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How Disgust Affects Romantic Attraction: How our Moods Affect our Judgments of Attractiveness

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Abstract

Facial attractiveness is an important part of our initial judgments of people and in our ability to determine their compatibility as a mating partner. Just as mating is evolutionarily important, the emotion disgust is one of the most evolutionarily beneficial emotions as it helps keep us away from poisonous and possibly infectious substances or foods. We instinctively avoid people with facial scars and other facial deformities because these are seen as a sign of illness or generally poor well-being. Facial attraction is one component of how we choose a mate. The current experiment examined whether or not being disgusted created an avoidance behavior, in the form of lower attractiveness scores, of individuals who are not scarred similar to our desire to avoid people with scars. Disgust was induced by showing participants a series of disgusting photos prior to making attractiveness ratings of potential mating targets. It was found that individuals who were disgusted did not rate photos significantly different than participants who received a neutral mood induction or a hygienic mood induction. Possible explanations for this finding such as the hygienic induction making participants more aware of pathogens instead of feeling clean are discussed. Future research opportunities into areas like facial surgery are also discussed.

Keywords: Attraction, Mood Induction, Disgust, Scars, Facial Attractiveness
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How Disgust Affects Romantic Attraction: How our Moods Affect our Judgments of Attraction

Imagine getting on to the subway during rush hour; the car is so crowded you can barely stand comfortably. As you meander your way through the crowd looking for a place to sit, you come across a man sitting by himself with space for at least two people to sit near him. You thank your good fortune and move to sit next to the man but then he turns and you see his horribly scarred face, making you second guess your decision to sit next to him. You may feel guilty for allowing someone's physical deformity to color your judgment of him, but avoiding facially scarred people is common. Houston and Bull (1994) conducted a study looking at this phenomenon by having a confederate sit on a busy subway car and recording the interactions of people with the man and more importantly, the seats around him. They found that no one was willing to sit next to the disfigured man even on the crowded subway car. But why would people avoid sitting next to this man? The answer may be found in the emotion of disgust and its powerful behavior-moderating abilities.

The current study examines these behavior-moderating abilities of disgust in terms of romantic attraction. Theories such as the Appraisal Tendency Framework (Lerner & Keltner, 2000) indicate that emotions can affect our process of making judgments and decisions. Because determining how attractive you find someone is a judgment, it is possible that emotions could affect how attractive we find someone similarly to how they can affect other types of judgments and decision-making. When you couple this framework with known behavior-moderating abilities of disgust through disease avoidance behaviors, there is a strong case that disgust could in fact change how we judge attractiveness of faces. The disease avoidance hypothesis (Oaten, Stevenson, & Case, 2009) of disgust also can explain the reluctance of people to sit next to the person on the bus with the facial scarring, as some facial scars are indicative of contagious
diseases. This could possibly explain the avoidant behavior and social stigmatization individuals with facial scars endure.

Facial scars are an important part of the current study because of their relationship with disgust and some disease avoidant behaviors disgust can create. Research has shown that facial scars are seen as less attractive by humans, especially if they resemble a scar associated with a contagious disease (e.g., Houston & Bull, 1994; Kurzban & Leary, 2001; Ryan, Oaten, Stevenson, & Case, 2012). Facial attraction research has also indicated that facial scars can impact facial symmetry and how prototypical a face looks; both of which are factors in how attractive a face is seen (e.g., Halberstadt & Rhodes, 2000; Johnson, Hagel, Franklin, Fink, & Grammer, 2001; Penton-Voak et al., 2001; Schieb, Gangestead, & Thornhill, 1999). Related to facial attraction is how people perceive human faces. Research indicates that we perceive the human face as a whole instead of by individual parts of the face (e.g., Diamond & Carey, 1972; Tanaka & Farah, 1993; Tanaka & Sengco, 1997). The perception of the face as a whole is crucial to understand in any discussion of facial attractiveness. Facial scarring, just like the disgust mood induction, should negatively impact the attractiveness ratings participants give to the photos they are rating in this experiment.

**Appraisal tendency framework**

The ability of emotions to affect our judgments is a part of the Appraisal Tendency Framework (Lerner & Keltner, 2000). The Appraisal Tendency framework theorizes that emotions exert specific effects on judgment and choice in problem solving until the problem that caused the initial emotion is resolved. Initial evidence in the field has shown that emotions, like anger and sadness, change perceptions of how much control people have over a situation. Lerner and Keltner (2001) conducted a series of four studies on how emotions can change an
individual's decision-making process. Three of the studies used participant’s predisposition to feeling certain emotions, like fear, anger and happiness, while in the fourth these emotions were induced by the researchers. Once emotional predisposition was discovered or was induced, the participants were asked to make judgments on negative scenarios; researchers then measured the relative optimism in the participants’ responses to these scenarios. These studies showed the researchers that emotions affected the relative optimism of a person’s decisions but that it was more tied to the amount of perceived control and certainty that specific emotions give people. For example, participants who were more predisposed to be happy or had happiness induced were more likely to be more optimistic than people predisposed to sadness. Emotions like anger and happiness are generally viewed as having high control and certainty while sadness is generally seen as having low control and certainty (Lerner & Keltner, 2001).

Previous research done on the appraisal tendency framework has not involved the emotion of disgust, however these previous studies still hold relevance to the current thesis. The main idea of this thesis is that an individual's emotions will change the way they judge or think about something as shown by Lerner and Keltner (2000; 2001). Although it has yet to be shown that it will actually activate the appraisal tendency framework, disgust is considered a powerful emotion on the same level that anger and happiness are which have been shown to activate the appraisal tendency framework. As such it is possible that the priming of disgust will induce the Appraisal Tendency Framework and cause participant's judgments of attractiveness to change.

Disgust

Disgust has been defined as a basic emotion that has the primary function of preventing people from being contaminated with harmful and dangerous bacteria (Olatunji, Williams, Tolin, Abramowitz, Sawchuck, Lohr & Elwood, 2007). This has led research to be focused on disgust
as a means of disease avoidance, which led to the creation of the disease avoidance hypothesis (Oaten, Stevenson, & Case, 2009). Oaten, Stevenson, and Case (2009) have a number of hypotheses of disgust perception and disgust violations they discuss that support the disease avoidance hypothesis. The hypotheses proposed by Oaten, Stevenson, and Case (2009) examine violations of cultural norms when it comes to disease related objects and practices as well as the reason why women have enhanced disgust sensitivity during pregnancy, which occurs because women are more vulnerable to disease and infections during pregnancy (e.g., Fessler, 2002; Fessler, Eng, & Navarrete, 2005). The disease avoidance hypothesis also describes disgust as an evolutionary adaptation that prevents us from eating certain foods that may be toxic along with avoiding people who may have infectious diseases.

Prokop and Fancovicova (2010) determined that children can identify which animals carry harmful parasites or bacteria. Prokop and Fancovicova projected 25 pictures on a screen and asked participants to rate how disgusting, scary, or dangerous they found the animals in each picture. The animals comprised five different groups, three of which were disease relevant insects and parasites (i.e., yellow fever mosquito, giant roundworm, and bed bugs) and the other two groups were disease irrelevant insects and worms (i.e., Azure Damselfly and earthworms), which served as a control. The researchers found that participants rated the insects and parasites that are disease relevant to humans as more disgusting, scary, and dangerous than the disease irrelevant insects and worms. This lends support to the idea that humans are very good at recognizing what can make them sick, which leads them to being disgusted by these possible disease-carrying objects.

As discussed in the opening of the paper, people will generally avoid others who have prominent facial scars or disfigurements (Houston & Bull, 1994). The disease-avoidance
hypothesis suggests this occurs because the person with the facial scars elicits disgust in us and this in turn triggers an avoidance reaction. Park, Faulkner, and Schaller (2003) hypothesized that facial scars are directly linked to some of the more contagious and deadly diseases. Diseases like smallpox, Leprosy, and the Bubonic Plague all have skin blemishes as one of the main symptoms. It is believed that because of these types of diseases we have adapted to avoid skin conditions like those that occur when someone has contracted a disease like the bubonic plague. This research provides a foundation for an evolutionary model of disease avoidance and a link between disease avoidance and disgust.

Ryan, Oaten, Stevenson, and Case (2012) looked for empirical evidence to show that disgust is a moderator of disease avoidance. They showed participants videos of confederates handling props that the participants had to interact with later in the study. The confederates were either healthy, had a facial scar, or exhibited signs of having the flu such as a runny nose, coughing and sneezing. The researchers found that participants were equally and significantly more disgusted with the props after the confederates with the flu or the facial scar handled them. The participants exhibited greater facial reaction, like crinkled noses and big eyes, indicating disgust and refused to touch the props in some cases. This provides strong evidence that disgust is a moderator in the disease avoidance process, and that we can attribute facial scarring with diseases and avoid both similarly.

