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### **UC Merced Undergraduate Research Journal**

#### **Title**

Red, Rank, and Romance in Women viewing Men

#### **Permalink**

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#### **Journal**

UC Merced Undergraduate Research Journal, 8(2)

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#### **Publication Date**

2016

#### **DOI**

10.5070/M482030777

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Undergraduate



# Red, Rank, and Romance in Women Viewing Men

## A Replication Study

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## Abstract

This project attempted to replicate Elliot et al. (2010) in collaboration with the Collaboration Replication and Education Project (CREP). Elliot et al.'s (2010) experiment examined the influence of seeing the color red on volunteers' perceptions/appraisals of others. In the present study, female undergraduate volunteers, self-identifying as heterosexual and non-colorblind, were recruited (N = 175). Participants were randomly assigned to view a photograph of man with a red or grey background for 10 seconds. Volunteers then completed surveys to rate the man's attractiveness on several different features of attractiveness (e.g., sexual desirability, extraversion, likability, agreeableness, and status/power). Two independent series of two-way ANOVAs were conducted using condition (red vs. grey) as the primary independent variable of interest. The second independent variable was the volunteers' ethnicity and relationship status, respectively. Unlike Elliot et al. (2010), this study did not find any significant interaction between color and perceived attractiveness. This could be due to the wide ethnic difference of participants between the two studies. Caucasian participants and participants who were in a casually dating were most likely to rate higher levels of perceived sexual desirability. Implications for research and differences between the studies are discussed. Further research should be conducted in order to determine the effect of ethnicity and relationship status on perceived attractiveness.

*Keywords: Attraction, Color, Red, Perceptions, Attractiveness, First Impression*



## Red, Rank, and Romance in Women Viewing Men

### A Replication Study

This study was conducted as an attempt to replicate the findings of Elliot, Kayser, Greitemeyer, Lichtenfeld, Gramzow, Laier, and Liu (2010) in their seven international studies on “Red, Rank, and Romance in Women Viewing Men.” Their one-way experimental design examined the influence of seeing the color red on volunteers’ perceptions/appraisals of others, and was conducted in North America, England, China, and Germany. In the original study, Elliot et al. (2010) sought to determine if the color red influences female appraisal of a man’s attractiveness. It was predicted that “viewing red leads women to perceive men as more attractive and more sexually desirable.” This prediction was influenced by previous research that provides evidence that some female animal species show preference in mates with red colorations. To test their hypothesis, female participants were exposed to a picture of a male with either a red, white, or gray border, and were then asked to complete a questionnaire regarding their perceptions of the male’s attractiveness, sexual desirability, extraversion, likability, agreeableness, and status/power.

The color red has shown significant meaning in both the animal kingdom and in multiple human cultures. Multiple animal studies have found that female animals were more likely to try to copulate with males that displayed the largest amount and intensity of red coloration on their bodies. This female attraction to red has been reported in multiple species including fish (Milinski & Bakker, 1990), crustaceans (Iyengar & Starks, 2008), birds (Burley, 1981), and nonhuman primates (Waite et al., 2003). Animals that display more amounts of red are often more dominant and given a higher status among the group when compared to the same species with less red. Surprisingly, even the artificial addition of a red hue on male animals provokes



responses of attraction from the females (Burley, 1981; Yasukawa, Butler, & Enstrom, 2009). In humans, the color red is sometimes indicative of higher testosterone in men because of testosterone's stimulation of peripheral vasodilation, which is a widening of blood vessels in visible areas of the skin (Edwards, Hamilton, Duntley, and Hubert, 1941; Frost, 2005). In human culture, red has been associated with power, competitive dominance, strength, as well as high social status. Previous research on red, finds that humans across the globe associate the color with feelings of passion and love (Aslam, 2006; Jacobs, Keown, Worthley, & Gyhmn, 1991; Neto, 2002). Throughout history, cultures have commonly used the color red as an important symbol of strength in ceremonies and rituals, or as a symbol of fertility in mythologies (Aslam, 2006; Jacobs, Keown, Kohn, 1999, Worthley, & Gyhmn, 1991; Neto, 2002).

