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The Effect of Background Colors and Associations on Perceived Attractiveness, Help-seeking, and Helping Behavior

Zeina Y. Ghanem

Hollins University, ghanemzy@hollins.edu

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THE EFFECT OF BACKGROUND COLORS AND ASSOCIATIONS ON PERCEIVED
ATTRACTIVENESS, HELP-SEEKING, AND HELPING BEHAVIOR

by

Zeina Y. Ghanem

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Director of Thesis: Dr. Bonnie Bowers

Department: Psychology

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Abstract

The objective of this study is to understand how background colors influence an individual's perception of another person's interpersonal attractiveness, along with how these factors affect an individual's social support giving and seeking behavior for each presented image. The study aims to explore the effects of color, attractiveness, color associations, and prosocial behaviors.

Participants ($N = 278$) consented to take a 10-minute online survey. The background colors used were red and blue with varied saturation levels (light, medium, and dark) and a white control background. There were no significant effects of background colors and saturation lightness levels found for Interpersonal Attraction and Social Support Seeking. Key findings revealed that there was a statistically significant difference in Interpersonal Attraction ratings with the medium red color background between individuals on their menstrual period ($M = 3.98$, $SD = .72$) and those who were not at the time ($M = 4.63$, $SD = .51$), ($F(1, 27) = 6.42$, $p = .017$, $\eta^2 = .19$).

Additionally, there was a strong positive correlation between Interpersonal Attraction and Social Support Seeking for all background colors and saturation lightness levels, $r(268) = .611$, $p < .001$, and the background colors of red and blue and their three saturations, $r(231) = .618$, $p < .001$. The results indicated the higher an individual is rated in attraction the more likely they are to receive social support and be sought for help. The findings prompt further research into the effects of background colors on these measures.

Keywords: Interpersonal Attraction, Helping Behavior, Social Support Seeking, Background Color, Saturation

The Effect of Background Colors and Associations on Perceived Attractiveness, Help-Seeking, and Helping Behavior

This study aims to understand how background colors influence an individual's visual perception of another person's social and physical attractiveness. Alongside interpreting the connections between color and attractiveness, the research investigates how these factors impact an individual's inclination to seek assistance and extend help when needed for each presented image. By examining the interplay of color, attractiveness, associated color terminology, and prosocial behaviors, the study endeavors to shed light on the underlying mechanisms that guide human interactions, ultimately contributing to a more comprehensive understanding of the complex dynamics at play in subconscious interpersonal perceptions and actions.

Tham et al. (2020) found that color stands out as an immediate visual stimulus processed by the human brain due to color information influencing an individual's perception. Color is considered an essential component encompassing varied symbolic functions, expressions, and concepts. For instance, specific color associations are used as expressions like *you are as white as a ghost* (indicating that you look pale because you are afraid or scared), or *this just happened out of the blue* (something unexpected). In recent years, there has been significant attention focused on studying the influence of color on an individual's psychological functioning in relation to cognition and behavior. Research has discovered that color can impact various aspects of performance, including IQ tests, anagram and numeracy tasks, creativity exercises, demanding cognitive activities, physical strength tasks, and even performance in combat sports (Tham et al., 2020).

Color in Context, Concept Associations, and Lightness Levels

Tham et al. (2020) suggests that the context in which color associations are invoked can be a factor that influences their conceptual meanings and can have an impact on psychological functioning. While colors can influence tasks differently by either hindering or facilitating them, their effects are not consistently uniform. For example, the color red on a traffic light signifies danger and prompts drivers to stop, due to the repeated pairing of that color on the road to the word stop leading to the action of stopping. Pravossoudovitch et al (2014) found in their two experiments that the color red was strongly associated with danger, as shown by its consistent linkage across two different types of stimuli and dependent measures. However, in the context of a romantic dinner, it is argued that the same color could symbolize love or attraction, akin to red roses given on Valentine's Day which help indicate the passion, desire, and affection an individual has for their partner (Tham et al., 2020).

Additionally, in the study of Tham et al. (2020), there were universal themes associated with specific color categories like the term purity with the color white. Furthermore, they discovered that specific groups of concepts were linked to distinct ranges of lightness, with negative concepts correlated with darker colors and positive concepts associated with lighter colors. An association between lightness and color was discovered for several color categories, including red, yellow, green, purple, blue, and pink. There were similarities across both English-speaking and monolingual Chinese participants, associating light green with the word fresh. However, medium green had contrasting associations; it was linked for example to envy and jealousy for English participants, whereas it was associated with hope and vitality for monolingual Chinese participants. These distinct patterns of associations suggest that light, medium, and dark colors can carry specific meanings that depend on the cultural context.

A cluster consists of interconnected concepts predominantly linked to a single or a narrowly defined set of color categories. Tham et al. (2020) found consistency across cultures regarding the clustering of concepts around dark and medium lightness levels for certain colors like dark and medium red, as well as light and medium lightness levels for colors like pink and green. However, differences emerged in the clustering of colors for blue and purple, with different cultures associating concepts across light, medium, and dark lightness levels, or just medium and dark saturation lightness levels, or only light and medium saturation lightness levels. Overall, these findings indicate the significant influence of lightness levels on positive and negative associations with colors.

Furthermore, it was noteworthy that participants in the study, when presented with a wide range of color tiles for selection, didn't always base their choices solely on broad color categories. Interestingly, it was observed that certain points within the color spectrum exhibited the strongest associations with specific concepts (e.g., danger). Additionally, observations were made that certain concepts were associated with specific ranges of lightness. In these cases, negative concepts tended to be linked with darker colors, while positive concepts were more often associated with lighter colors. Substantial evidence suggests that one specific aspect of color, lightness, inherently carries emotional connotations (Palmer et al., 2013, as cited in Tham et al., 2020, p. 1327).

Color and Emotion

In the study of Thorstenson et al. (2018), participants were tasked with altering the color of neutral faces to match six different emotions: anger, disgust, fear, happiness, sadness, and surprise. Their findings revealed that increasing redness was linked to emotions like anger, happiness, and surprise which are approach-oriented emotions. In contrast, reducing facial

redness was associated with emotions like disgust, fear, and sadness which are avoidance-oriented emotions. These findings align with the presumed impact of vascular responses on skin coloration when individuals experience these emotions (Changizi & Shimojo, 2011, as cited in Thorstenson et al., 2018, p. 1034).