One of the hypotheses outlined by Oaten, Stevenson, and Case (2009) predicts that women would have stronger disgust responses to disease relevant stimuli, due to the higher cost to them in mate selection or reproduction if they were to get infected with a disease. If facial scars represent disease relevant stimuli, the hypothesis presented by Oaten, Stevenson, and Case (2009) means there would be stronger reactions to facial scars by women and weaker reactions
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by men. Kleck and Strenta (1985) examined the reaction of both men and women when looking upon facially scarred individuals. Participants viewed pictures of themselves and other people both with and without facial scars while having their Galvanic Skin Response (GSR) measured. At the same time participants were also asked to describe their emotional reaction to the faces. Although there was no gender difference in GSR, women expressed their disgust using stronger emotional adjectives. Both sexes became highly aroused when viewing the disfigured photos, the difference lay in how they described their reactions to the faces. This study shows that simply putting a scar on a face elicits a more visceral emotional response from women, than a normal face and that men and women react similarly physiologically to facial scars.

From this research some conclusions can be drawn about what elicits a disgust response in humans and why disgust is an integral part of disease avoidance, which are critical to the current study. The belief is that the same disgust response that would prevent us from eating a poisonous food would affect our ability to find someone attractive in a negative way. The papers on facial scarring, particularly of scars that look similar to skin conditions, indicate that scars can elicit a disgust reaction. This disgust response can contribute to people finding scarred faces less attractive. The previous research also serves as an example of how disgust has moderated human behavior in the past, which sheds some light on the possible behavior changes that could occur in the current experiment. These studies indicate a possible link between the avoidant behaviors associated with disgust, and lower judgments of attractiveness along with other types of social stigmatization.

Social Stigmatization

As previous studies have shown, disgust is a mediator of avoidance response especially if an individual or an object could possibly transmit a deadly disease or parasite. This avoidant
behavior is a type of social stigmatization. Stigmatization has been defined as peoples' behaviors towards the out-group or the social group we disassociate ourselves from (Kurzban & Leary, 2001). It is hypothesized by Kurzban and Leary (2001) that stigma evolved to keep us from these out groups because they could be harmful to us and to keep us closer to groups that are known to be socially beneficial, known as the in-group. Disgust is one factor that has an effect on stigma and therefore has an effect on what we choose as our in-group (Kurzban & Leary, 2001). Any individual who may have a communicable pathogen is viewed as disgusting and as such are shunned from the in-group because of the fear of catching said pathogen. The desire to keep the out-group away can help explain why people behaved the way they did towards the man on the subway in the Houston and Bull (1994) experiment. The man's scars automatically identified him as different (and possibly carrying a disease), therefore forcing him into the out-group.

To examine how facially disfigured people are stigmatized we can look at two particular studies. The first study conducted by Halioua, Williams, Murray, Skalko, and Vogelsong (2011), looked at how much people stare at people with facial disfigurements. Staring in this experiment constituted a relatively long fixation of gaze (of around 3 seconds) by participants. The researchers had participants sit in front of an eye-tracker, which was used to measure gaze patterns of the participants. The researchers were looking for differences in staring behavior of participants when looking at facially disfigured and non-disfigured people. To test this, participants were presented with multiple slides, which had four faces per slide; some of which were disfigured and some were not. The participants were presented with the photographs and then asked to rate the individual pictured on a variety of scales, including trustworthiness and competence. What the researchers discovered was that participants stared significantly longer at the person in the picture who had the facial disfigurement. The authors took staring time as a
measure of stigmatization so the longer the staring time the more stigmatized a face was. Staring time was used as measure of stigmatization based on previous research that suggests staring is how humans make differences seem less novel and the fact that staring is seen as a negative reaction by social and cultural norms (Langer, Fiske, Taylor, & Chanowitz, 1976). This study goes towards showing that stigmatization is indeed something that occurs from something as simple as a facial disfigurement. Because facial scarring is known to create avoidance responses associated with disgust (Park, Faulkner, & Schaller, 2003; Ryan, Oaten, Stevenson, & Case, 2012) and staring is a type of stigmatizing or avoidant response, the staring behaviors exhibited in the Halioua et al. (2011) study show a possible link between staring and disgust.

Lawrence, Rosenberg and Fauerbach (2007) looked at how burn victims were treated by their peers, and how this treatment affected the body-esteem of these victims. Participants completed a body-esteem scale and a perceived stigmatization questionnaire to test for a link between the two factors. It was found that an individual's body esteem was directly tied to their perceived level of stigmatization, thus illustrating the negative effect stigmatization can have on your perception of yourself. Perhaps the most interesting finding in this study was that female burn victims appeared to have a better body image than women who were not burn victims. This was a strange and unexpected result of the experiment, which led the researchers to conduct further post-hoc analyses. After running the analyses the researchers realized there was a possible confound in their study in regards to the population. Because the data was taken from individuals at a summer camp for burn victims an individual's disfigurement was the social norm and as such no one was disgusted by anyone else, leading to less stigmatization. This study shows the importance of being accepted into a group for our own self-esteem. Both of these
studies illustrate disgust as a social moderator and this is important to remember especially when we discuss, the emotion of disgust as evolutionarily adaptive.

The understanding of stigmatizing behaviors is important for the current study. Stigmatizing behaviors are a way which we separate the in-group from the out-group and the studies above clearly illustrate that facial scars will usually place someone in the out-group, unless everyone in the group has a facial scar. It is also important to note that stigmatizing behaviors are avoidant behaviors as well. This part of stigmatization is clearly illustrated in the Houston and Bull (1994) experiment and is expected in the current experiment.

**Facial Perception**

A large portion of any facial perception theory is the distinction between internal and external facial characteristics. Internal facial characteristics are the facial features such as the eyes, nose and mouth; whereas external facial characteristics are the hair, jaw line and cheekbones. These features all play a certain part in facial processing and recognition and help us identify familiar and unfamiliar faces. Ellis, Shepherd and Davies (1979) conducted one of the first studies looking at the importance of these facial features in facial recognition and processing. The first experiment examined familiar faces, the second examined unfamiliar faces, and the third examined picking one familiar face out of a group of other familiar faces. All three experiments involved showing participants a face first that was either familiar or unfamiliar, then covering the outer or inner 50% of the same face and examining how well participants could recognize the faces with these parts covered up. In Experiments 1 and 3 they found that with familiar faces participants had a harder time recognizing them if the innermost portion of the face was covered. In Experiment 2 they found the opposite held true for unfamiliar faces, that when the outermost portion was covered it was harder for participants to recognize them. These
three experiments showcase a distinct difference in facial processing with familiar and unfamiliar faces. It appears that internal features on familiar faces are encoded and processed to a greater degree than on unfamiliar faces. Ellis, Shepherd and Davies (1979) hypothesized this is because of a need for people to process the emotions of familiar faces, which are mostly conveyed through the internal facial features.

Further illustrating the importance of external facial features in unfamiliar face recognition is research conducted by Bruce, Henderson, Greenwood, Hancock, Burton, and Miller (1999). In this study the researchers were trying to determine how accurate participants were at identifying an unfamiliar face they were asked to find in photographs and in video clips. They found that participants overall were much worse at identifying the face if an expression changed (90% accurate down to 81%) or if the viewing angle changed (90% accurate down to 72%). The researchers also discovered that when faces were matched correctly it was usually because of a distinct external facial feature being visible in both the target picture and the photo participants had to match. This study further supports the findings of the Ellis et al. (1979) study but in a modern setting and with different forms of media, in this case video.

The importance of internal facial features when trying to recognize a familiar face was also demonstrated by Young, Hay, McWeeny, Flude, and Ellis (1985). They had participants match presented external and internal facial characteristics with a photograph that would be presented later. For example, a picture of a nose would be shown and then two faces would appear and participants would be asked to match the nose to the face. The researchers ran two different conditions with familiar and unfamiliar faces and just as in previous research, they found that internal facial features were more easily recognized when it came to familiar faces. Participants were much quicker at matching the internal features with the photograph of a
familiar face than of an unfamiliar face. Unlike the Ellis et al. (1979) study, Young et al. (1985) found no difference between unfamiliar and familiar faces when participants were asked to match external facial features to the photographs. These findings again illustrate the importance of internal facial features in facial perception and recognition. These internal features appear to be the basis for the majority of our facial processing power and external features appear to be mainly used on people we do not know and most likely won’t ever see again.