While Elliot et al. (2010) had a strong basis of previous evidence supporting their hypothesis, their discussions and conclusions were misguided. Elliot et al. (2010) claim that the female attraction to red may be caused by society as well as "roots in our biological heritage," however; six of these seven studies had a predominantly Caucasian population, meaning that 81% in total of the participants in these studies were Caucasian. Elliot et al. (2010) cannot accurately suggest that their observed attraction to red is caused by principles in evolutionary psychology, because the same results were not found in more ethnically diverse populations. In order for Elliot et al.'s (2010) theory to be more reputable, it was necessary that the same study was conducted on a sample that was less homogeneous.

University of California, Merced was the perfect campus to replicate this study because of its extremely diverse student population which differs greatly from the populations of the original study. UC Merced has an ethnic make-up that is 48.5% Hispanic, 23.8% Asian/Pacific Islander, 12.7% White, 5.3% non-resident alien, 4.8% African American, and approximately 2%



Native American or other. With UC Merced's more ethnically diverse population, we were able to test Elliot et al.'s hypothesis of females appraising males as more attractive when paired with the color red. This varied population allowed for results with higher internal and external validity than in the original study.

This replication study was conducted with the help of the Collaborative Replications and Education Project (CREP). CREP is a crowdsourced replication initiative with the purpose of providing undergraduate researchers the opportunity to engage independent research studies. Students who are involved with CREP research learn the mechanics of research in an environment that promotes creativity thinking on challenging topics. Along with providing undergraduates with research methodology, CREP also helps researchers conduct research and provide information for meta-analyses. The research materials needed to conduct this study were provided by CREP.

## **The Present Study**

### **Participants**

In this study we recruited 175 non-colorblind, non-homosexual female students who were 18 or older ( $M = 19.92$ ,  $SD = 1.40$ ). Participant ethnicity was as follows: 16 African American, 35 Asian, 16 Caucasian, 96 Hispanic/Latina, and 12 multi ethnic. Participants were recruited for this research through UC Merced's Research Participation System (SONA) for course credit.

### **Material and Design**

All data collected in this experiment was collected using Qualtrics (Qualtrics, 2013). All data was analyzed using the Statistical Package for the Social Sciences, and all graphs made in this article were made in Microsoft Office Excel 2013.





This was a two-way experimental design, where the independent variables measured was color of the border of the picture (red or grey, see red border photograph in Appendix A) and the dependent variables were: the man's physical attractiveness, sexual desirability, extraversion, likability agreeableness, and status/power.

## Method

In preparation for this study, only female researchers wearing neutral colors were allowed to run fellow female participants through this study, in an attempt to minimize any priming effect that a male researcher and/or the color red could have. Participants were given a written consent form to read and sign. Once consent was obtained, a researcher would instruct the participant to sit in a comfortable chair, in front of a computer. Participants were falsely told that they would engage in a task designed to gauge their first impression of another person, based on a photograph. In actuality, participants engaged in an experiment designed to manipulate their impressions/appraisals, by exposing them to the color red. Participants, with the researcher by their side, read task directions from the computer screen. The researcher confirmed that the participants understood the instructions. Participants were also reminded of their right to withdraw from the study at any time, especially if they experienced any form discomfort or distress. At this point, the experimental task began.

Participants were shown one of two black-and-white photographs of a man. These photos differed only in the color displayed (red versus grey) in the border of the photograph. Participants then responded to a survey, and rated the status, sexual desirability, personality, and emotional stability of the man in the photo. At this time, researcher left the area where the experiment was being conducted to prevent their viewing of participants' responses. The



researcher remained nearby, and was available during and after the experiment to address any concerns the participants had. Next, participants were asked to provide some demographic information, including data about their sexual orientation. They were also asked to describe what the study was supposedly about as a manipulation check, and were asked about colorblindness. Lastly, participants were debriefed and given a sheet of paper with the senior researchers' information on it as well as resources to learn more about this study.

## Measures

We used a *First Impression Questionnaire* (Appendix B) adapted from Elliot et al.'s (2010) study. We also used a basic demographic questionnaire (Appendix C), and a manipulation check as well as a screening question about colorblindness (Appendix D).

## Results

Two independent series of two-way ANOVAs were conducted using color of border around picture (red vs. grey) as the primary independent variable of interest. The second set of independent variables were the volunteers' ethnicity and relationship status, respectively.

To begin, we ran a univariate ANOVA to answer the question of whether the photograph of the man with the red border was more attractive to women than they grey border, organized on the basis of ethnicity. This relationship was not significant,  $F(4, 175) = 0.54$ ,  $p = .71$ ,  $\eta_p^2 = .013$ . This means that there was not a significant difference between racial/ethnic groups in mean attraction to the man in the photograph with the red versus the grey border.