The color emotion-based theory by Ou et al. (as cited in Palmer & Schloss, 2010, p. 8877) proposes that feelings arise from experiencing either individual colors or combinations of colors. This theory suggests that our preference for certain colors is based on how they make us feel. In other words, if viewing certain colors generates positive emotions, individuals are more likely to develop a preference for those colors. While Humphrey et al.'s hypotheses (as cited in Palmer & Schloss, 2010, p. 8877) focus on genetic adaptations over generations, the Ecological Valence Theory (EVT) proposed by the article, expands the scope to include individual organisms acquiring color preferences during their lifetimes. An analogy can be drawn with taste preferences, which involve both evolutionary factors and learned experiences from consuming different flavored foods with varying outcomes. The EVT connects with Ou et al.'s emotion-based theory by proposing that environmental feedback necessary to develop mental shortcuts for color preferences is acquired through emotional experiences associated with colors throughout an individual's life. In other words, our emotional responses to colors over time shape our preferences for them, forming mental shortcuts or associations that influence our perceptions and choices. The theory posits that individuals are more likely to favor colors they associate with enjoyable and positively impactful experiences. According to the Ecological Valence Theory (EVT), people's overall preference for a particular color is mainly influenced by their average emotional reactions to objects of that color. As a result, individuals are inclined to favor colors linked to salient objects that typically evoke positive emotions, whereas they are prone to dislike

colors tied to salient objects that typically evoke negative reactions. Strauss et al. (2013) found a causal link between people's preferences for a specific color and their preferences for objects typically associated with that color, providing additional backing for the EVT beyond previous correlational evidence. These results support the EVT's proposition that color preferences are influenced by preferences for associated objects.

Color and Attraction

The findings from the first and second experiments conducted by Young (2015) indicate that the link between the color red and sexual attraction seems to be influenced by an individual's baseline attractiveness. The color red enhanced perceptions of attractiveness only for faces initially considered relatively attractive; men rated women higher in attractiveness against a red background when they were already deemed attractive. Conversely, the color red had no effect on the perceived attractiveness of faces initially considered unattractive; thus, men did not alter their ratings in such cases.

The central hypothesis of Elliot and Niesta (2008) revolves around the idea that the color red influences men's perception of women, making them appear more attractive and sexually desirable. It proposes that red functions as a sexual stimulator for men due to its association with sexual tendencies and romance within the context of heterosexual interactions. This hypothesis finds support in empirical research, which has demonstrated that red is commonly associated with passionate feelings, lust, and romantic love in people's minds. The five experiments conducted by Elliot and Niesta (2008) strongly validate the anticipated impact of the color red. This effect was consistently observed across various conditions. Importantly, it's worth noting that red didn't affect women's perceptions of the attractiveness of other women; this effect was evident among male perceivers as it manifested in terms of perceived attractiveness, sexual

appeal, and intentions related to dating and spending. However, it did not have an influence on men's perceptions of other positive attributes in women such as overall likability, kindness, or intelligence. Additionally, participants in the red condition rated the target woman as more attractive and sexually desirable compared to those in the blue condition. The results support that red conveys a sexual meaning due to the effects observed on males and females and on specific types of positive attributes.

Help and Attraction

It is assumed that feelings of attraction drive helping behavior regardless of whether the person in need belongs to one's in-group or out-group. Stürmer et al. (2005) suggests that group dynamics indicate that feelings of interpersonal attraction play a more significant role in helping when the person in need belongs to an out-group. Empathy and attraction were found to be important predictors of helping behavior. While empathy typically drives helping behavior towards in-group members, when considering help for out-group members, inhibiting factors such as negative intergroup emotions may override empathy. In such cases, attraction may serve as an alternative pathway to helping, offering a less stereotypical perspective of the person in need. In situations where empathy is not the primary motivator for helping, attraction can act as an alternative route to assisting others. By feeling drawn to the individual in need, people may be more inclined to provide assistance, viewing the person through a lens less influenced by stereotypes or preconceived notions which can sometimes hinder help provision. This attraction-based pathway offers a different perspective on the person in need, potentially leading to more genuine and unbiased support (Stürmer et al., 2005).

The findings of the study conducted by Mims et al. (1975) indicate a preference for assisting individuals who are deemed attractive, irrespective of their gender. Additionally,

individuals tend to evaluate others more favorably when they possess attractive instead of unattractive qualities, regardless of whether they are of the same gender as well.

Conducted Research Study

This study utilized the colors white, blue, and red, with blue and red having three varied saturation lightness levels of light, medium, and dark. The experiment displayed images of people (both male and female identifying) with different colored backgrounds. The measures used were Interpersonal Attraction and Social Support Seeking. It is hypothesized that the images with lighter-colored backgrounds, light red and light blue, will receive higher attraction ratings, more social support, and more positive associations than those with darker-colored backgrounds. Additionally, those with a red background will have higher ratings in comparison to blue in light saturation but not in medium and dark saturation lightness levels. The second hypothesis suggests that individuals menstruating may associate the color red with negative terminology and will more likely select a lower attractiveness response for individuals depicted against red backgrounds compared to those not menstruating. The third hypothesis proposes that those who were rated higher in attraction will be more likely to be helped and more likely to be reached out to for help and vice versa.

Method

Participants

There were two participant pools for this research study— one comprised of students associated with a small liberal arts university and the general public ($N = 69$) and one from Prolific ($N = 209$). When combined, a total of 278 participants volunteered and consented to

partake in an online survey, approved by the Institutional Review Board (IRB) at Hollins University. Some of the participants were recruited from prolific.

The research study offered compensation to student participants in the form of extra credit for psychology courses at Hollins University. It allowed all participants to enter a raffle for two \$25 Amazon gift cards. Among the participants, 210 (74.8%) were students. The majority comprised 128 (46%) undergraduate students, 80 (28.8%) graduate students, and 70 (25.2%) falling into the “other” category. Within the undergraduate category were 30 freshmen, 26 sophomores, 22 juniors, 34 seniors, and 16 others ($N = 128$ undergraduate students). The highest level of education completed was high school 128 (46%), bachelor’s 96 (34.5%), master’s 25 (9%), associate’s 18 (6.5%), PhD, MD, JD, or other professional degree 6 (2.2%), and other 5 (1.8%). Participants' ages ranged from 18 to 69 ($M = 26.67$, $SD = 8.65$). Gender identification predominantly included female ($N = 144$, 51.8%), followed by male ($N = 122$, 43.9%), non-binary/third gender ($N = 9$, 3.2%), other ($N = 1$, .4%), and ($N = 2$, .7%) selected prefer not to answer.

Regarding sexual orientation, most identified as heterosexual ($N = 187$, 67.3%), then bisexual ($N = 48$, 17.3%), other ($N = 20$, 7.2%), homosexual ($N = 16$, 5.8%), and those who preferred not to answer ($N = 7$, 2.5%). For race/ethnicity, the majority identified as White/Caucasian ($N = 165$, 59.4%), followed by, Hispanic, Latinx, or Spanish origin ($N = 57$, 20.5%), Black or African American ($N = 21$, 7.6%), Asian or Asian American ($N = 17$, 6.1%), Multiracial or Biracial ($N = 9$, 3.2%), Middle Eastern or Arab American ($N = 2$, .7%), and other ($N = 3$, 1.1%). None identified as Native American or Alaska Native and Native Hawaiian or Pacific Islander; however, a small percentage ($N = 4$, 1.4%) chose not to answer.

Lastly participants had to indicate if they were on their menstrual period, ($N = 150$, 54%) selected no, ($N = 94$, 33.8%) selected not applicable to me, ($N = 31$, 11.2%) selected yes, and ($N = 3$, 1.1%) selected maybe.