The focus on internal and external features hearkens back to the earlier work on the configurational approach of facial perception done by Diamond and Carey (1972). This configurational approach states that as we age we see faces more as a product of the entire configuration of the face rather than striking features. Tanaka and Farah (1993) examined this type of configurational approach and tried to determine if it is true for adults. The researchers conducted three experiments to determine if faces are more easily recognized than other objects when viewed in a more holistic sense. Participants were shown the whole face, they were then shown an isolated feature (like a nose by itself next to another nose) and then asked which nose went with the face they just viewed. They found that when given just the isolated facial feature and then asked to identify it, participants had difficulties identifying the facial feature. However, participants were adept at identifying whole faces and matching them to the target stimuli. Scrambled and inverted faces were also more difficult to recognize. Tanaka and Sengco (1997) found similar findings in their research when it came to people having trouble matching features in isolation to a face. However, they also found that when an isolated feature was put into a novel face participants were much more successful in matching the feature to previously seen faces. These studies show the importance of viewing the facial features in terms of the whole of the face, and shows that adults appear to process faces in this holistic sense.
What all of these studies illustrate is that adults appear to perceive and process faces as wholes and not just as striking individual features, but the features we do focus on, whether they be internal or external, are influenced by familiarity. This is important to understand in the context of the current study as it asks participants to process faces and make judgments on said faces. These basic mechanisms should be understood because, as will be outlined in the next section of the paper, the configurational processing of a face is important in the judgments of facial attractiveness. This is because judgments of sexual dimorphism and symmetry require viewing the face as a whole and not just one feature or another.

**Facial Attraction**

Physical attraction and beauty is difficult to define, as it is a product of many different factors. One basic definition would be what we find physically attractive is someone with whom we want to mate (Buss & Schmitt, 1993). Someone who is physically attractive is believed to have good genes that will pass on to the next generation and ensure that next generation's survival (Schieb, Gangestead, & Thornhill, 1999). One of the main ways we determine someone's physical attractiveness or beauty is through their face.

A review of the literature on the subject of facial attractiveness conducted by Fink and Penton-Voak (2002) revealed three main facets of facial attractiveness: bilateral symmetry, averageness, and sexually dimorphic facial characteristics. Two of which, averageness and bilateral symmetry, can be directly affected by facial scars. The first trait we find generally attractive in faces across cultures is bilateral symmetry of the face. There have been suggestions in past research (Johnson, et al., 2001; Penton-Voak et al., 2001; Schieb et al., 1999) that symmetrical faces indicate a well-developed and healthy person and someone who has been able to navigate their environment without major injury to themselves. Research has also shown that
facial symmetry is positively correlated with the heterozygosity of an individual's genetic makeup (e.g., Schieb, Gangestad, & Thornhill, 1999). This means that the more genetic diversity a person has the more symmetrical their face will look. This is important because heterozygosity is a main factor in healthy offspring and is indicative of genetic defenses to various pathogens.

We also see a correlation between averageness of faces and ratings of attraction (Fink & Penton-Voak, 2002). Many studies have found that when we show people faces that have been computer generated to be average, they are rated as more attractive especially over faces with prominent features on them (Halberstadt & Rhodes, 2000). This same effect has been shown in objects other than human faces like pictures of dogs or birds, which is indicative of a general human preference of things that are average. It is possible this comes from human beings having a natural affinity for prototypical objects. This does not mean that average faces are necessarily attractive but there is a clear preference for them. To make an average face more or less attractive there are certain features that can be manipulated. Some of these features are known as sexually dimorphic traits (Fink & Penton-Voak, 2002). These sexually dimorphic traits are also called hormone markers. These are features that represent the hormonal health of an individual and their capability to sexually reproduce. High levels of testosterone in males show in wider cheekbones and a prominent jaw, while high levels of estrogen in females is shown in high cheekbones, clear skin free of lesions and, relative hairlessness. These hormone markers are evolutionary adaptive because they not only indicate fertility of individuals but also strength of an individual's immune systems as both estrogen and testosterone have strong effects on the immune system (Fink & Penton-Voak, 2002).
Rhodes (2006) had similar findings to Fink and Penton-Voak (2002) in her meta-analyses of the current research of sexually attractive facial characteristics. She found that for both men and women averageness and symmetry were important in determining how attractive an individual was. Sexual dimorphism was more preferred in female faces than male faces, meaning that the more sexually dimorphic a woman's features are, the more attractive she appears. These preferences are believed to have evolved because they enhanced reproductive success and thus helped ensure the passing on of genes to the next generation. The meta-analyses of data found a weak association between attractiveness and mental health but a moderate to strong one between attractiveness and physical health. This lends support to facial attraction evolving out of a need to find physically healthy mates. The geneticists Roberts and Little (2007) further supported these findings when they conducted a meta-analysis of studies on genes and attraction. They found that people see certain traits, such as body size, height, and sexual dimorphic facial characteristics as attractive. These meta-analyses provide a good basis on which to move on with the understanding that facial attraction can be tied to evolutionary adaptive traits and specific dimorphic characteristics found in males and females.

A great deal of research has been conducted directly on women's facial preferences in men. Penton-Voak et al. (2003) found that how attractive a woman found herself was important to what facial features they found attractive on men. The women who saw themselves as less attractive were more likely to pick feminine featured male faces as the most attractive. These results indicated to the researchers that women could possibly have much more diverse tactics in mate selection when compared to men. DeBruine et al., (2006) discovered that a woman's self reported ideal mating partner and her real partner's masculinity had an effect on the facial masculinity a woman preferred. If their current partner had a very masculine face women would
tend to prefer more masculine faces and if their current partner had a more feminine face the
women would find other men with feminine facial features attractive. Watkins, DeBruine, Little,
and Jones (2012) have discovered that the perceived amount of social support an individual has
directly affects their facial preferences. Faces that appear more feminine are perceived to be
more supportive by both men and women. When asked to imagine a scenario where they receive
little to no social support, individuals would then find faces that had more feminine traits as more
attractive. This is applicable to women during situations where they perceive they need more
social support, such as when the body is flooded with progesterone (during the menstrual cycle)
(e.g., Jones et al., 2008; Penton-Voak, et al., 1999). Combined with studies that have found that
men are more focused on physical beauty in mate selection than women (Li et al., 2013) there is
a clear illustration that different factors influence women and men in terms of finding someone
attractive or not. These studies point to a possible difference in how men and women process and
judge attractiveness. It appears that women have more factors than men that they consider when
making a decision regarding someone's attractiveness. The different factors that women consider
could possibly appear in the results of the current study in a difference between the attractiveness
scores men and women give photographs.

All of these studies are important to the current study because they show what is
attractive in a human face and give some insight into how we process facial attraction. As
participants are asked to make judgments of attractiveness in the current study, it is important to
know first what is attractive. Clearly facial attraction is a combination of the main three factors:
symmetry, averageness and sexual dimorphic traits, as much of the previous research has found.
A facial scar would directly impact the symmetry of a face as well as the averageness, which
should result in the scarred faces being rated as less attractive. Besides scarring, it has been
shown that many other factors can change opinions of attractiveness. These studies also indicate that there is a difference between what men and women find attractive in faces and that different things affect women more when it comes to making attraction judgments. These differences between men and women could present as significantly different attractiveness ratings between the sexes.

*Mood Induction*

All participants in this experiment took part in a mood induction procedure. A mood induction is when participants have a particular emotion induced usually through some type of film or pictures and sometimes even reading aloud phrases (Polivy, 1981). In particular it has been shown that film, pictures, and music are effective methods of inducing a specific mood (e.g., Falkenberg, Kohn, Schoepker, & Habel, 2012; Larsen & Ketelaar, 1989; Mata, Hogan, Joorman, Waugh, & Gotlib, 2013; Pagliacco, Luby, Gaffrey, Belden, Botteron, Gotlib, Barch, 2012; Thake & Zelenski, 2013; Weinberger & McKee, 2012).

With these types of laboratory inductions it is important to understand which method of induction works best for a particular emotion. Westerman, Spies, Stahl, and Hesse (1996) conducted a meta-analysis of the different types of mood induction procedures. They found that film and the presentation of stories were the most effective mood inducers across all emotions. For negative emotions, methods like asking participants to imagine a particular scenario, music, pictures, and false feedback tasks were all deemed just as effective as the film or the story by the meta-analysis. The type of negative emotion induced in this experiment is disgust, which has been induced by previous researchers through the use of film (Thake & Zelinksi, 2012) and through the use of photographs (Moretti & Di Pellegrino, 2010; Olatunji & Armstrong, 2009; Rohrmann, Hopp, & Quirin, 2008). Because of the use of photographs to induce disgust in
previous research and the meta-analysis (Westerman et al., 1996) indicating the efficacy of methods other than film to induce negative emotions, like disgust, the current study used photos to induce the moods of participants.