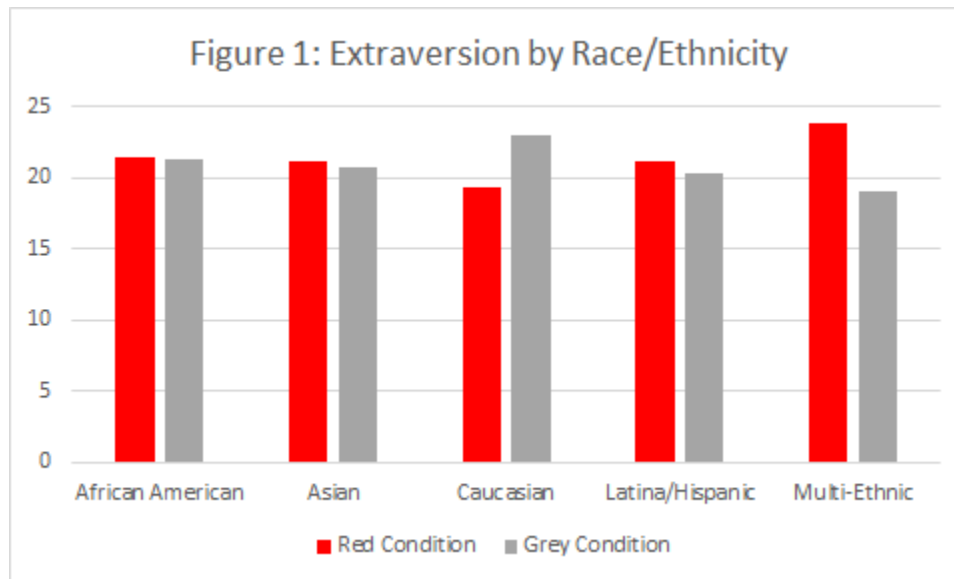
Next, we ran a univariate ANOVA where the red versus grey bordered photograph predicted sexual desirability by race/ethnicity. This relationship was overall not significant either,  $F(4, 175) = 0.53$ ,  $p = .71$ ,  $\eta_p^2 = .013$ .





Relationship status did not impact appraisals of the man's attractiveness ( $F(2, 175)= 0.35$ ,  $p= .71$ ,  $\eta_p^2= .004$ ) or sexual desirability,  $F(2, 175)= 0.51$ ,  $p= .60$ ,  $\eta_p^2= .006$ . This is to say that attractiveness (when looking at general physical attractiveness and sexual desirability) had no effect on women when they looked at the red or the grey-bordered photograph of the man, which directly counters the Elliot et al.'s (2010) findings.

Next, we ran a univariate ANOVA where ethnicity predicted perceptions of the man's extraversion. This relationship was significant,  $F(4, 174)= 2.42$ ,  $p= 0.05$ ,  $\eta_p^2=.055$ . Multi-ethnic participants who saw red appraised the photo as more extraverted ( $M =23.83$ ,  $SD =3.92$ ) while Caucasians rated him as less extraverted ( $M= 19.33$ ,  $SD= 1.73$ ). Other ethnicities showed no differences (see Figure 1). We are unsure as to why there is an effect for extraversion when there is no effect on any other of our facets of attractiveness.



Last, all other variables in this study (likability, agreeableness, and status/power) did not show significant differences between red and grey conditions, even when moderated by ethnicity or relationship status. Implications mentioned in discussion section.



## Discussion

Our findings conflict with Elliot et al. (2010) who found that seeing red changed women's perceptions of men, as our findings suggest that there is no such significant interactions. Furthermore, our study indicates that the most noted mean differences in factors of attraction (e.g., sexual desirability) favored the photograph of the man with the grey border. It should be noted that there were almost no significant differences in viewing red versus not viewing red (grey) with the exception of extraversion, moderated by ethnicity. Results showed no evidence of a differential response to the color red in human females. Instead, findings suggest the effects of red could be mostly driven by acculturation, primarily into Caucasian and Asian cultural norms. Attraction to red does not appear have biological underpinnings as attraction to red seems culture-specific. This dismisses the part of Elliot et al.'s theory that this attraction to a certain color is biologically based.

