceptions of individuals with facial disfigurement: The effectiveness of a brief intervention. *Basic and Applied Social Psychology*, 42, 341-353.

Stone, A. & Potton, A. (2014). Emotional responses to disfigured faces: the influences of perceived anonymity, empathy, and disgust sensitivity. *Basic and Applied Social Psychology*, 36, 520-532.

Stone, A. & Wright, T. (2012) Evaluations of people depicted with facial disfigurement compared to those with mobility impairment. *Basic and Applied Social Psychology*, 34: 212-225.

Stone, A. & Wright, T. (2013) When you face doesn't fit: employment discrimination against people with facial disfigurements. *Journal of Applied Social Psychology*, 43, 515-526.

Storage, D., Charlesworth, T.E.S., Banaji, M.R., & Cimpian, A. (2020) Adults and children implicitly associate brilliance with men more than women. *Journal of Experimental Social Psychology*, 90, https://doi.org/10.1016/j.jesp.2020.104020.

Wardle, C. & Boyce, T. (2009) *Media coverage and audience reception of disfigurement on television*. London: The Healing Foundation.

Werheid, K., Schacht, A. & Sommer, W. (2007) Facial attractiveness modulates early and late event-related brain potentials. *Biological Psychology,* 76, 100–108.

Wolfe, N.D., Dunavan, C.P. and Diamond, J. (2007) Origins of Major Human Infectious Diseases. *Nature*, 447, 279-283.

Zhang, Z. & Deng, Z. (2012) Gender, facial attractiveness, and early and late event-related potential components. *Journal of Integrative Neuroscience*, 11, 477-487.

Appendix: figures and tables

	With acquaintance Mean (SD)	Without acquaintance Mean (SD)	t-value for comparison with/without acquaintance	p value	Effect size
Experiment 1					
Attractiveness	0.75 (0.58)	0.81 (0.49)	0.61	ns	0.11
Health	0.40 (0.81)	0.75 (0.47)	2.08	0.02	0.53
Contribution	0.49 (0.71)	0.77 (0.68)	2.86	0.005	0.40
Experiment 2					
Attractiveness	1.05 (0.96)	0.97 (1.07)	0.25	ns	-0.08
Health	0.39 (0.68)	1.01 (0.80)	2.59	0.014	0.84
Social	0.35 (0.57)	1.13 (0.59)	3.95	0.001	1.34
Emotion	0.40 (0.81)	1.22 (0.71)	3.30	0.002	1.08

Table 1: mean IAT effect for each facet, for participants with and without personal acquaintance, and the results of t-tests comparing mean IAT effect between the groups of participants with and without personal acquaintance. Effect size for the t-tests is measured as Cohen's D.