In her review of many mood induction studies, Polivy (1981) found that when one mood is induced there is a possibility that other moods will also be induced because the activation of one emotion has been found to activate similar emotions. Most researchers deal with this problem by making participants fill out a mood questionnaire following the induction to see which emotions a participant is feeling at that moment. These questionnaires are used to ensure that a participant is feeling the desired emotion and to measure how strongly they are feeling a specific emotion. The current study used a similar questionnaire to ensure the validity of the participant’s self-report measures, which asked participants to what extent they were feeling the emotions happiness, disgust, anger, frustration, and surprise. Disgust and happiness were both manipulation checks for the disgust and hygiene inductions respectively. Anger, frustration, and surprise are emotions associated with the induction of negative emotions (Polivy, 1981) and as such they are measured.

These studies serve two purposes. First, they indicate which methods of mood induction work best and which have been used most effectively in the past. The method to be used in the current study, mood induction by pictures, has been used with effectiveness in the past and has been shown to be effective in the lab. The previous effectiveness of photographs, and the ease to which photographs are integrated into the software used in this experiment are the reasons why photographs were used in the current experiment. The second purpose the studies above serve is to show that a mood induction could in fact induce more moods than intended and as such it is important to ask participants what moods they are feeling after a mood induction. It is because of
this information that a mood questionnaire was presented at three separate points during the experiment.

**Premises**

The previous research examined in this thesis indicates several things that are important to the current study. First, based on the work done on the Appraisal Tendency Framework, we have learned that moods and emotions can impact our judgments and that powerful emotions like happiness or anger can have a greater impact than weaker emotions like sadness. The current study will try to see if another powerful emotion, in this case disgust, can activate the same effect on judgment and decision-making. Because it hasn't been shown before that disgust is capable of activating the appraisal tendency framework, this facet of the study is interesting, as it will add to previous research in the field.

The previous research has quite clearly illustrated the ability of disgust to trigger avoidant behaviors from people and objects (e.g., Houston & Bull, 1994; Ryan, et al., 2012) as well as suggesting that disgust is a part of our disease avoidance behaviors (Oaten, et al., 2009). It has also been shown that people can fixate on things that disgust them, as can be seen in some of the staring behaviors towards people facial scars (Halioua, et al., 2011). This staring happens without any sort of mood induction typically, so it is quite possible that being induced into a disgusted state could cause people to fixate even more on facial scars. Also illustrated in the previous research is the link between facial scarring and disgust. It has been suggested that since some highly contagious diseases exhibit facial markings, like scarring, people have evolutionarily adapted to be disgusted by facial scars to stay away from these individuals and therefore the contagious diseases they could possibly carry (Park, et al., 2003). This link between
disgust and scarring is highly critical to the current study and forms the basis of one of the hypotheses.

The research on facial processing tells us that people use different methods to process familiar and unfamiliar faces. It appears that with familiar faces people focus more on the internal features of a face and with unfamiliar faces they focus mostly on the external features (Ellis, et al., 1979; Young, et al., 1985). In the current experiment participants will be required to make judgments on unfamiliar faces and as such it is possible that they will focus most on external features of these faces rather than internal features. This fact has led to the development of one of the hypotheses in the current study.

The previous research also serves as a reminder of what exactly human beings find attractive in the human face. The big three factors are symmetry, averageness, and sexual dimorphic traits (Fink & Penton-Voak, 2002), but these aren't the only factors that influence what we find attractive in a face. Research shows that the sex of an individual changes what they find attractive and what can change their perception of another's attractiveness (DeBruine et al., 2006; Penton-Voak et al., 2003; Watkins, et al., 2012). From the facial attraction research we also learn that scarring can hamper how attractive someone is seen by others. Scarring affects two of the big three factors in facial attractiveness directly, these two factors being how average a face appears and the bilateral symmetry of a face which would very clearly affect any attractiveness rating of a face. This means that an individual with facial scarring would generally be seen as less attractive than an individual without facial scarring.

The last thing the previous research illustrates is what methods of mood induction are the most effective as well as a proper procedure for administering a mood induction. Because the current thesis will involve participants undergoing a mood induction this information is a
necessity. The previous research indicates that for inducing negative emotions like disgust, photographs are an effective method. The previous research also shows how photographs have been used before to induce specific emotions with effectiveness (Falkenberg et al., 2012; Larsen & Ketelaar, 1989; Mata et al., 2013). Also gleaned from the previous research is the need for some type of measure to ensure that participants are feeling the correct emotion or mood from the mood induction, which led to one being implemented in the current thesis.

**Hypotheses**

Using the various theories and studies from the introduction, a number of hypotheses were developed for the current experiment.

The first hypothesis proposed in this thesis is that people who have the emotion of disgust induced will rate pictures of people as less attractive, in contrast to participants who are primed with clean and neutral photos. This can be seen in the staring behaviors towards individuals with facial scars, as they are stared at more frequently precisely because their scar is disgusting or deviates their face from the norm (Halioua, et al., 2011). It is possible that the state of being disgusted could create these same behaviors and cause individuals to fixate on negative features of a particular face. The evolutionary importance of disgust as a moderator of behavior, as has been shown in previous research, and its importance in avoiding certain types of contagious diseases supports this hypothesis (e.g., Oaten, et al., 2009; Park, et al., 2003; Ryan, et al., 2012). The current study, however, hopes to show how it affects our perceptions of attractiveness specifically.

The second hypothesis is that the pictures with facial scarring will be rated as less attractive than the other faces regardless of mood induction. Research has shown that facially scarred individuals are actively avoided and socially stigmatized through this avoidance or
staring behaviors (e.g., Halioua, et al., 2011; Houston & Bull, 1994; Lawrence, et al., 2007; Kleck & Strenta, 1985). Research on the importance of facial symmetry to ratings of attractiveness also supports this hypothesis as facial scarring eliminates facial symmetry (Fink & Penton-Voak, 2002; Johnson, et al., 2001; Schieb, et al., 1999).

The third hypothesis is that the participants in this experiment will rate faces with outer scars on them as less attractive than the faces with inner scars and the faces with no scars. As found by previous research (e.g., Ellis, et al., 1979; Young, et al., 1985) people tend to rely on the outer facial features of unfamiliar people when recognizing and identifying them, as opposed to using internal facial features with familiar faces. Because all of the photos participants will be viewing will be unfamiliar to them, it is most likely they will rely on the external facial features when rating their attractiveness so scars in that area will be noticed much more and therefore have more of an impact on the attractiveness rating given to that photo.

The final hypothesis of the current study is that there will be a difference in attractiveness scores that men and women give to the photos they see. A sex difference in attraction has been predicted by previous research (Debruine et al., 2006; Penton-Voak et al., 2003; Watkins, et al., 2012) which has found that men and women have different processes by which they evaluate attractiveness and different factors, like perceived social support and current mating partner, can affect how attractive they find individuals. Although this data was not collected from participants, the research indicates that women have a different process of judging attractiveness than men. Because of these differences the current study expects significant differences in attractiveness scores between men and women.
Method

Participants

Data from 61 participants were collected for this experiment; however 10 participants were excluded before analysis began. Nine of these participants were excluded because they were non-heterosexuals (it has been found that non-heterosexuals have different facial preferences than heterosexuals and as such they should be tested separately; e.g., Bailey, Kim, Hills, & Linsenmeier, 1997; Glassenberg, Feinberg, Jones, Little, & DeBruine, 2010). The last participant was excluded because they provided the same rating for every photo suggesting that the participant did not pay attention to the photos. Principal analysis was done on 51 college aged students (29 men, 22 women) with a mean age of $M_{age} = 20.65, SD = 2.23$. Participants were recruited either by an online research participation system and were given class credit for their participation or they were recruited via word of mouth and participated strictly as volunteers with no class credit given.