However, there may be other principles of evolutionary psychology at play. For example, it is often mentioned in throughout evolutionary psychology (Ray, 2013) that women are generally attracted to men of higher status. This is because higher status in any species tends to mean a better ability to provide resources for their mate and offspring, thus benefitting the female. This principle relates to our study because the present study was conducted in Northern America, where the majority of people are Caucasian, also where there are institutional systems in place that tend to favor those who are Caucasian (Lipsitz, 2006). This is a possible explanation to why female participants may have rated the man in the picture as potentially holding high status/power, regardless of red or grey bordering, because of the higher status Caucasian males tend to hold in American society (Lipsitz, 2006). With this logic, women could be attracted to the man in the photograph due to evolutionary groundings in mate choice on the basis of



perceived status of the male, as status can provide resources for her (and her offspring) via high status and any of the benefits that high status may garner (e.g., better ability to pay for groceries, health care, etc.).

Discrepant findings can also be explained by the differences in our sample, as compared to Elliot et al. (2010). The ethnic composition of our sample was predominantly Latino/Hispanic (54.9%). We studied the effects of red on a culturally unique group, finding no universal trends other than the trend that viewing red or grey does not seem to make much of a difference to female participants.

In addition to finding contradictory evidence to Elliot's theory, there are additional flaws to be addressed in the original study. While reviewing the Elliot et al.'s (2010) studies, it was noticed that in some of the conditions the picture of the male that was used was of a local undergraduate student. Therefore, in at least two of the seven studies that Elliot et al. (2010) based their results on, the responses from the participants could have been biased. The female participants were supposed to be able to produce their judgements solely on the picture provided of the male and the color of the picture's frame. However, if a picture of another student was used, then it is entirely possible that the female participants could have seen the male around campus or even know him personally. Therefore, it would be difficult to not sway their answers when judging the person's personality traits. If this study is replicated in the future, researchers should take precautions to not to use a picture of a student that is enrolled in that university.

### **Limitations**

While this study has a more diverse sample population than the original there are still multiple limitations. For instance, while we were able to study an ethnicity that had previously



excluded, we were unable to study a large range of ethnicities. We cannot say if these findings will remain the same if we studied an African-American or Native-American group.

Another possible limitation is that the man in the picture provided to us by CREP appeared to be a Caucasian in his late twenties or early thirties. Sometimes there are preferences in different ethnicities in mates, and other times there are not, which this study does not account for. This would be important to account for because of the likelihood of in-group or out-group racial/ethnic bias when deciding if someone is attractive or not. Elliot et al.'s (2010) studies consist of showing racial/ethnic majorities a photograph of a man who is a member of that country's majority group. There also may have been differences in the results if the man had appeared closer to the average age of our participants. While this limitation is less likely to cause discrepancies in the data, there is still a possibility that the race or age alone could have been enough to warp participant reactions.

### **Conclusion**

In sum, our study directly countered the findings in Elliot et al.'s (2010) work. Our study found that red does not significantly affect women's appraisals of men more than our control color, grey. This was an important finding as this replication study was part of a national replication effort in an attempt to generate enough data through replication to publish a large meta-analysis (on the part of CREP) to determine if red has an effect on any groups of women.

In the future, we hope that this study can be conducted on even more diverse populations in order to obtain the most accurate results. With a higher number of ethnically different samples that this study collects, we can have better insight on whether or not there is any biological reasoning behind the female attraction to red, or if the observation is purely based on individual



culture. In these more diverse samples, it may also be important to use a picture of a man that is of the same race as the women being studied.

Another aspect that could be measured in future studies is to see if the woman making the appraisal is on any form of prolonged birth control (e.g., oral contraceptives), and where she is in her menstrual cycle (ovulating versus not ovulating), as ovulation without birth control makes women desire symmetrical features, as well as look for a short-term mate (at the least) with the features of attractiveness mentioned in our study (e.g., status/power, extraversion, agreeableness, sexual desirability) (Ray, 2013) which could affect how they appraise the man in the photograph.



