



The correlation between color choices and impulsivity, anxiety and depression

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ABSTRACT

Objective: It is considered that, in addition to different effects of colors on mood, psychopathological processes are also a conductive factor in color preferences. Thus, the objective of the present study was to investigate whether there was a relationship between color preferences and impulsive behavior.

Method: Socio-demographic information, anxiety levels, depression and impulsivity levels of 200 individuals aged 18-50, which were selected randomly, were assessed. Beck Anxiety (BAI), Beck Depression (BDI) and Barrat Impulsivity Scales (BIS) were applied to all participants. They were asked the first color that comes to mind and their favorite colors. Preferred colors were divided into three groups of cold (blue, purple, green), warm (red, yellow, pink, brown) and neutral colors (black, white, grey).

Results: Study group included 87 males (43.5%), 113 females (56.5%) and their mean age was 26.9±6.2 years. (female mean age: 25.9±5.5; male mean age: 28.1±6.9). The first color that came to mind was blue (32%), followed by red (20%). Their most favorite colors were blue (33%) and black (20%). BIS total points were the highest for those who chose yellow, blue, purple and black colors, respectively. BAI was the highest in participants who preferred color black and BDI was the highest in participants who preferred color grey. Those who scored the highest points in BAI and BDI preferred neutral colors. Anxiety scores for those preferring cold, warm and neutral colors were statistically significantly different ($p=0.02$).

Conclusion: Color preferences are closely related to impulsivity. Furthermore, anxiety and depression levels of individuals also affect their color preferences.

Keywords: Color, impulsivity, anxiety, depression.

INTRODUCTION

The sensation created by light rays reflected by objects in our eyes is called "color." Colors have been an indispensable part of social life since the ancient times. Ancient people used colors as objects of sorcery and visual expressiveness during worship, to hide from enemies, to look scary, or to be liked and to satisfy the beautification instinct (1). Colors were also used to define shapes and to differentiate objects in artistic work. Today, colors are still significant and basic tools of communication in their use as a media to reflect the emotions and thoughts of individuals and communicating messages. Since colors have the capacity to affect emotional, cognitive and physical worlds of individuals, they could have stimulating, depressing, repulsive or attractive effects (2). Colors are divided into two groups of cold and warm colors based on their intensity and their mental effects on individuals. Warm colors are produced when the sunlight passes through a prism and they verge on the color red. The colors such as red, yellow, orange and brown, which are lively, attractive colors that give energy to individuals and stimulate the emotion of liveliness, are classified as warm colors. Colors with less vibration that produce cool and calm emotions such as blue, purple and green are called cold colors (3). Possible effects of colors on human psychology also influence individuals' color preferences (4). Color preferences are also influenced by the character of the individual, the conditions the individual experiences, the individual's age, gender, whims and desires. Selected colors reveal subliminal desires and inefficacies and could function as a personality development agent. In a study conducted by Ireland et al., it was determined that individuals with high level of anxiety preferred dull colors when compared to individuals with low anxiety and the result was related to non-preference

of shiny colors by individuals with anxiety due to the stimulating effects of these colors (5). In another study, it was determined that individuals diagnosed with post-traumatic stress disorder (PTSD) preferred the color green to color red (6). In addition to different effects of colors on color preferences to their intrinsic nature, it was considered that psychopathological processes could be a significant factor for color selection. Thus, in the present study, it was aimed to investigate whether there was a relationship between the impulsive behavior, which are the actions of individuals without considering the consequences, and the color preferences of individuals.

MATERIALS AND METHODS

Socio-demographic information, anxiety levels, depression and impulsivity levels of 200 individuals between the ages of 18 and 50, who did not receive any psychiatric treatment during the last 3 months, and which were selected randomly from the society, were analyzed in the present study. Socio-demographic information about the individuals such as age, gender, marital status, education and income levels, alcohol - substance use and suicide history were recorded. Beck Anxiety, Beck Depression and BIS were applied to all participants. All participants were asked the first color that comes to their mind and their favorite colors, and the answers were recorded in the data form. A study instrument that consisted of 4 x 4 cardboards in blue, green, red, yellow, pink, black, brown and grey colors glued to a larger cardboard was utilized to determine the favorite colors of participants (7). To survey the color preference, the participants were asked to identify the first color that comes to their mind and their favorite colors. Participants were informed that they could choose any color even though it was not represented on the cardboard.