Materials

The main instrument for this study was a computer program, which presented both induction stimuli and target photos to participants. The program used to run the experiment was DirectRT ("Direct R.T.," 2004), a computer program designed to run psychological experiments. Following the example of previous research (e.g. Falkenberg, et al., 2012; Larsen & Ketelaar, 1989; Mata, et al., 2013) the induction stimuli consisted of 9 images for each of the three conditions: disgust induction, control, and hygiene. The disgust and neutral induction photos came from the International Affective Pictures System (IAPS; Lang, Bradley, & Cuthbert, 2008) while the hygiene pictures were taken from the Internet. The pictures used as induction stimuli were pre-rated in a pilot study on a scale of 1 to 7 (1 being the least of a characteristic, i.e. "not
disgusting" and 7 being the most i.e. "very disgusting"). The photos were rated on four different characteristics: disgust, cleanliness, positivity, and negativity. The pictures used in the disgust induction condition were rated as the most disgusting ($m = 6.68$) and the most negative ($m = 5.26$). They were also rated as the least clean and least positive ($m_{\text{clean}} = 1.51$, $m_{\text{positive}} = 1.83$). The pictures used in the hygiene condition were rated as the cleanest ($m = 6.68$) and the most positive ($m = 6.08$) and as the least disgusting and least negative ($m_{\text{disgust}} = 1.07$, $m_{\text{negative}} = 1.44$). The pictures used in the neutral induction condition were rated as near the average when compared to the disgusting and hygienic pictures average across all 4 conditions ($m_{\text{disgust}} = 1.91$, $m_{\text{clean}} = 3.44$, $m_{\text{positive}} = 3.91$, $m_{\text{negative}} = 2.97$). All of these photos can be found in Figure 1.

The pictures that participants gave attractiveness ratings to were sets of 45 pictures in three different conditions: inner scarred where a scar was placed on the inner part of the face, outer scarred where a scar was placed on the outer part of the face, or not scarred faces where the photo was unedited (no scars). All faces were the same size of 313x385 pixels and were all presented in the same aspect ratio on screen of 800x600 pixels. To put scars on the faces, photo-editing software was used. The scars were different shapes but the same size and were color matched to match the skin tone of the individual in the picture. The scars also were either placed on the outer (hair line, jaw line) or inner (below eye, next to mouth) part of the face, depending on the scarring condition. These pictures were taken from the Florida State Penal Database where pictures of all parolees and prisoners are publicly available (Figure 2).

Because the differences in scores assigned to the target photos between mood induction conditions is the main focus of this study it was imperative that the target photos be heterogeneously attractive across the race conditions. This would ensure that any differences found would be a result of the mood induction condition and not a result of faces of one race
being more attractive as a whole than another. To accomplish this and determine the heterogeneity of the target photos a repeated measures ANOVA was run in which the scores assigned to every photo by every participant were compared against each other. This population was determined to be heterogeneous in terms of attractiveness of individual faces by this ANOVA $F(2, 49) = 269.46, p < .01, \eta_p^2 = .84$. The significant result means that no one group of target photos (race, gender) was made of photographs that were more attractive as a whole than another group. All groups of target photos contained photographs that were attractive, unattractive and in between. Please consult Figure 3 to see this information in graphical form. This is important to establish as it means that any results found are not caused by any one group of photos being generally more attractive than the others, but instead being caused by one of the experimental factors in the thesis.

Throughout the experiment participants are also asked to fill out a mood questionnaire where they mark down how much of a particular mood they are feeling at that time. The moods they are asked about are happiness, disgust, frustration, surprise, and anger. Participants self reported their mood on a likert scale of 1 to 7 with one meaning the participant did not feel a particular mood with a 7 meaning they felt the mood on an extreme level. This mood questionnaire served as a manipulation check (see Figure 4).

Procedure

Participants came into the lab and were asked to sit in front of the computer they would use for the experiment. They were then given the consent form to read and sign. After consenting, participants filled out a demographic questionnaire and then the first of three mood questionnaires to determine their feelings prior to the mood induction. Participants filled out the mood questionnaire three times throughout the experiment ($T_1$, $T_2$, $T_3$) with approximately 1-5
minutes in between each administration of the questionnaire depending on how quickly participants were able to make their attractiveness ratings. Following the completion of both the demographic and first mood questionnaire \((T_1)\) participants were then randomly assigned into one of three induction groups: disgust induction \((N = 18)\), hygiene induction \((N = 16)\), or neutral induction \((N = 17)\). Participants viewed each of the 9 pictures in the condition twice in a set order. Each picture was visible to participants for one second. This led to a total induction time of 18 seconds, which according to previous research is on the low end of necessary time to induce a mood but still acceptable (e.g., Pagliacco et al., 2012; Rohrmann, Hopp, & Quirin, 2008). The time was selected due to lab time constraints, which required participants to finish under a half hour and the fact that it was an acceptable time for mood induction based on the previous literature (e.g., Pagliacco et al., 2012; Rohrmann, Hopp, & Quirin, 2008). The hygiene induction was conducted as an opposite to the disgust induction to see if an effect opposite of the one found by inducing disgust exists. The use of another mood induction along with disgust to test for a different effect between moods has been done in previous research (Moretti, & Di Pellegrino, 2010) and specifically using the induction of a pleasant emotion to test for an effect opposite from disgust, has also been done in previous research (Ihme, & Mitte, 2009). The neutral induction was used to provide baseline scores for comparison. Following this presentation of induction materials the participant then filled out the same mood questionnaire \((T_2)\) to test for any changes in mood following the mood induction. Participants were then given instruction on how to properly rate the faces via DirectRT and allowed to continue the experiment. Participants were instructed on the scale they were to use and to use only the number pad on the keyboard to enter their responses. Each participant looked at 45 pictures, which were split by race and scarring condition. Each participant viewed 15 African-American, Hispanic and
Caucasian faces. Participants viewed only pictures of the gender they were attracted to. So for example, a heterosexual female would look at pictures of men and a heterosexual male would look at pictures of women. Of these 15 pictures, 5 of the pictures would have a scar on the inner part of the face, the outer part of the face, or no scar at all.\footnote{Due to a coding error participants in the disgusting induction condition saw 6 inner scarred black faces and 4 outer scarred black faces and the participants in the neutral induction condition saw 6 outer scarred black faces and 4 inner scarred black faces. All other conditions were split evenly, but no specific racial effect was expected with scarring so it was felt this coding error would not affect the results.} Participants were asked to rate the photos on a scale from 1 to 9 with 1 being very unattractive and 9 being very attractive. To determine if any specific race or condition sped up or slowed down the rating process of participants, the computer program also kept track of how long participants spent on each photo. Average time for participants however was not measured as participants were given the freedom to complete the ratings of the photos at their own pace. When all photos had been rated the participants fill out the mood questionnaire ($T_2$) as previously, to determine if the induction had any lasting effects. After the questionnaire was filled out the participant was then debriefed and allowed to leave the room.

Results

To determine if the inductions used in this experiment had the desired effect, an analysis was first conducted on the responses of participants to the mood questionnaire. The mean mood scores can be found in Table 1 and graphical representations of the data can be found in Figure 5. An omnibus Analysis of Variance was run looking at mood, time, induction condition and gender. Significant effects were found between moods $F(4, 42) = 84.40, p < .01, \eta^2 = 0.89$, for mood and condition $F(8, 38) = 5.49, p < .01, \eta^2 = 0.54$, and for mood, condition, and time $F(16,76), p < .01, \eta^2 = 0.46$. There was no significant effect found between any of the other

\footnote{Due to an error in the computer program participants in the neutral condition who looked at photos of women saw only 44 photos. It was not the same photo twice as the program randomly selected a photo to cut. Again this coding error is not expected to affect the results.}
variables. Because of the significant effect found between mood, condition, and time additional analysis was run on each mood individually. A repeated measures ANOVA with a between subjects factor of the mood induction condition, was run for each mood that participants reported. There was a significant difference in participant scores on the disgust ratings from Time 1 through to Time 3 $F(4, 94) = 17.24, p < .01, \eta_p^2 = 0.42$. Post-hoc analysis revealed that this was due to the significant increase in the self reported disgust scores of participants in the disgust condition from Time 1 ($M = 1.00, SD = 0.00, 95\% CI [0.64, 1.36]$) to Time 2 ($M = 4.33, SD = 1.91, MD = 3.33, 95\% CI [3.71, 4.95]$); more so than participants in the hygiene induction ($M_{time1} = 1.38, SD = 0.89, 95\% CI [0.99, 1.76]; M_{time2} = 1.13, SD = 0.50, MD = 0.25, 95\% CI [0.47, 1.78]$) and neutral induction condition ($M_{time1} = 1.41, SD = 1.00, 95\% CI [1.04, 1.78]; M_{time2} = 1.41, SD = 1.00, MD = 0.00, 95\% CI [0.78, 2.05]$) (see Table 1). There was also a significant decline in happiness scores from the participants across the experiment $F(4, 94) = 3.09, p < .05, \eta_p^2 = 0.12$. Post-hoc analyses revealed that no one condition changed more than the others over time, suggesting that participant happiness levels decreased independent of condition. Meaning that happiness scores generally decreased over time across all three mood induction conditions. A significant interaction was also found between surprise scores and mood induction condition of participants $F(4, 94) = 9.68, p < .01, \eta_p^2 = 0.29$. This was due to the change in surprise scores from Time 1 to Time 2 in the disgust induction condition $M_{Time1} = 1.67, SD = 1.03, M_{Time2} = 3.78, SD = 2.02$. There were no other main effects with either anger or frustration. These results suggest that the disgust mood induction had the desired effect on participants, whereas the hygiene condition was not successful in creating the desired effect in participants. Along with showing that the disgust induction did make participants feel disgusted they also show that the mood induction effect did not last through the experiment to T3 and it is
possible a stronger induction effect would have lasted throughout the experiment. Because the mood questionnaire was not given during the experiment we cannot be sure when exactly the effect wore off only that the mood induced was back to baseline following the experiment.