Stimuli

The Chicago Face Database (CFD) by Ma, Correll., & Wittenbrink (2015) includes self-identified Asian, Black, Latino, and White female and male models. The Chicago Face Database: Multiracial Expansion (CFD-MR) by Ma, Kantner, & Wittenbrink (2020) extension set has female and male individuals who self-reported multiracial ancestry. Both sets recruited models from the United States. The question they asked in the main CFD set and CFD-MR extension set in order to receive the mean value of attraction in the study is: “Now, consider the person pictured above and rate him/her with respect to other people of the same race and gender.” (For example, if you indicated that the person was Asian and male, consider this person on the following traits relative to other Asian males in the United States). Attractiveness was rated on a 7-point Likert scale from 1 (*Not at all*), 4 = (*Neutral*), 7 = (*Extremely*).

Five female and five male images (one Asian Female (AF), one Black Female (BF), one Latina Female (LF), one White Female (WF), one Multiracial Female (MF) & one Asian Male (AM), one Black Male (BM), one Latino Male (LM), one White Male (WM), one Multiracial Male (MM)) were used for this study. Their rated age range is from 21 to 29. The rated age of AF is 24.1, BF is 21.34, LF is 28.79, WF is 22.6, and MF is 25.95. The mean rated age for the female images is $M = 24.536$. The rated age of AM is 29.2, BM is 22.4, LM is 26.55, WM is 25.8, and MM is 23.57. The mean rated age for the male images is $M = 25.504$. The chosen attractiveness ratings are from 3.9-5.5. The attractiveness mean for AF is 4.52, BF is 4.89, LF is 4.58, WF is 5.48, and MF is 3.91 Overall attractiveness mean = 4.68. The attractiveness mean

for AM is 3.89, BM is 4.12, LM is 5.07, WM is 4.66, and MM is 4.26. Overall attractiveness $M = 4.40$.

The majority of the image properties had a width of 460 and a height of 345 while some had a width slightly above or under 460 and a height slightly above or under 345 due to graphic upload differences. The blocks were randomized, and participants were presented with images of people displayed with either a plain control white background, light red colored background, dark/dull red colored background, red colored background, light blue colored background, blue colored background, or a dark/dull blue colored background. Based on random assignment, the participants would receive one independent group of a background color with the Social Support Seeking Measure and Interpersonal Attraction Scale—Modified questions displayed underneath each presented image. The app YouCam Perfect was used to integrate and saturate background colors for each individual image.

Measures

The Social Support Seeking Measure by Frison and Eggermont (2015) was modified by the researcher to incorporate two helping/prosocial behavioral questions. The measure originally had two items but modified has 4 with leading scenario statements and are rated on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The Interpersonal Attraction Scale—Modified by Tung (2016) is used to rate social and physical attraction. The edited aspect in this scale is the word robot which was replaced with person. The scale is rated on 7-point Likert scale from 1 = strongly disagree to 7 = strongly agree.

Lastly, participants are asked, “What do you associate the color red/blue/white/light blue/light red/dark blue/dark red with?” Participants randomly received any of the colored

backgrounds and whichever was displayed, the associated color question was asked. Refer to Appendix A.

Procedure

Participants were first provided with an informed consent form with instructions. The presented purpose mentions the deceptive intention of the study; however, the real intention was revealed after the study was completed. After consenting, the participants received an online survey in Qualtrics that took about 10 minutes to complete. A brief page about general demographic information collection for an individual was displayed on the screen. Then participants were randomly assigned a block out of seven variations and were presented with a questionnaire that was divided into two categories of relevance. The initial segment incorporated a modified version, tailored for this study by the researcher, of the Social Support Seeking Measure originally developed by Frison and Eggermont (2015). In this phase, participants were presented with female and male images either having a plain white background or one among the red or blue saturated background colors of light, medium, or dark. The associated questions were then displayed beneath each image. This process was repeated for all ten images, encompassing both genders. Subsequently, the same methodology was applied to the Interpersonal Attraction Scale—Modified by Tung (2016). Background color acted as the manipulation factor in this study due to comparing differences in its effect. The misleading aspect of this study was the omission of measuring attractiveness from the title. The title shown to participants was, “Individual Social and Physical Perceptions, Help-Seeking, and Helping Behavior” and the purpose avoided the mention of attraction and used perceptions. Lastly, participants were presented with a question related to the background color they received, asking about their associated color terminology using one word. Finally, the participants were debriefed.

Afterward, they were redirected to a page that allowed them to select which study they had participated in and whether they would like to be entered into a raffle and/or receive extra credit for a psychology course at Hollins University.

Results

The Effect of Background Color and Saturation on Interpersonal Attraction Ratings

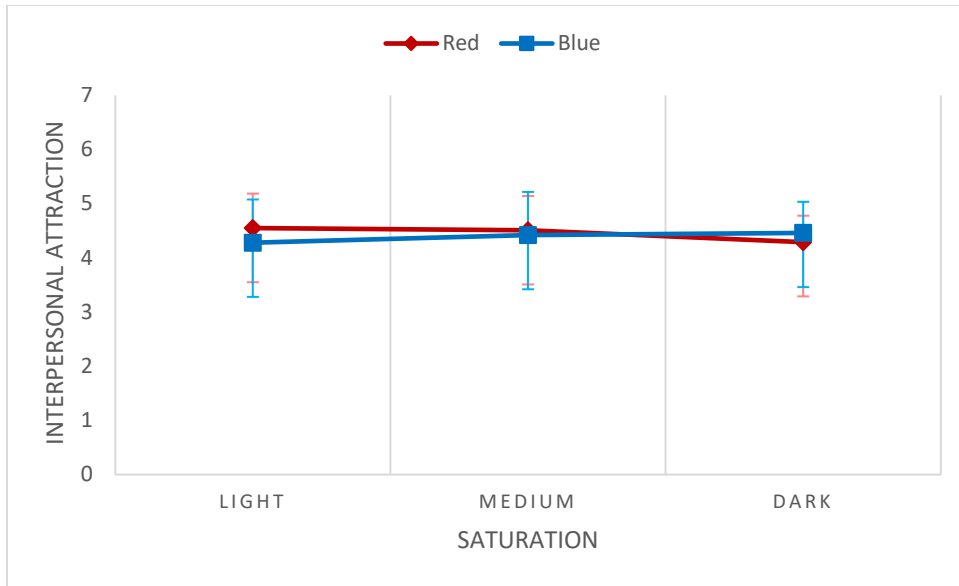
A one-way ANOVA was used to analyze the effects of the background color's red, blue, and white on Interpersonal Attraction. A non-significant result was found, $F(2, 266) = .866$, $p = .422$, $\eta^2 = .006$. The value for η^2 represents a small effect size.