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Scales Used

1. Socio-demographic and Clinical Data Form: A socio-demographic and clinical data form designed by the authors based on the clinical experience in the cases and literature review conducted and parallel to the objectives of the current study was used. This was a semi-structured form that included socio-demographical information such as age, gender, marital status, education level, profession, domicile, income level and family structure, and clinical data.

2. Beck Anxiety Inventory (BAI): This scale measures the frequency of anxiety symptoms that an individual experienced. It includes 21 question total. Each item is scored 0 - 3 points that gradually increase. Higher total scores demonstrate the level of that individual's anxiety. Validity and reliability study for the scale was conducted by Ulusoy et al. in Turkish (8).

3. Beck Depression Inventory (BDI): It is applied to identify the depression risk in the patient, and to measure the level and intensity of the depressive symptoms. It includes 21 questions total. Each item is scored 0 - 3 points that gradually increase and the total score is calculated by totaling these scores. Total score can vary between 0 and 63. Validity and reliability study for the scale was conducted by Hisli in Turkish (9).

4. BIS Impulsivity Scale (BIS): The scale is used to assess impulsivity and filled by the patient. It includes 30 items. 4 different scores are obtained in BIS-11. These are; total points, motor impulsivity, attentional impulsivity and non-planning impulsivity. A high total score means a high impulsivity level for the patient. Validity and reliability study for BIS-11 was conducted by Güleç et al. in Turkish (10).

Statistical Assessment

Collected data were assessed based on the literature. SPSS for Windows V.22.0 computer software was used for data analysis. In the software, t-test was used for paired comparisons, chi-square test was used for categorical comparisons, and finally analysis of variance test (ANOVA) was used for triple comparisons. Level of significance was set as $p < 0.05$.

RESULTS

Study group included 87 males (43.5%) and 113 females (56.5%) and their mean age was 26.9±6.2 years. Socio-demographic characteristics of the participants are presented in Table 1. The first color that came to participants' mind was the color blue (32%), followed by the color red (20%). Color blue (33%) came to males' mind the most, while only 28% of the females said that color blue came to their mind first. Participants said their favorite color was blue (33%) and black (20%) the most. 43.7% of the males said that their favorite color was blue, followed by black (20%), while blue was the favorite color for 25% of the females, followed by color black (20%) (Table 2). Colors pink and purple were among the favorite colors of only females, while brown was a favorite color for males only. Analysis of scale scores demonstrated that all scale scores except for BIS attentional score (BAI, BDI, BIS non-planning, BIS motor and BIS total) were higher among females than males (Table 1). However, there were no statistically significant difference between the scores of males and females ($p > 0.05$). Participant who preferred the colors yellow, blue, purple and black scored the highest BIS total points. Those who preferred the color blue received the highest BIS non-planning points, while those who preferred the color purple received the highest BIS motor points, and those who preferred the color yellow received the highest BIS attentional points. BAI points were the highest among those that selected color black, and BDI points were the highest among those that selected color grey (Table 5). BIS total points were lowest among the individuals

who selected color pink as the first color that came to mind or as their favorite color. Anxiety rates were lower among the individuals who selected colors yellow and brown, and depression rates were lower among the individuals who selected colors green and brown as their favorite color. However, the differences between the scores were not statistically significant ($p > 0.05$).

When the colors preferred by the participants are grouped as cold (blue, purple, green), warm (red, yellow, pink and brown) and neutral (black, white, grey) colors, it was determined that mostly cold colors (48.5%) were preferred. The group with the highest Beck Anxiety score and Beck Depression score was these who preferred the neutral colors of black, white and grey (Table 6). The difference between the groups based on anxiety scores was statistically significant ($p < 0.02$).