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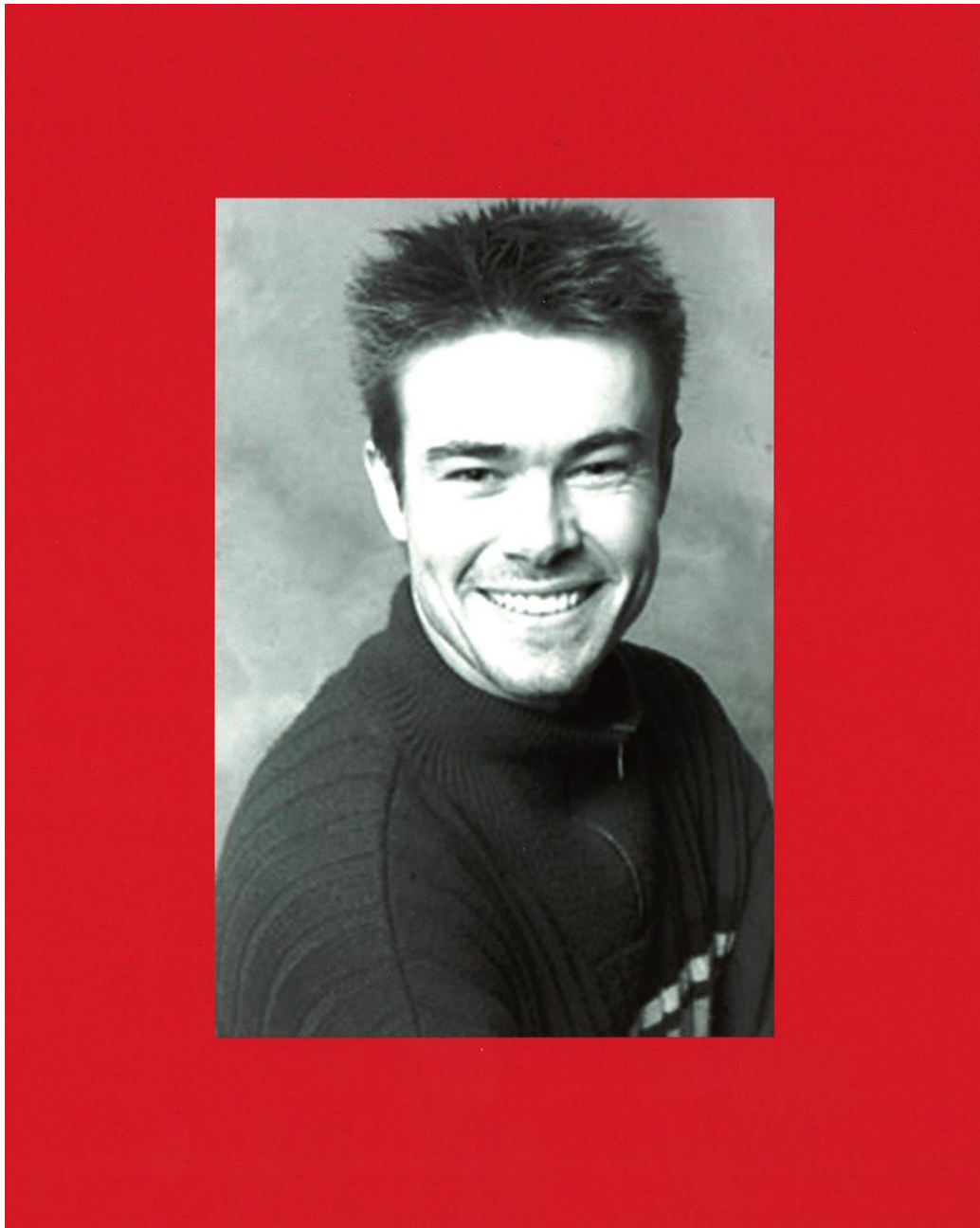
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### Appendix A: Sample Photo







### Appendix B: First Impression Questionnaire

How attractive do you think this person is?

Not at all attractive	1	2	3	4	5	6	7	8	9	Extremely attractive
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If I were to meet the person in this picture face to face, I would think he is attractive.

No, definitely not	1	2	3	4	5	6	7	8	9	Yes, definitely
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How pleasant is this person to look at?

Not at all	1	2	3	4	5	6	7	8	9	Very much
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Would you want to date this person?

No, definitely not	1	2	3	4	5	6	7	8	9	Yes, definitely
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Would you want to kiss this person?

No, definitely not	1	2	3	4	5	6	7	8	9	Yes, definitely
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How happy do you think this person is?

Not at all happy	1	2	3	4	5	6	7	8	9	Very happy
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How honest do you think this person is?

Not at all honest	1	2	3	4	5	6	7	8	9	Very honest
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How nice do you think this person is?