The effects of background color and saturation on Interpersonal Attraction ratings were assessed a 2 (background color: red, blue) x 3 (saturation-lightness levels: light, medium, dark) factorial ANOVA. There was no significant interaction between background color and saturation type, $F(2, 226) = 2.02$, $p = .135$, $\eta_p^2 = .018$. A nonsignificant main effect of background color was found, $F(1, 226) = .49$, $p = .485$, $\eta_p^2 = .002$, with Interpersonal Attraction being higher in red background ($M = 4.45$, $SE = .065$) than in blue background ($M = 4.39$, $SE = .062$). A nonsignificant main effect of saturation type was also found, $F(2, 226) = .35$, $p = .702$, $\eta_p^2 = .003$, with interpersonal attraction being the highest in medium ($M = 4.47$, $SE = .076$), then light ($M = 4.41$, $SE = .077$), and lastly dark ($M = 4.38$, $SE = .079$). The effects are depicted in Figures 1 and 2. Figure 2 acts as a closer indication of the effects where blue slightly increases in mean value from light to dark while it had a reverse effect on red.

Figure 1

The Effect of Red and Blue Backgrounds of Different Saturation Lightness Levels on

Interpersonal Attraction



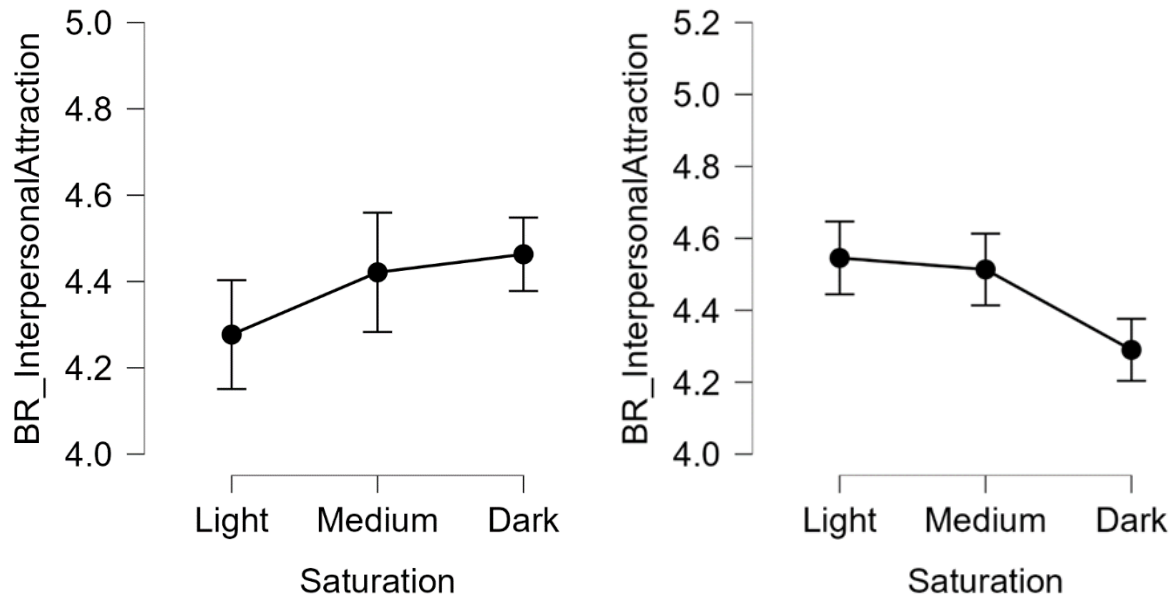
Note. The figure above shows the differences in numerical averages in Interpersonal Attraction for the images displayed in the study between the red and blue backgrounds using three saturation lightness levels. The figure depicts that blue is slightly less than red in value for light saturation, they are about the same for medium saturation, however blue increases slightly in comparison to red in dark saturation.

Figure 2

Background Color and Different Saturation Effects on Red and Blue in Interpersonal Attraction

Color_BR: Blue

Color_BR: Red



Note. The descriptive plots above show the same results as Figure 1, however, they provide a more approximate numerical average for each saturation lightness level for the red and blue backgrounds and indicate their slight differences in Interpersonal Attraction ratings for the displayed images in the study.

The Effect of Background Color and Saturation on Social Support

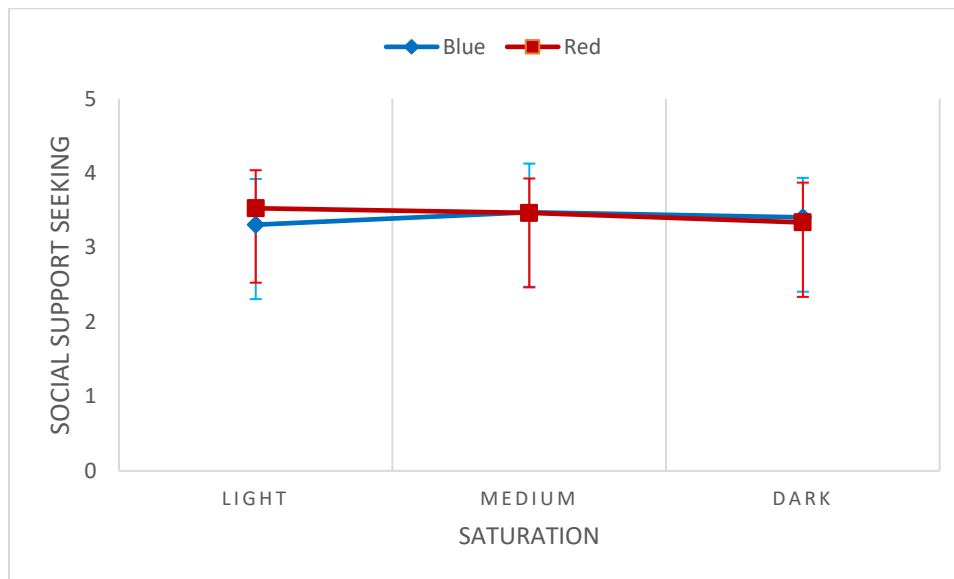
A one-way ANOVA was used to analyze the effects of the background color's red, blue, and white on Social Support Seeking. A non-significant result was found, $F(2, 270) = .821, p = .441, \eta^2 = .006$.

The effects of background color and saturation on Social Support Seeking ratings were assessed a 2 (background color: red, blue) x 3 (saturation-lightness levels: light, medium, dark) factorial ANOVA. There was no significant interaction between background color and saturation type, $F(2, 229) = 1.47, p = .232, \eta_p^2 = .013$. A nonsignificant main effect of background color was found, $F(1, 229) = .43, p = .515, \eta_p^2 = .002$, with Social Support Seeking being higher in red background ($M = 3.44, SE = .052$) than in blue background ($M = 3.4, SE = .051$). A

nonsignificant main effect of saturation type was also found, $F(2, 226) = .6, p = .547, \eta_p^2 = .005$, with social support seeking being the highest in medium ($M = 3.47, SE = .062$), then light ($M = 3.42, SE = .063$), and lastly dark ($M = 3.37, SE = .064$). The means are depicted in Figures 3 and 4. Figure 4 acts as a closer indication of the effects where blue slightly increases in mean value from light to medium but dips a bit in value in dark saturation while red continues to decrease from light to dark saturation.