Through the analysis of the results it was found that mood of an individual does not significantly affect how attractive they found an individual. To determine this a One-Way ANOVA comparing the attractiveness scores of each photo in all three mood induction conditions, was run. A non-significant result was found with the One-Way ANOVA \( F(2, 48) < 1 \), meaning that the current study does not support the first hypothesis. To see the data related to this analysis please consult Table 2.

Another hypothesis present in this thesis is that the pictures with scars on them would be rated lower than the photos without scars. To examine this hypothesis a repeated measures ANOVA was run comparing the different types of scarring used on the faces in the experiment. The results of this ANOVA show a significant difference among the scarred and normal faces \( F(2,49) = 8.36, p < .01, \eta^2_p = .25 \) supporting the hypothesis that the scarred faces would be rated significantly lower than the normal faces. Results show that both outer \( (M = 3.10, SD = 1.01, MD_{outer-inner} = 0.04, MD_{outer-noscar} = -0.28, 95\% CI [2.82, 3.39]) \) and inner \( (M = 3.07, SD = 1.00, MD_{inner-outer} = -0.04, MD_{inner-noscar} = -0.32, 95\% CI [2.78, 3.35]) \) scarred faces were rated lower than faces with no scarring on them \( (M = 3.39, SD = 1.00, MD_{noscar-outer} = 0.28, MD_{noscar-inner} = 0.32, 95\% CI [3.10, 3.66]) \).

The third hypothesis of this thesis is related because it predicts that the faces with scars on the outer part of the face would be rated lower than faces with scars on the inner part of the face. To determine if the current study supported this hypothesis another repeated measures ANOVA was run this time looking only at scores given to both outer-scarred photos \( (M = 3.10,
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SD = 1.01) and the inner scarred photos (M = 3.07, SD = 1.00). The results of this ANOVA do not support the hypothesis that outer scarred faces would be rated less attractive than inner scarred faces F(1,50) < 1. These results indicate that no matter where the scar is placed people will find a scarred face as unattractive when compared to a face without a scar.

The fourth hypothesis of this study was that the sex of an individual will have an effect on attractiveness scores participants gave photos. To determine this another One-Way ANOVA was run looking at sex of participants and the scores they gave photos. A significant interaction was found between sex and attractiveness scores F(1, 45) = 4.78, p < .05, η² = 0.10 meaning that there is a significant difference between the attractiveness scores men and women provide. The results indicate that men give higher attractiveness ratings (M = 3.44, SD = .83, 95% CI [3.08, 3.79]) than did women (M = 2.85, SD = 1.02, 95% CI [2.44, 3.26]). These results support one of the hypotheses of this study that men and women would have significantly different scores of attractiveness of the photos they looked at.

Further exploratory analyses was run using a 3(Black, Hispanic, White) X 3(none, outer, inner) repeated measures ANOVA with a between subjects factor of the mood induction to discover if any other effects other than those that were hypothesized occurred in the experiment. Only one other effect was found with this exploratory analyses when a main effect was found with ethnicity F(2, 47) = 23.30, p < .01, η² = 0.50 where the target photos that featured black individuals were rated lower in attractiveness than the other races; please see Figure 6. A participant race analysis was not conducted itself, because the majority of participants in the study were Caucasian (n = 38, N = 51).

Further analysis was conducted regarding the time participants took to provide attractiveness ratings of the target photos. A One-Way ANOVA was run to determine if the
mood induction participants received would have any effect on how long their responses took. The ANOVA found no significant interaction between the condition a participant was in and their response time $F(2, 48) < 1$ meaning that regardless of the mood participants were in, the time they took to respond to each photo did not change.

Also examined was the relationship between response time and participant sex. To examine this relationship another One-Way ANOVA was run which found a significant difference between sex and response time $F(1) = 4.70, p < .05, \eta^2_p = 0.10$. It was found that women were significantly quicker with their responses ($M = 2591.73$ ms, $SD = 683.76$ ms) than men ($M = 3222.06$ ms, $SD = 1213.73$ ms).

The relationship between scarring and response time was also examined. Through the analysis of the results it was found that response times are not affected in a significant manner by scars on a face or where the scars are placed on a face. To examine this relationship a repeated measures ANOVA was run to examine if any differences existed between scarred faces and the faces that were not scarred. The results of the ANOVA indicated no differences between the scarred and non-scarred faces $F(2,49) = 1.531, p = .227, \eta^2_p = 0.06$ ($M_{outer} = 2887.17$ ms, $SD = 1212.96$ ms; $M_{inner} = 3085.63$ ms, $SD = 1286.33$ ms; $M_{noscar} = 2877.66$ ms, $SD = 1074.09$ ms). Another repeated measures ANOVA was then run to see if any differences existed between the faces with scars on the outer part of the face and the inner part of the face. This ANOVA again revealed no significant differences $F(1,50) = 2.33, p = .133, \eta^2_p = 0.05$ ($M_{outer} = 2887.17$, $SD = 1212.96$; $M_{inner} = 3085.63$, $SD = 1286.33$). These results indicate that response times are not affected in a significant manner by scars on a face or where the scars are placed on a face.

Further exploratory analysis with response time was conducted with a $3$ (black, hispanic, white) X $3$ (none, outer, inner) repeated measures ANOVA with mood induction conditions once
again as the between subjects variable. A marginally significant main effect of ethnicity occurred $F(2, 47) = 2.65, p = .081$, $\eta_p^2 = 0.10$, such that the pictures featuring black individuals tended to be rated faster than all other races examined ($M_{Black} = 2887.01$ ms, $SD = 1358.92$ ms; $M_{Hispanic} = 3163.27$ ms, $SD = 1180.55$ ms; $M_{White} = 3150.50$ ms, $SD = 1417.06$ ms).

**Discussion**

*Findings*

The significant differences in the mood questionnaire following the disgusting mood induction clearly show that the disgust induction was successful in creating feelings of disgust in participants. However, it is clear that this effect diminished quickly during the experiment as disgust scores were back to baseline by the end of the experiment. Because mood was not examined during the actual rating of the photographs we cannot be sure when exactly the effect was back to baseline. This shows that the experimental condition was created but that it did not last throughout the experiment, suggesting that not all of the ratings participants who had disgust induced were done under the influence of disgust. Another method of induction may have worked better than the procedure used in this experiment.

As such, the findings of this experiment do not support hypothesis one of the current thesis. The attractiveness ratings participants in the disgusted condition gave were not significantly different from either of the other two conditions. This could be due to the fact that the induction appears to not have lasted throughout the experiment.

The second hypothesis of this study was that the faces with scars would be rated as less attractive than the faces without scars faces. The results support this hypothesis as all of the scarred faces received lower attractiveness scores than the non-scarred faces. This finding has previously been demonstrated and the current study provides more support towards the fact that
people find them less attractive which may lead to avoidance (e.g., Halioua, et al., 2011; Houston & Bull, 1994).

The third hypothesis of this study, that the outer-scarred faces would be found less attractive than the inner scarred faces, was not supported by the results of the experiment. The results showed no significant difference between the attractiveness scores received by faces with the outer scars or the inner scars. These results show that just because humans recognize strange faces better from features in the outer part of the face (e.g., Ellis, et al., 1979; Young, et al., 1985), it does not mean that humans use external features more when judging the attractiveness of an unfamiliar face. These results could also indicate an overpowering effect of scars, because it appears that it doesn't matter where they are on the face they tend to get noticed and we find people less attractive because of them. Previous research into the stigmatizing power of scars shows that scars can indeed draw our attention with great effect (e.g., Halioua, et al., 2011; Houston & Bull, 1994). This result may reflect the strength of facial scarring overall, so location on the face does not matter.