Not at all nice	1	2	3	4	5	6	7	8	9	Very nice
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How smart do you think this person is?

Not at all smart	1	2	3	4	5	6	7	8	9	Very smart
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How friendly do you think this person is?

Not at all friendly	1	2	3	4	5	6	7	8	9	Very friendly
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How much do you think you would like this person if you got to know him?

Not at all	1	2	3	4	5	6	7	8	9	Very much
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Phase II Questionnaire (for female sample)

How attractive do you think this person's face is?

Not at all attractive	1	2	3	4	5	6	7	8	9	Extremely attractive
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How attractive do you think this person's body is?

Not at all attractive	1	2	3	4	5	6	7	8	9	Extremely attractive
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How attractive do you think this person is, overall?

Not at all attractive	1	2	3	4	5	6	7	8	9	Extremely attractive
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How would you describe this person's physical appeal?

Very low	1	2	3	4	5	6	7	8	9	Very high
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Would you want to "make out" with this person?

No, definitely not	1	2	3	4	5	6	7	8	9	Yes, definitely
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How easygoing do you think this person is?

Not at all easygoing	1	2	3	4	5	6	7	8	9	Very easygoing
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How understanding do you think this person is?

Not at all understanding	1	2	3	4	5	6	7	8	9	Very understanding
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Would you want to have sexual intercourse with this person?

No, definitely not	1	2	3	4	5	6	7	8	9	Yes, definitely
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How high in status do you think this person is?

Not at all high	1	2	3	4	5	6	7	8	9	Very high
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How much power do you think this person has?

None at all	1	2	3	4	5	6	7	8	9	Very much
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How would you describe this person's emotional stability?

Emotionally Unstable	1	2	3	4	5	6	7	8	9	Emotionally Stable
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Would you want to leave your current partner for this person?

No, definitely not	1	2	3	4	5	6	7	8	9	Yes, definitely
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I think that this person has the potential to have a great deal of status?

Not at all	1	2	3	4	5	6	7	8	9	Very much
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I think that this person has the potential to have a high social position?

Not at all	1	2	3	4	5	6	7	8	9	Very much
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I think that this person has the potential to have high earnings?

Not at all	1	2	3	4	5	6	7	8	9	Very much
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I think that this person has the potential to have a great deal of success?

Not at all	1	2	3	4	5	6	7	8	9	Very much
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How well do the following statements describe this person?

21. He is the life of the party?

Not at all	1	2	3	4	5	6	7	8	9	Very well
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22. He does not talk a lot?

Not at all	1	2	3	4	5	6	7	8	9	Very well
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23. He talks to a lot of different people at parties?

Not at all	1	2	3	4	5	6	7	8	9	Very well
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24. He keeps to the background?

Not at all	1	2	3	4	5	6	7	8	9	Very well
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### Appendix C: Demographic Questions

Age: \_\_\_\_\_ years \_\_\_\_\_ months

Ethnicity:

- |   |  |
|---|--|
| <input type="checkbox"/> African American         | <input type="checkbox"/> Latino / Hispanic           |
| <input type="checkbox"/> Caucasian                | <input type="checkbox"/> Native American             |
| <input type="checkbox"/> Asian / Pacific Islander | <input type="checkbox"/> Multi-ethnic                |
| <input type="checkbox"/> East Indian              | <input type="checkbox"/> Other (Please specify)_____ |

Marital Status:

- |  |  |
|--|--|
| <input type="checkbox"/> Married                       | <input type="checkbox"/> Dating Someone              |
| <input type="checkbox"/> Single                        | <input type="checkbox"/> Remarried                   |
| <input type="checkbox"/> Living together (not married) | <input type="checkbox"/> Separated                   |
| <input type="checkbox"/> Divorced                      | <input type="checkbox"/> Other (Please specify)_____ |

Sexual Orientation:       Heterosexual       Bisexual       Prefer not to Answer  
 Homosexual       Other

Years of school completed       12 years (College Freshman)  
 13 years (College Sophomore)  
 14 years (College Junior)  
 15 years (College Senior)  
 16 years (Super Senior)  
 +16 years





### Appendix D: Screening Questions

Please answer these questions, so we can learn a little more about your experience during the study.

What did you think the purpose of this study is?	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
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Are you red-green colorblind?	<input type="checkbox"/> Yes <input type="checkbox"/> No
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