Table 1: Comparison of socio-demographic characteristics based on gender

| | Female | | Male | | Total | |
|-------------------------------|------------|-------|--------------------|-------|-----------|------|
| | n:113 | %56.5 | n:87 | %43.5 | n:200 | %100 |
| Age | 25.9±5.5 | | 28.1±6.9 | | 26.9±6.2 | |
| Marital status (married) | 37 | %33 | 26 | %30 | 63 | %32 |
| Education | Primary S | | Middle - High Sch. | | College | |
| | 1 | %1 | 1 | %1 | 2 | %1 |
| | 19 | %17 | 20 | %23 | 39 | %20 |
| | 93 | %82 | 66 | %76 | 159 | %80 |
| Profession (unemployed) | 48 | %42 | 39 | %45 | 87 | %44 |
| Income Level (low) | 4 | %3 | 6 | %7 | 10 | %5 |
| Smoking | 28 | %25 | 32 | %37 | 60 | %30 |
| Alcohol | 4 | %3 | 9 | %10 | 13 | %7 |
| Substance use | - | | - | | - | |
| Domicile (central) | 104 | %92 | 82 | %94 | 186 | %93 |
| Suicide history | 3 | %3 | 2 | %2 | 5 | %3 |
| Psychiatric treatment history | 12 | %10 | 12 | %14 | 24 | %12 |
| Beck Anxiety Inventory | 11.62±9.02 | | 8.83±8.52 | | 10.4±8.9 | |
| Beck Depression Inventory | 10.62±8.27 | | 8.8±7.8 | | 9.8±8.09 | |
| BIS Motor Score | 21.03±3.62 | | 19.9±3.35 | | 20.5±3.5 | |
| BIS Attentional Score | 16.6±3.56 | | 16.8±2.93 | | 16.7±3.3 | |
| BIS Non-planning | 27.8±3.7 | | 26.7±4.03 | | 27.4±3.9 | |
| BIS Total | 65.2±8.9 | | 63.4±6.7 | | 64.4±8.05 | |

Table 2: Comparison of colors that came to mind first

| | Blue | Red | Black | Green | Yellow | Pink | Purple | Grey | White | Brown |
|--------|------|-----|-------|-------|--------|------|--------|------|-------|-------|
| Female | 32 | 23 | 17 | 11 | 9 | 10 | 9 | 1 | 1 | - |
| Male | 32 | 16 | 14 | 15 | 4 | 1 | 1 | 2 | 2 | - |
| Total | 64 | 39 | 31 | 26 | 13 | 11 | 10 | 3 | 3 | - |

Table 3: Comparison of the color that came to mind first and scale scores

| | BAI | BDI | B.non-planning | B.motor | B.attentional | B.total |
|--------|-----------|-----------|----------------|-----------|---------------|-----------|
| Red | 11.1±10.2 | 9.4±8.8 | 28.4±4.4 | 21.1±4.1 | 16.97±2.9 | 66.4±7.0 |
| Yellow | 8.8±7.1 | 10.0±8.2 | 27.2±4.5 | 20.5±2.4 | 16.7±2.9 | 66.5±6.5 |
| Blue | 10.8±8.8 | 11.1±8.9 | 27.1±3.6 | 20.3±3.7 | 16.7±3.9 | 64.4±7.1 |
| Green | 8.7±5.6 | 7.3±6.1 | 26.7±3.0 | 19.1±1.97 | 16.2±3.1 | 62.0±5.5 |
| Black | 13.6±10.5 | 10.6±7.5 | 27.3±4 | 20.5±3.7 | 16.9±3.5 | 65.0±5.9 |
| Pink | 5.5±4.5 | 7.2±5.1 | 26.1±3.9 | 21.5±3.8 | 16.4±2.3 | 57.9±19.9 |
| Brown | - | - | - | - | - | - |
| Grey | 10.0±5.2 | 18.3±10.0 | 27.0±6.6 | 21.7±1.5 | 19.7±2.5 | 68.3±6.4 |
| Purple | 9.8±10.7 | 6.7±5.2 | 28.2±3.9 | 21.7±3.5 | 16.6±2.8 | 66.5±7.99 |
| White | 2.7±3.06 | 13.0±11.4 | 28.3±3.2 | 22.3±4.9 | 16.8±2.1 | 67.0±5.3 |

BAI: Beck Anxiety Scale, BDI: Beck Depression Scale, B.non-planning: BIS non-planning, B.motor: BIS motor, B.attentional: BIS attentional, B.total: BIS total

Table 4: Comparison of favorite colors

| | Blue | Black | Red | Green | Pink | Grey | White | Purple | Yellow | Brown |
|--------|------|-------|-----|-------|------|------|-------|--------|--------|-------|
| Female | 28 | 23 | 18 | 13 | 13 | 3 | 6 | 6 | 3 | - |
| Male | 38 | 17 | 7 | 12 | - | 7 | 1 | - | 3 | 2 |
| Total | 66 | 40 | 25 | 25 | 13 | 10 | 7 | 6 | 6 | 2 |