The fourth hypothesis of this study was that there would be a significant difference in the attractiveness ratings that men and women give to photographs. This hypothesis was supported by the results of this current thesis as women on average tended to rate photos as less attractive than did men. This finding has been previously demonstrated in past research (Watkins et al., 2012) as well as being predicted by research that showed the different ways in which men and women think about attraction and attractiveness judgments (Debruine et al., 2006; Penton-Voak et al., 2002). Much like the findings with facial scarring, this thesis and its findings provide support to this previous research.
When reaction time was examined there was no significant interaction found between the three manipulations of this experiment (scarring, race of photograph, and condition). The only significant interaction found was when race of the target photo and the reaction time of the participant were examined separately. This analysis showed that photos of black individuals were rated much quicker than the white target photos. This significant finding demonstrates the propensity for people to make judgments on minorities much quicker than any other group (e.g., Kunda & Thagard, 1996; Rydell, McConnell, & Beilock, 2009; Wittenbrink, Judd, & Park, 1997).

*Trend with Hygiene Induction Condition*

Participants in the hygiene induction condition tended to rate photos lower than did the participants in the neutral mood induction condition. Although caution should be used in over-interpreting the results related to this finding as this result was only a trend towards significance, there are some potentially interesting ramifications from this finding. This trend could be because some of the pictures used to induce hygiene were photos of hand soap and people washing their hands which has been shown to actually induce feelings of needing to wash ones hands (Nichols, 2014). This could have affected the mindset of participants in the hygiene condition. A related study found that one way to increase usage of hand sanitizer stations was to make people aware of the germs on their person and how to get rid of these germs (Updegraff, Emanuel, Gallagher, & Steinman, 2011). These two studies illustrate the possibility that the photos of people washing their hands or of soap only served to remind participants of germs on their person, which would have the opposite effect as desired by the hygiene induction and make them more disgusted. However, when looking at the results it is clear that disgust scores went down following the hygiene induction making it unlikely that the hygiene induction photos
disgusted participants. Instead the photos could have activated a pathogen fear response, which may have caused the activation of avoidant behavior resulting in lower scores for the hygiene condition over the neutral condition. To further examine this, future measurements of anxiety and pathogen fear should be taken of each participant, possibly on the mood questionnaire given throughout the experiment. This should allow researchers to look at any possible link between pathogen fear and the hygiene induction activating avoidant behaviors associated with disgust.

Another possibility as to why some participants in the hygiene condition rated faces lower in attractiveness than those in the neutral condition can be found in contrast effects. Much like comparing the mile time of an average person to an Olympian's mile time, it could be that looking at the clean pictures made the scars on the target photos much more visible and salient to the participants (Damisch, Mussweiler, & Plessner, 2006). Studies have shown contrast effects in art by placing aesthetically pleasing artwork next to not so aesthetically pleasing artwork will cause people to find the aesthetically pleasing artwork even more pleasing to the eye while finding the less aesthetically pleasing artwork less pleasing to look at than they normally would (Tousignant & Bodner, 2014). Similar contrast effects have been found for faces where the presentation of attractive faces before the presentation of unattractive faces has made participants rate the unattractive faces lower than a set of baseline scores for the faces (Cogan, Parker, & Zellner, 2013). It is possible that a similar contrast effect was created in this experiment when the participants who had viewed the hygiene induction photos then looked at the target photos. The scarred photos may even seemed more disgusting and unattractive by comparison to the hygiene induction photos, thus leading to the lower ratings. It is important to note that although the ratings were not significantly different from the disgust to the hygiene conditions, the fact that the scores of the hygiene condition trended lower than the disgust is opposite of what was
predicted in hypothesis one and as such it is important to discuss possible reasons why it occurred. More research would be required to determine if there is a contrast effect with the hygiene induction that could be creating the results.

Limitations with Mood Induction

It was shown in this experiment that the mood induction method of using photographs worked well in inducing a disgusted state as was supported by other research (Moretti & Di Pellegrino, 2010; Olatunji & Armstrong, 2009; Rohrmann, Hopp, & Quirin, 2008). However, the effect of the mood induction did not last very long and as such future research should consider using videos to induce mood. It has been shown that videos are one of the best methods of inducing a particular mood (e.g., Pagliacco, et al., 2012; Thake & Zelenski, 2013; Westerman, et al., 1996) and because photos did not appear to create a lasting induction in the current experiment, future research should consider using videos to see if they work better at creating a lasting induction in both the hygiene and disgust conditions.

Another possible problem with the mood induction is that some of the photos may have been more arousing than others. Arousal measures on a scale of 1 to 9 for the disgusting ($M = 5.686, SD = .713$) and for the neutral photographs ($M = 2.722, SD = .446$) were obtained because they were pulled directly from the IAPS database (Lang, Bradley, & Cuthbert, 2008). However, because the hygiene photographs were pulled from the internet and no arousal measure were taken in the pre-test, no comparison between arousal of the photographs can be made. It could be that the pictures used to induce hygiene were more arousing than the photos used to induce disgust or vice versa. Previous research has shown that pictures that are arousing in a specific manner, i.e. motivating, create a stronger mood effect in participants (Bradley, Codispoti, Cuthbert, & Lang, 2001). If any of the pictures used in this experiment were arousing in a
motivation sense then they could have led to a much higher mood effect. Contrastingly if they did not have any arousal of motivation they may have had a lessened mood effect. Because no measure of arousal was taken during the experiment we cannot be sure it presented an issue (most likely the hygienic photographs were less arousing). Work done by Gomez, Zimmerman, Schar, and Danuser (2009) suggests that arousal from a mood induction does not last long but the mood itself will persist throughout the experiment if the initial arousal is high enough. As stated earlier in the discussion the mood did not persist throughout this experiment and another factor in that lack of lasting effect could have been the arousal of participants from the photographs. Other methods of induction and even different photos could have created greater arousal, which would have led to a longer lasting mood induction. Because some of the results were not as predicted it would be helpful in the future to have arousal measures for all photographs to analyze and see what effect, if any, exists.

Another issue with the mood induction could be the emotion disgust itself. Any mood induction you do on participants runs the risk of inducing other related moods (Polivy, 1981) but with disgust this proves more difficult than other emotions. The majority of the high arousal disgust photos in the IAPS (Lang, Bradley, & Cuthbert, 2008) are photos of body envelope violations or murders which while disgusting can also induce fear. The current study tried to avoid inducing fear, as such, photographs that may have been lower in arousal were chosen because they did not activate a large fear response.

**Limitation with Target Photographs**

A further limitation of this study involves the photographs used as the target pictures that participants had to rate. The potential issue with these photos is that they all were of criminals who were recently put on parole in the State of Florida. These photos were chosen for the current
experiment because they fall under the realm of public domain so they were editable without the individual's permission. The photos also represent a very diverse racial population, which was helpful in the current experiment. The use of photographs of criminals is an issue because as research first conducted by Thornton (1939) and more recently by Valla, Ceci, and Williams (2011) suggests, people are adept at picking out criminals when just given pictures. People were able to identify, with good accuracy, the individuals who had a criminal history when given packets of photographs and asked to point out which people they believed had a criminal background. The knowledge that the pictures were of criminals would be an issue with this study because it means participants could have rated the photos as they would rate criminals and not as they would rate a member of the general public. This could mean the results of the current experiment do not translate to the general population or possibly that the results are not a clear indicator of the true phenomenon present. To fix this limitation future research should consider using photos of individuals from the general population.

Another possible issue with the target photographs could be the expressions on their face. Previous research has shown that an individual's facial expression can change how attractive people find that individual (Mueser, Grau, Sussman, Rosen, 1984; Tracy, Beall, 2011). Specifically the research has shown that sad facial expressions cause people to rate photographs as less attractive than both a happy face and a neutral face (Mueser, et al. 1984). The photographs appeared to have neutral facial expressions but no ratings of the expressions of the faces was obtained so it is quite possible that participants saw the faces as having a sad expression on their face. This could have negatively affected the attractiveness ratings given to the photographs meaning the results could possibly not reflect any effect of mood of the participant.
Both the fact that the photographs are of criminals and the expressions on their faces could explain why the ratings for all photographs were relatively low (Figure 3 and 6). Because criminals are looked down upon in society they could be viewed as less attractive as research has shown that social outcasts are generally rated as unattractive (Mueser et al., 1984). As previously discussed sad facial expression can lower the attractiveness score given to a particular face and if participants perceived all of the faces as having sad expressions it could have contributed to the low scores.

**Applications**

These results have interesting implications for the Appraisal Tendency Framework (Lerner & Keltner, 2000). The current study shows that disgust may not be strong enough of an emotion to activate the Appraisal Tendency Framework or that the diminishing back to baseline throughout the course of the experiment of the induction caused this failure of activation. The lack of significant finding could also mean that attraction judgments are judgments that do not fit into the Appraisal Tendency Framework. Previous research (Lerner & Keltner, 2000; 2001) has shown that the Appraisal Tendency Framework works for situational decision making and judgments. An example of a situational decision making task or judgment would be having to decide between one option or another in a fake epidemic task. But, based on the results it appears that attraction judgments differ significantly from these types of situational judgments and decisions. Attraction judgments may not fall under judgments that can be affected by emotions. This is a possibility that would require further research to completely understand.