Figure 3

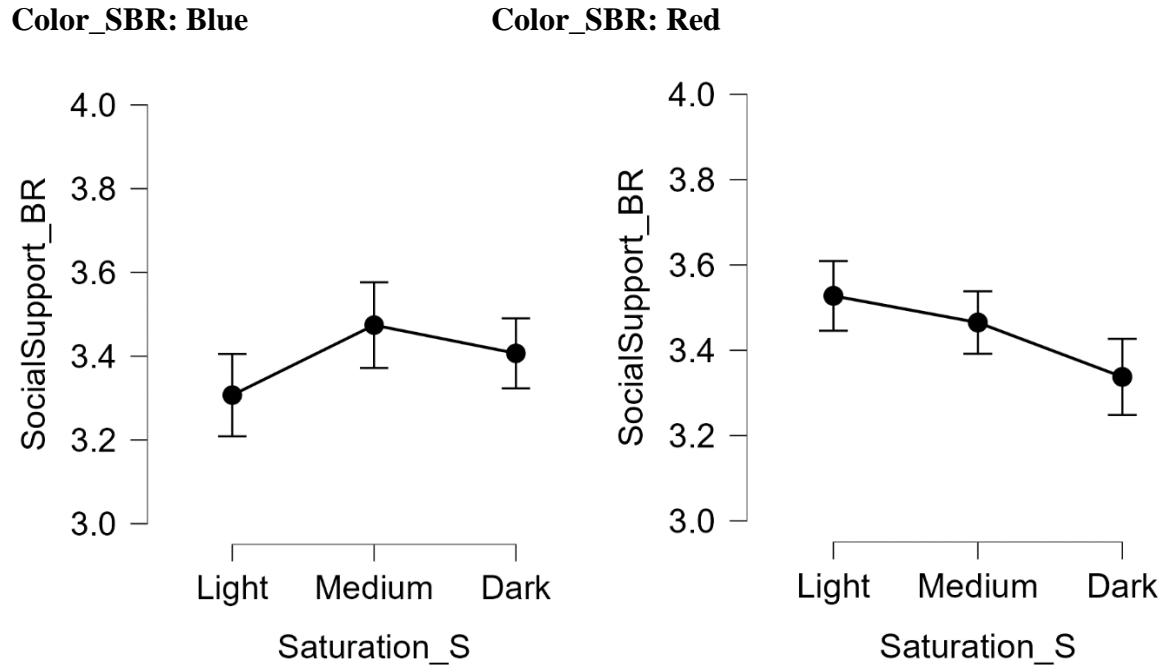
The Effect of Red and Blue Backgrounds of Different Saturation Lightness Levels on Social Support Seeking



Note. The figure above shows the differences in numerical averages in Social Support Seeking for the images displayed in the study between the red and blue backgrounds using three saturation lightness levels. Similar to Figure 1, Figure 2 depicts that blue is slightly less than red in value for light saturation, they are about the same for medium saturation, however blue is also in line with red in dark saturation.

Figure 4

Background Color and Different Saturation Effects on Red and Blue in Social Support Seeking



Note. The descriptive plots above show the same results as Figure 3, however, they provide a more approximate numerical average for each saturation lightness level for the red and blue backgrounds as well as show their slight differences in Social Support Seeking ratings for the displayed images in the study.

Differences Between Genders in Light Red Background and Interpersonal Attractiveness

Since there were slight variation in light red mean values in Interpersonal Attractiveness, an independent samples t-test was performed to compare Interpersonal Attraction for female images with a light red colored background between male and female participants. There were no significant differences in Interpersonal Attraction between males ($N = 17, M = 4.79, SD = .92$) and females ($N = 21, M = 4.75, SD = .56$); $t(36) = .166, p = .869, d = .05$. It has a small

effect size. When conducted with male images with a light red colored background between male and female participants, there were no significant differences in Interpersonal Attraction between males ($N = 17, M = 4.52, SD = .79$) and females ($N = 21, M = 4.12, SD = .6$); $t(36) = 1.761, p = .087, d = .57$. It has a medium effect size.

Differences Between Genders in Light Red Background and Social Support Seeking

Since there were slight variation in light red mean values in Social Support Seeking, an independent samples t-test was performed to compare Social Support Seeking in female images with a light red colored background between male and female participants. There were no significant differences in Social Support Seeking between males ($N = 17, M = 3.56, SD = .54$) and females ($N = 22, M = 3.84, SD = .54$); $t(37) = -1.62, p = .115, d = -.52$. It has a medium effect size. When conducted with male images with a light red colored background between male and female participants, there were no significant differences in Social Support Seeking between males ($N = 17, M = 3.27, SD = .53$) and females ($N = 22, M = 3.33, SD = .67$); $t(37) = -.277, p = .783, d = -.099$. It has a small effect size.

The Effect of Menstruation on Attraction Ratings of Individual Images with Medium Red Background

A one-way ANOVA was performed to compare the effect of having a menstrual period on Interpersonal Attraction with the red color background. A one-way ANOVA revealed that there was a statistically significant difference in Interpersonal Attraction ratings between at least two groups, ($F(1, 27) = 6.42, p = .017, \eta^2 = .19$). There is a large effect size. The mean value for individuals on their menstrual period was ($N = 6, M = 3.98, SD = .72$) while those that were not ($N = 23, M = 4.63, SD = .51$) which indicated that those that answered yes chose 3 = *somewhat*

disagree and 4 = *neither agree nor disagree*, and those that answer no chose between 4 = *neither agree nor disagree* and 5 = *somewhat agree*. Therefore, an individual on their menstrual period selected a lower attractiveness response to those with medium red backgrounds compared to those not menstruating.

However, when looking into the Social Attraction and Physical Attraction sections from the Interpersonal Attraction Scale separately in relation to menstruation, the results differed. For Physical Attraction there was a significance difference between those menstruating ($N = 6, M = 3.88, SD = 1.01$) and those not menstruating ($N = 23, M = 4.63, SD = .72$); $t(27) = -2.08, p = .048, d = -.86$ regarding the red background. It has a large effect size. Additionally, for Social Attraction there was a statistically significant difference between those menstruating ($N = 6, M = 4.04, SD = .58$) and those not menstruating ($N = 23, M = 4.63, SD = .5$); $t(27) = -2.51, p = .019, d = -1.1$. It has a large effect size.

Color Associations

The words that were repeated the most when attributed to the color white were “Snow” ($N = 10$) with the words “Cold” and “Winter” added to the total. Then “Purity” ($N = 8$), the word “Pure” was added to the word count. The word “Cleanliness” ($N = 7$) and the words “Clean” and “Cleaning” were added to the total. The words “Cloud” and “Sky” combined ($N = 4$). The words “Peace,” “Emptiness,” “Paper,” “People,” and “Milk” had ($N = 2$). The remainder of the listed words in Table 1 have ($N = 1$). The majority of the words used have positive connotations.

The words that were repeated the most when associated with the color light red were “Flowers,” “Carnations,” and “Roses” combined ($N = 5$), “Grapes,” “Strawberries,” and “Tomato” combined ($N = 5$), “Traffic Light” and “Stop” combined ($N = 4$), and “Lipstick” and “Lip-gloss” combined

($N = 4$). The words “Passion,” “Love,” “Blood,” and “Anger” had ($N = 2$). The remainder of the listed words in Table 1 have ($N = 1$). The majority of the words used have positive connotations.