Table 5: Comparison of selected favorite color and scale scores

| | BAI | BDI | B. non-planning | B. motor | B. attentional | B. total |
|--------|------------|----------|-----------------|-----------|----------------|-----------|
| Red | 9.8±8.5 | 7.5±6.8 | 27.2±3.5 | 20.3±3.97 | 16.2±3.4 | 63.6±7.6 |
| Yellow | 6.2±4.7 | 9.3±5.2 | 26.3±4.2 | 22.2±1.5 | 17.8±4.1 | 66.3±7.0 |
| Blue | 10.6±9.4 | 9.5±9.0 | 28.2±3.7 | 20.2±3.8 | 17.1±3.3 | 65.6±7.3 |
| Green | 7.4±5.05 | 7.5±6.8 | 26.7±4.1 | 19.7±2.7 | 15.6±2.0 | 62.0±5.5 |
| Black | 13.7±10.2 | 11.6±7.2 | 24.5±4.2 | 20.5±3.9 | 16.9±3.9 | 65.5±6.2 |
| Pink | 8.6±8.97 | 8.9±7.5 | 26.5±3.0 | 21.4±3.0 | 17.2±2.5 | 60.1±18.4 |
| Brown | 5.5±7.78 | 7.5±10.6 | 24.5±6.4 | 21.5±0.7 | 15.5±0.7 | 61.5±4.9 |
| Grey | 10.9±5.26 | 11.8±8.4 | 26.4±4.5 | 20.8±1.8 | 17.4±4.3 | 64.6±6.3 |
| Purple | 8.7±5.2 | 8.5±8.45 | 27±4.4 | 22.5±4.1 | 16.0±2.0 | 65.5±7.6 |
| White | 12.4±13.87 | 8.7±7.5 | 27±4.1 | 21.1±4.6 | 15.9±3.4 | 64.0±6.9 |

BAI: Beck Anxiety Scale, BDI: Beck Depression Scale, B.non-planning: BIS non-planning, B. motor: BIS motor, B.attentional: BIS attentional, B. total: BIS total

Table 6: Comparison of scale scores of those that preferred warm, cold and neutral colors

| | Cold colors n:97 | Neutral colors n:56 | Warm colors n:47 | p |
|-----------------|---------------------|------------------------|---------------------|-------|
| BAI | 9.63±8.37 | 13.14±9.94 | 8.72±8.04 | 0.020 |
| BDI | 8.96±8.44 | 11.36±7.41 | 9.78±8.04 | 0.211 |
| B. non-planning | 27.71±3.88 | 27.2±4.23 | 27.4±3.89 | 0.416 |
| B. motor | 20.25±3.56 | 20.7±3.64 | 20.9±3.4 | 0.555 |
| B. attentional | 16.7±3.0 | 16.88±3.87 | 16.64±3.17 | 0.921 |
| B. total | 64.7±7.0 | 65.2±6.23 | 62.87±11.31 | 0.302 |

BAI: Beck Anxiety Scale, BDI: Beck Depression Scale, B.non-planning: BIS non-planning, B. motor: BIS motor, B.attentional: BIS attentional, B. total: BIS total
Cold colors; Blue, green, purple Neutral colors; Black, white, gray Warm colors; Yellow, red, pink, brown

DISCUSSION

It is possible to come across studies on color preferences in the literature. However, since there was no study that compared color preferences with impulsivity, the present study is significant in being the first study in the field. In the study, it was determined that participants preferred the colors blue, black, red and green the most, respectively and the rank based on the color that came to mind first was blue, red and black. Three colors that came to mind first and the top three preferred colors were the same except for the ranking. In a study conducted with college students in Turkey, the first color that came to mind spontaneously was identified as the color red and the favorite colors of college students were blue, red, black and white, respectively (11). In another study conducted in Turkey in 2002, the most liked colors by the participants were colors black, white and blue (61.8%) with a small margin (12). Overall review of these studies would demonstrate that black and blue were the most preferred colors and the third most preferred color varied between the color red and white.

It has been known that factors such as the culture, conditions surrounding the individual, age, and gender, in addition to the personality traits of the individual were effective in color preferences. Literature review would demonstrate that individuals with similar personality traits preferred similar colors. Max Lüscher, who discovered the color test in 1947, argued that colors had psychological meanings and individuals'

choices in color are closely related to their personalities. Lüscher selected colors yellow, red, blue and green for 4 personality types used to define humans in general and stated that each of these 4 personality type resembled the color it was named after (13).