Figure 1: disfigured faces used in Experiment 1 and 2

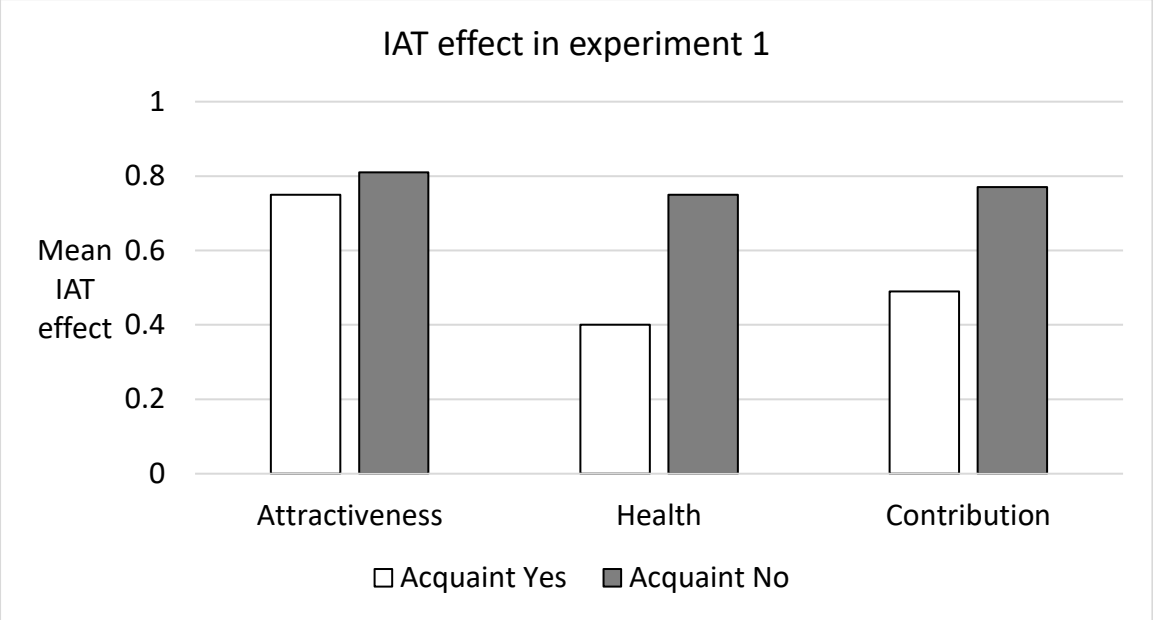

Figure 2: Implicit Association Test effect for the three facets in Experiment 1, according to whether the participant had an acquaintance with a disfigurement.

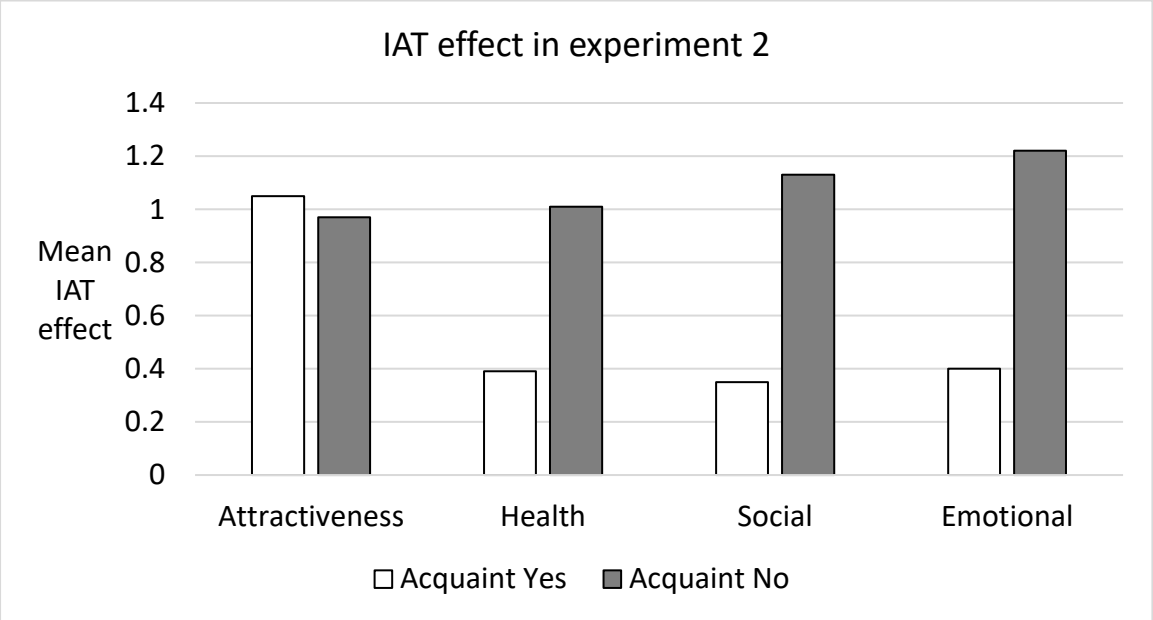

Figure 3: Implicit Association Test effect for the four facets in Experiment 4, according to whether the participant had an acquaintance with a disfigurement.