Along with the interesting theoretical implications, this research holds important meaning to the real world with its conclusions. What this study illustrates is the market and the continued need for progression of medical techniques and surgery that could hide facial scars. As the study
shows, facial scars do affect how attractive people find another person, making any type of medical intervention that hides them very helpful to people with facial scars. These techniques and surgeries give people with facial scars an option to get rid of their scar so they could have a higher quality of life post injury or post facially scarring disease. These techniques should try to mirror the success of transplanting fat into an AIDS patients face that hides facial wasting usually found in AIDS patients (Guaraldi, De Fazio, Orlando, Murri, Wu, Guaraldi, & Esposito, 2005). After this surgery AIDS patients experience a higher quality of life partly because people can no longer immediately tell how sick they are. The current research highlights the market for these surgeries like the kind that AIDS patients receive for patients with facial scarring. Another idea in the same vein of hiding facial scars could be the development of more facial make-up designed to cover up scars. This would be less expensive than surgery (in addition to being less invasive) so this may be a more appealing option. Ideas like this will hopefully improve the quality of life of people with facial scarring.

Along with helping people with facial scars or deformities lead a higher quality of life, the current study could also be the fuel behind education programs. These programs would be designed to educate the general public that people with facial scars or deformities are not necessarily contagious and they most likely do not have those scars as a result of some disease. Most of the people with facial scars have them as a result of some sort of accident. It will be difficult to do as it appears our desire to steer clear of people with facial scars is ingrained deeply into our psyche by evolution (Park, et al. 2003; Ryan, et al., 2012), but it could be a great change for society as we all work together to help ensure that everyone has the highest quality of life possible.
Conclusion

The current study's results indicate that being disgusted will not affect how attractive an individual finds another person. However, the results do reaffirm that facial scarring is seen as less attractive compared to faces not marred by scars. The research also shows that men and women do have differences when it comes to rating the attractiveness of faces and in fact women tend to rate faces lower than men do. This again supports previous findings of other researchers. An important finding of this research is the fact that placement of scar did not matter when it came to rating the attractiveness of faces. No matter where a scar is, if it is present on a face that face will be rated as less attractive. This suggests facial scars are salient stimuli that affect judgment and decision making process when it comes to rating attractiveness.

The lack of significant results in hypothesis one was most likely a result of the disgusting mood induction not lasting as long as it needed to. Participants self reported disgust as being nearly back to baseline at Time 3 of this experiment which was after participants had rated the photographs. This means that it is quite possible that some photographs were not rated under the influence of disgust leading to the lack of support for hypothesis 1. There is also the possibility that the lack of support was the product of the hygiene induction condition where participants sometimes rated photos lower than participants in the disgusting condition. Although it was not a significant difference it was a definite trend towards lower scores that could have ensured that no significant effect was found. Research indicates that this could possibly be due to the fact that some of the photos used to induce hygiene were photos of people washing their hands or of hand soap which could have made people aware of germs on their person, activating some of the same avoidant behaviors disgust is known to activate. This could have led to the activation of a pathogen fear response and then avoidant behaviors associated with that fear response. These
along with other confounds in the target photographs will need to be corrected in future research in order to truly test what effect disgust has on how we rate attractiveness if any exists.

This research comes with some interesting applications to the real world. It has applications to a diverse set of realms like medicine, and cosmetics. In the realm of medicine this research points out the continued need for surgeries and medical techniques that could help get rid of facial scarring on individuals or in the realm of cosmetics, the development of a new type of make-up designed to hide facial scars to greater effect than current products. These products or types of surgeries should be made more widely available than they are currently are, as most health insurance companies will not cover any cosmetic procedure that is not medically necessary ("Clinical Policy Bulletin: Cosmetic," n.d.; Zamosky, 2013). This research clearly indicates that although a facial scar may not be life threatening, it certainly could hamper the life of an individual.
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doi:10.1037/1528-3542.1.3.276


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http://dx.doi.org/10.1016/j.evolhumbehav.2004.12.001


http://dx.doi.org/10.1007/s10862-008-9096-y


http://dx.doi.org/10.1037/1040-3590.19.3.281


http://dx.doi.org/10.1016/j.paid.2012.08.041


DISGUST AFFECTS ROMANTIC ATTRACTION


http://dx.doi.org/10.1037/a0023125


http://dx.doi.org/10.1093/ntr/ntr198


Appendix

Disgusting photographs:

Hygiene photographs:

Neutral Photos:

*Figure 1.* Pictures used in the mood induction. Pictures shown are smaller than presented to participants.
Figure 2. Examples of faces that were be rated for attractiveness by participants. Non-scarred, Outer and Inner scarred photos are pictured.
Figure 3. Boxplots showing the ratings of faces based on the sex and race of the target photograph independent of condition. Faces were rated on a scale of 1-9.
Please indicate on the scale the level to which you are currently feeling the following emotions.

Happiness:

1 2 3 4 5 6 7
Not happy Extremely Happy

Anger:

1 2 3 4 5 6 7
Not angry Extremely angry

Sadness:

1 2 3 4 5 6 7
Not sad Extremely sad

Disgust:

1 2 3 4 5 6 7
Not Disgusted Extremely Disgusted

Frustration:

1 2 3 4 5 6 7
Not frustrated Extremely frustrated

Surprise:

1 2 3 4 5 6 7
Not surprised Extremely surprised

Figure 4. Mood survey participants have to complete to ensure induction worked properly.
Figure 5. Bar graphs representing the mean mood scores of participants at Time 1, 2 and 3 for each condition. Moods were rated on a scale of 1 to 7. Blue bars represent Time 1, green bars represent Time 2 and tan bars represent Time 3.
Figure 6. Boxplots representing the attractiveness ratings of photographs of each race participants viewed by the mood induction condition participants were in. There is a boxplot corresponding to the sex of the target photographs. Photographs were rated on a scale of 1 to 9.
Table 1

*Mean Mood Ratings at Time 1, 2 and 3. Moods rated on a scale of 1 to 7.*

<table>
<thead>
<tr>
<th>Condition</th>
<th>Mood</th>
<th>( M_{time1} )</th>
<th>Std. Deviation</th>
<th>( M_{time2} )</th>
<th>Std. Deviation</th>
<th>( M_{time3} )</th>
<th>Std Deviation</th>
</tr>
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<tr>
<td>Neutral</td>
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<td>1.412</td>
<td>1.004</td>
<td>1.412</td>
<td>1.004</td>
<td>2.000</td>
<td>1.275</td>
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<td>4.882</td>
<td>1.269</td>
<td>4.824</td>
<td>1.424</td>
<td>4.412</td>
<td>1.204</td>
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<td>Anger</td>
<td>1.529</td>
<td>1.289</td>
<td>1.529</td>
<td>1.125</td>
<td>1.412</td>
<td>1.004</td>
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<td>Frustration</td>
<td>2.471</td>
<td>1.940</td>
<td>2.294</td>
<td>1.929</td>
<td>1.882</td>
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<td>1.765</td>
<td>1.640</td>
<td>1.941</td>
<td>1.600</td>
<td>2.000</td>
<td>1.323</td>
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<td>Hygiene</td>
<td>Disgust</td>
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<td>0.885</td>
<td>1.125</td>
<td>0.500</td>
<td>1.688</td>
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<td>4.375</td>
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<td>0.000</td>
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<td>1.944</td>
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<td>1.667</td>
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<td>2.016</td>
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</table>
Table 2

*Mean Attractiveness Scores of all Photographs by Mood Induction Condition. Scores on a scale of 1 to 9.*

<table>
<thead>
<tr>
<th>Condition</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
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<td>Neutral</td>
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<tr>
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<tr>
<td>Disgusting</td>
<td>3.170</td>
<td>1.020</td>
<td>18</td>
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Table 3

*Mean Attractiveness Scores of All Photographs*

<table>
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<th>Scarring</th>
<th>Condition</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
<th>Scarring</th>
<th>Condition</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
<th>Scarring</th>
<th>Condition</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
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<td>0.948</td>
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<td>Outer</td>
<td>Neutral</td>
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<td>1.342</td>
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<td>Neutral</td>
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<td>0.746</td>
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<td>1.196</td>
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<td>Outer</td>
<td>Clean</td>
<td>2.875</td>
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<td>Disgusting</td>
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<td>Clean</td>
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<td>Disgusting</td>
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</table>

*Note.* Scores on a scale of 1 to 9 with 1 being very unattractive and 9 being very attractive.