The words that were repeated the most when associated with the color medium red were “Anger,” “Fury,” and “Rage” combined ($N = 9$), “Blood” ($N = 9$), “Danger” ($N = 6$), “Love” ($N = 5$), “Passion” ($N = 4$), “Apples” ($N = 3$), “Strength,” “Bold,” “Strong,” and “Brave” combined ($N = 4$). The words “Fire,” “Wine,” and “Intensity” had ($N = 2$). The remainder of the listed words in Table 1 have ($N = 1$). The majority of the words used have negative connotations.

For those who were menstruating, the words used to associate the color medium red with were: “Angry,” “love,” “apples,” “blood,” “fashion,” and “rage,” with each word being mentioned once.

The words that were repeated the most when associated with the color dark red were “Blood” ($N = 12$) and the words “Danger” and “Wine,” had ($N = 2$). The remainder of the listed words in Table 1 have ($N = 1$). The majority of the words used have negative connotations.

The words that were repeated the most when associated with the color light blue were “Sky” ($N = 20$), “Calmness,” “Calm,” and “Serenity” ($N = 4$), and “Comfort” ($N = 2$). The remainder of the listed words in Table 1 have ($N = 1$). The majority of the words used have positive connotations.

The words that were repeated the most when associated with the color medium blue were “Sky” ($N = 14$), “Calmness,” “Calm,” “Serenity,” and “tranquility” combined ($N = 11$). The remainder of the listed words in Table 1 have ($N = 1$). The majority of the words used have positive connotations.

The words that were repeated the most when associated with the color dark blue were “Ocean,” “Deep Ocean,” and “Sea” ($N = 21$), “Night,” “Night Sky,” and “Sky” combined ($N = 3$), “Sadness” ($N = 3$), and “Depth” ($N = 2$). The remainder of the listed words in Table 1 ($N = 1$). The majority of the words used have positive connotations.

Table 1

Color Associations for Different Saturations

Color Associations						
White	Light Red	Red	Dark Red	Light Blue	Blue	Dark Blue
Milk	Danger	Pain	Blood	Sky	Sky	Night Sky
Snow	Sunset	Love	Love	Beauty	Heaven	Melancholy
Cold		Passion		Products		Gloomy
Winter	Lip-gloss	Romance	Fire		Peace	
	Lipstick			Ocean	Peacefulness	
Peace		Danger	Anger	Sea		Deep ocean
	Blood				Ocean	Ocean
Cleanliness		Anger	Elegance	Serenity	Lake	Sea
Clean	Traffic light	Fury		Calm		
Cleaning	Stop	Rage	Danger	Calmness	Comfort	Peace
Surrendering	Problem					
				Formality	Tranquility	Sapphires
Emptiness	Salmon	Blood	Velvet		Serenity	
				Reliability	Calm	Depth
					Calmness	
People	Flowers	Apples	Roses	Babies	Good thoughts	Royalty
	Roses					Luxury
Pure	Carnations	Brave	Stop			
Purity		Strong			Sad	Peace
	Strawberries	Strength	Apples		Sadness	
Attractive	Grapes	Bold	Cherries			Mystery
	Tomato		Tomatoes		Assertive	
		Roses				Sadness
Sky	Emergency		Christmas		Flowers	
Clouds		Fire	Wood			Power
Light	Love	Warmth			Cold	Authority
	Passion		Wine			

Marriage	Coziness	Intensity	Maturity	Cold
Paper	Coldness	Wine	Lipstick	
Walls	Anger	Alarm		
	Pink			

Note. The table above displays the terminology used when associated with a specific color and saturation lightness level.

The Correlation of Interpersonal Attraction and Social Support

A two-tailed Pearson correlation coefficient was computed to assess the linear relationships between Interpersonal Attraction and Social Support Seeking for all background colors and saturation lightness levels. There was a strong positive correlation between these two variables, $r(268) = .611, p < .001$. When assessing for a correlation for the backgrounds red and blue along with their three saturations, there was also a strong positive correlation between Interpersonal Attraction and Social Support Seeking, $r(231) = .618, p < .001$. The previous data checked for a separate effect of saturation lightness levels of red and blue on Interpersonal Attraction and Social Support Seeking individually, and these results reveal how these two measures affect each other. Overall, the results indicated the higher an individual is rated in attraction the more likely they are to receive social support and be sought out for help.

Additionally, an independent samples t-test was performed to compare Social Support Seeking between male and female participants. There were significant differences in Social Support Seeking between males ($N = 122, M = 3.35, SD = .54$) and females ($N = 140, M = 3.49, SD = .54$); $t(260) = -2.06, p = .041, d = .26$. It has a small effect size. However, no significant

differences were shown for Interpersonal Attraction between males and females; $t(255) = -.6, p = .549$.

Racial/Ethnic Identity and Interpersonal Attraction

For the white control background, Table 2 shows that Latinx Female had the highest mean value (M = 4.74) among the women displayed and the Latinx Male (M = 4.61) had the highest mean value among the men while Multiracial Female (M = 3.93) and Asian Male (M = 3.95) had the lowest average value for Interpersonal Attraction. Originally, Latinx Female had a score of 4.58 and Multiracial Female had a score of 3.91. Their scores in this research study were slightly higher in value. In contrast, Latinx Male had a score of 5.07 and Asian Male of 3.89. The mean value decreased for Latinx Male and increased for Asian Male. For additional results refer to Appendix B.

Table 2

Individual Image Interpersonal Attraction Ratings for White Background

Race For individual Image	N	Mean	SD	Minimum	Maximum
Asian Female	40	4.6	1.02	2.38	6.38
White Male	40	4.45	1.06	1.00	6.63
Asian Male	39	3.95	1.13	1.00	6.50
Black Female	39	4.63	1.07	2.25	7.00
Latinx Male	39	4.61	1.16	1.00	7.00
Latinx Female	38	4.74	.95	2.13	6.63
Multiracial Female	38	3.93	1.06	1.75	5.75
Black Male	38	4.11	.89	1.00	5.75
Multiracial Male	38	4.07	1.13	1.00	6.25
White Female	38	4.42	.89	2.75	6.38

Note. The table above shows that Latinx Female had the highest mean value (M = 4.74) among the women displayed and the Latinx Male (M = 4.61) had the highest mean value among the men for the control white background.

An analytical test cannot be performed due to the difference in the number of statements in the measures. The main CFD set, and CFD-MR extension set had one statement related to measuring attraction whereas the Interpersonal Attraction Scale—Modified had two sections measuring social and physical attraction and eight statements in total. However, the scale used for both was about the same, 7-point Likert scale but with different associated terminology.