Impulsivity is a personality trait characterized by inappropriate or extremely risky, not adequately planned behavior that cause undesired consequences. It is more frequently observed generally in careless, impatient, novelty-seeking, risk taking, thrill and pleasure seeking, extravert individuals that undermine the possibility of harm (14). In the present study individuals with the highest impulsivity scores preferred the colors yellow, blue, black and purple, respectively. In fact, the color yellow reflects a versatile personality that has the potential to reach a self-satisfactory success in various occupations as a result of persistent pursuits (15). However, in the current study, it was observed that those who selected the color yellow scored higher points in both BIS attentional and BIS total scales. A high score in BIS attentional scale means that the individual engages in careless behavior, a high total score translates into high impulsivity. Thus, the findings made us think that color yellow could be related to impulsivity.

Purple color is a mixture of colors red and blue and preferred mostly in stressful situations. One of the three color preferences in our study with high impulsivity scores was the color purple and BIS motor scores of participants that preferred the purple color were higher compared to those who preferred the other colors. It was also identified that those whose favorite color was purple in the present study were all females. It was observed that individuals who commit suicide, use drugs and engage in radical behavior outside the social norms wore purple make-up (16). Also, it was reported that color purple is the most preferred color in horror movies and people who are inclined to suicide stated at color purple for long periods of time (17). The findings of the present study, consistent with the reported results, showed that color purple was preferred by individuals with high impulsivity and especially by women.

Black color is known as the color of sadness, death, burden, seriousness and pessimism (18). In a study conducted in 1995, subjects stated that color black symbolized mysteriousness (30%), power (27%), manhood (23%), depressiveness (20%) and conservatism (18%) (19). The color black was one of the colors with the highest impulsivity scores in the present study. Studies reported that individuals who like the color blue are neat, patient and open to sharing people in the literature (2). However, contrary to the findings in the literature, it was observed in this study that individuals who picked the color blue were among those with the highest impulsivity scores.

Individuals involuntarily reflect their mood with the colors they choose. They might also feel discomfort when they are nested in colors that are not pertinent with their emotions (20). Studies demonstrated that individuals with high levels of anxiety preferred dull colors compared to individuals with low levels of anxiety and this finding was explained with the fact that shiny colors were less preferred by individuals with anxiety due to their stimulating effects (5). The present study demonstrated that anxiety scale scores were the highest among individuals who stated color black was their favorite color and the color it came to their mind first. Based on the results, it was identified that the color that could be related to anxiety the most was the color black. The individuals who stated grey was their favorite color and the color it came to their mind first received the highest scores in the depression scale compared to others. Grey is formed by mixing equal amounts of black and white and described by negative factors (21). Depressive individuals have a negative sense of self and a negative

perspective on events. Thus, it could be considered normal for individuals with high levels of depression preferred the color grey that reminds negative thoughts.

BIS non-planning scores of participants who said that the color that came to their minds first was red were higher than individuals who reported other colors. A high BIS non-planning subscale score corresponds to instability in organizing life and inability to plan. Red is the color of crisis (22). And it was found that this color stimulates adrenalin secretion and increases aggressiveness, action, excitement and libido (23). Furthermore, it was reported that color red was preferred more by individuals that exhibit hostile acts in interpersonal relationships (24). Our findings showed that color red could be related to impulsive behavior, known as unplanned actions.

Findings of the study demonstrated that individuals who stated that pink was the color that came to their mind first received the lowest BIS total scores. It is known that color pink creates the feeling of trust in individuals (16). Color pink also inseminates emotions of kindness, softness, sweetness, shyness, timidity and conservatism (25). In a study conducted in 2008, association of pink and femininity were found to be

high and 69% of the participants clearly identified the color pink as feminine (26). Color pink is also considered as a color that provides peace for women (27). The findings of our study that all individuals who chose the color pink were females and the impulsivity scores of these individuals were the lowest could be related to the calmness and trusting characteristics of the color.

Limitations of the study: Low number of participants and selection of a non-homogenous group could be listed among the limitations of the present study.

In conclusion, it was determined in the present study that the colors blue, black, red and green were preferred the most, and impulsivity scores were found among those who preferred the colors yellow, blue, black and purple the highest. It was also identified that black, white and grey colors could be related to high anxiety levels, and color pink to low anxiety levels. However, the results of the present study requires to be supported by studies that would be conducted with higher number of participants.

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