Discussion

The first hypothesis was not supported by the presented data in the research study. It was hypothesized that the images with lighter-colored backgrounds will receive higher attraction ratings, social support, and more positive associations than those with darker-colored backgrounds. A non-significant result was found on the effects of the background color's red, blue, and white on Interpersonal Attraction and Social Support Seeking. Additionally, there was no significant main effect between background hue of red and blue and saturation-lightness levels of light, medium, and dark for Interpersonal Attraction and Social Support Seeking. The color red did not appear to have much of a higher value than blue. Those with a light red background did have higher ratings in comparison to blue in light saturation but not in medium and dark saturation lightness levels in both Interpersonal Attraction and Social Support Seeking, however, not to the point where it would result in a significant difference. Thus, even though the data reveals small variations in the mean values, with light being slightly higher than dark, the effect was too small to cause a difference.

The associations used for the background colors white, light red, light blue, blue, and dark blue were mainly positive, however, for red and dark red, the associations were mainly negative. White had the most associations for snow and purity, light red with some variation of flowers and fruits, red with anger, blood, and danger, dark red associated with blood, light blue

and blue with the sky and a sense of calm, lastly, dark blue with the ocean. Therefore, light red did receive more positive associations in comparison to red and dark red, however, all saturation-lightness levels for blue received positive associations.

The second hypothesis was supported by the data. There was a statistically significant difference in Interpersonal Attraction ratings between individuals that were on their menstrual period and those who were not. The research data revealed that individuals menstruating selected a lower attractiveness response to individual images with medium red backgrounds compared to those who were not menstruating. Nevertheless, upon examining the Social Attraction and Physical Attraction dimensions individually within the Interpersonal Attraction Scale concerning menstruation, notable variations in results emerged. Physical Attraction and Social Attraction exhibited statistically meaningful variances. Specifically, the mean values from the Physical Attraction and Social Attraction measures derived from the Interpersonal Attraction Scale, with the background color red (medium), significantly differed between individuals where those currently experiencing menstruation had rated the images less attractive in comparison to those who were not. Due to the limited number of participants, there were not enough word associations with red to measure whether it is associated with negative or positive terminology.

Lastly, the third hypothesis was also supported. Overall, the results indicated a strong positive correlation between Interpersonal Attraction and Social Support Seeking, revealing that the higher an individual is rated in attraction the more likely they will receive social support and be sought for help. These results align with previous studies such as Mims et al. (1975). The study by LaBuda et al. (2015) also supports this data as participants in their study indicated a greater likelihood of helping individuals perceived as attractive than unattractive.

The results also showed that there were significant differences in Social Support Seeking between males and females. Females had a higher mean value in the Social Support Seeking measure in comparison to those identifying as male. The assumption could be made that women are more likely to assist individuals in need and seek help when needed while men are less likely to do so. This is contrary to available data on prosocial behavior and gender roles, as shown in the meta-analysis of Eagly (2009) that generally men helped more than women when interacting with strangers.

Limitations and Future Directions

This study has strengths and limitations. It collected information from a diverse population, including students, professors, and other individuals at Hollins University and outside, people of different gender identities and races/ethnicities, therefore, taking into perspective multiple views. A limitation to consider is if the sample size was larger. Slight differences were displayed but were not significant, therefore, if the sample size was potentially larger there could have been more significant differences. Each randomized block received around 38 to 40 responses. In order to accurately measure whether Menstruation does affect Interpersonal Attraction, specifically those with a medium red background, a larger sample size would be required. There were not enough participants that answered the word association section during menstruation.

Some issues with this study could be the variety of individual races presented. If one race was displayed, the results could be compared better between the images, however, the lack of representation could have interfered with participant responses and likewise racial bias could have also affected their responses. One female and one male image represented a certain race, more variation of individuals for a race would have presented more comparable data, however,

due to time constraints, 5 races using both genders were incorporated. Additionally, using one gender instead of both male and female for the images could have allowed for an overall better comparison.

The data collection involved a self-report survey, acknowledging the potential for participants to respond in a socially desirable manner. To mitigate this, anonymity was guaranteed, and participants were given the freedom to choose a comfortable environment for survey completion. The estimated time for survey completion was about 10 minutes which was not too long to deter individuals from completing it. It's important to note that while the survey may suggest a likelihood of helping behavior, actual responses in real-life situations could vary.

Future research could look into the effect of individuals belonging to diverse cultures on color associations, attraction, and prosocial behaviors. This research study opens new possibilities for the interference of color on helping and help seeking behaviors aside from attraction ratings. Additionally, the effect of menstruation on color preference has not been previously looked at. Even though the findings of this research study did not reveal an effect of color and saturation lightness levels on Interpersonal Attraction and Social Support Seeking, the results support the body of literature regarding the effect (or correlation) of attractiveness on helping behaviors.

Appendix A

Do you have a color deficiency? (No/Yes) If yes, refers them to end of the survey.

Are you a student? (Multiple choice: Undergraduate, Graduate, Other)

If currently in college, what is your year of study? (If answered Undergraduate- Multiple choice:
Freshman, Sophomore, Junior, Senior, Other)

What is the highest level of education you have completed? (Multiple choice: Highschool,
Associate, Bachelor, Master, PhD, Other)

What age range do you fall under? (if not over 18 refers them to end of the survey) (Under 18,
18-24, 25-34, 35-44, 45-54, 55-64, 65-74, 75 or older)

What gender do you identity as? (Male, Female, Non-binary/third gender, Other, Prefer not to
say)

What is your sexual orientation? (Heterosexual, Homosexual, Bisexual, Other, Prefer not to say)

What is your race/ethnicity? (White/Caucasian, Black or African American, Hispanic, Latinx, or
Spanish origin, Middle Eastern or Arab American, Asian or Asian American, Native
American or Alaska Native, Native Hawaiian or Pacific Islander, Multiracial or Biracial,
Other, Prefer not to answer)

Are you currently on your menstrual period? (Yes/Maybe/No/ Not applicable to me)

Note: Images are displayed first afterward with following questions.

Measurements

Items are rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Frison, E., & Eggermont, S. (2015). Social Support Seeking Measure.

Instructions: Answer the following to the best of your ability based on the image displayed below. (1 = *strongly disagree*; 2 = *somewhat disagree*; 3 = *neither agree nor disagree*; 4 = *somewhat agree*; 5 = *strongly agree*)

If you are feeling down or in a difficult situation...

(1) I would turn to this person to seek help.

(2) I would turn to this person to talk about my problems.

If they are feeling down or in a difficult situation....

(1) I would help this person.

(2) I would allow this person to talk about their problems with me.

Items are rated on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree).

Tung, F.-W. (2016). Interpersonal Attraction Scale—Modified.

Instructions: Answer the following to the best of your ability based on the image displayed below. (1 = *strongly disagree*; 2 = *disagree*; 3 = *somewhat disagree*; 4 = *neither agree nor disagree*; 5 = *somewhat agree*; 6 = *agree*; 7 = *strongly agree*)

Social Attraction Scale

1. I think this person is friendly.

2. I like this person.

3. I think this person could be my friend.

4. I would like to have a friendly chat with this person.
5. I think this person is pleasant to be with.

Physical Attraction Scale

6. I think this person is good-looking.
7. I think this person is attractive.
8. I like the way this person looks.

Instructions: Please answer the following question using one word.

1. What do you associate the color red with? (Participants who received images with a red background will get this question)
2. What do you associate the color blue with? (Participants who received images with a blue background will get this question)
3. What do associate the color white with? (Participants who received images with a white background will get this question)
4. What do you associate the color light blue with? (Participants who received images with a light blue background will get this question)
5. What do you associate the color light red with? (Participants who received images with a light red background will get this question)
6. What do you associate the color dark blue with? (Participants who received images with a dark blue background will get this question)
7. What do you associate the color dark red with? (Participants who received images with a dark red background will get this question)

Appendix B

Table 3

Individual Image Interpersonal Attraction Ratings for Light Red Background

Race For Individual Image	N	Mean	SD	Minimum	Maximum
Asian Female	39	4.7	.91	3.25	7.00
White Male	39	4.53	1.01	2.38	7.00
Black Female	39	5.19	.83	3.63	7.00
Asian Male	39	4.11	.96	2.38	6.38
Latinx Female	39	4.83	1.07	1.63	6.50
Black Male	39	4.23	1.09	1.25	7.00
Multiracial Female	39	4.63	.87	3.13	6.38
Latinx Male	39	4.38	.87	2.38	6.25
White Female	39	4.56	1.13	2.00	7.00
Multiracial Male	39	4.28	.75	3.00	6.00

Note. The table above shows that Black Female had the highest mean value ($M = 5.19$) among the women displayed and the White Male ($M = 4.53$) had the highest mean value among the men for the light red background.

Table 4

Individual Image Interpersonal Attraction Ratings for Medium Red Background

Race For Individual Image	N	Mean	SD	Minimum	Maximum
Asian Female	40	4.65	.76	3.38	7.00
White Male	40	4.37	.78	2.88	6.26
Black Female	40	5.05	.83	3.50	7.00
Asian Male	40	3.95	.93	1.00	5.50
Latinx Female	40	4.81	.91	3.13	6.75
Black Male	40	4.26	.94	2.38	7.00
Multiracial Female	40	4.31	.91	2.63	6.00
Latinx Male	40	4.4	.97	2.25	7.00
White Female	40	4.51	1.04	1.50	6.50
Multiracial Male	40	4.3	1.07	1.00	6.13

Note. The table above shows that Black Female had the highest mean value ($M = 5.05$) among the women displayed and the Latinx Male ($M = 4.4$) had the highest mean value among the men for the red background.

Table 5

Individual Image Interpersonal Attraction Ratings for Dark Red Background

Race For Individual Image	N	Mean	SD	Minimum	Maximum
Asian Female	38	4.58	.95	3.25	7.00
White Male	38	4.41	.97	2.38	7.00
Black Female	37	4.98	1.13	3.63	7.00
Asian Male	37	3.63	1.04	2.38	6.38
Latinx Female	37	4.69	1.05	1.63	6.50
Black Male	37	4.23	1.01	1.25	7.00
Multiracial Female	37	4.16	.88	3.13	6.38
Latinx Male	37	4.03	1.17	2.38	6.25
White Female	37	4.29	.98	2.00	7.00
Multiracial Male	37	4.29	1.08	3.00	6.00

Note. The table above shows that Black Female had the highest mean value ($M = 4.98$) among the women displayed and the White Male ($M = 4.41$) had the highest mean value among the men for the dark red background.

Table 6

Individual Image Interpersonal Attraction Ratings for Light Blue Background

Race For Individual Image	N	Mean	SD	Minimum	Maximum
Asian Female	38	4.54	.97	2.25	6.25
White Male	37	4.46	.99	1.75	6.50
Black Female	36	4.54	1.11	1.88	6.38
Asian Male	34	3.52	.95	1.38	5.13
Latinx Female	34	4.69	.99	1.88	6.38
Black Male	34	3.83	1.09	1.00	5.50
Multiracial Female	34	4.12	1.12	1.00	6.38
Latinx Male	34	4.09	1.13	1.00	5.88
White Female	34	4.45	1.15	1.50	6.88
Multiracial Male	34	3.98	1.14	1.00	6.38

Note. The table above shows that Latinx Female had the highest mean value ($M = 4.69$) among the women displayed and the White Male ($M = 4.46$) had the highest mean value among the men for the light blue background.

Table 7

Individual Image Interpersonal Attraction Ratings for Medium Blue Background

Race For Individual Image	N	Mean	SD	Minimum	Maximum
Asian Female	40	4.55	1.09	1.63	7.00
White Male	40	4.31	1.08	1.13	7.00
Black Female	40	5.03	1.25	1.38	7.00
Asian Male	40	4.06	1.11	1.13	7.00
Latinx Female	39	4.85	1.02	3.00	7.00
Black Male	39	4.31	1.09	2.25	7.00
Multiracial Female	39	4.39	.97	1.50	7.00
Latinx Male	39	4.22	1.07	2.00	7.00
White Female	39	4.37	1.08	1.88	7.00
Multiracial Male	39	4.6	1.06	2.50	7.00

Note. The table above shows that Black Female had the highest mean value ($M = 5.03$) among the women displayed and the Multiracial Male ($M = 4.6$) had the highest mean value among the men for the blue background.

Table 8

Individual Image Interpersonal Attraction Ratings for Dark Blue Background

Race For Individual Image	N	Mean	SD	Minimum	Maximum
Asian Female	39	4.48	.99	2.5	6.25
White Male	39	4.43	.93	1.88	6.00
Black Female	39	4.95	.8	3.00	6.63
Asian Male	39	3.93	.96	2.25	6.38
Latinx Female	39	4.74	.89	3.13	7.00
Black Male	39	4.27	.83	2.38	6.00
Multiracial Female	39	4.35	.98	1.38	6.25
Latinx Male	39	4.6	.82	2.88	6.25
White Female	39	4.54	1.02	2.13	6.38
Multiracial Male	39	4.53	.8	2.63	6.00

Note. The table above shows that Black Female had the highest mean value ($M = 4.95$) among the women displayed and the Multiracial Male ($M = 4.53$) had the highest mean value among the men for the dark blue background.

Individual Image Social Support Seeking Ratings

Table 9

Individual Image Social Support Seeking Ratings for White Background

Race For Individual Image	N	Mean	SD	Minimum	Maximum
Asian Female	39	3.62	.66	2.25	4.50
White Male	40	3.46	.80	1.50	5.00
Latinx Female	40	3.88	.61	2.50	5.00
Asian Male	40	3.35	.75	1.00	4.75
Black Female	40	3.79	.76	1.00	5.00
Latinx Male	40	3.41	.81	1.00	4.50
Multiracial Female	40	3.49	.79	2.00	5.00
Black Male	40	3.39	.71	1.00	4.75
White Female	40	3.53	.79	1.50	5.00
Multiracial Male	40	3.48	.75	1.00	5.00

Note. The table above shows that Latinx Female had the highest mean value ($M = 3.88$) among the women displayed and the Multiracial Male ($M = 3.48$) had the highest mean value among the men for the white background.

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