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Investigating the Usefulness of Color Therapy Across Different Demographics

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ABSTRACT

Color therapy is a holistic approach and a cost-effective treatment that apply the various frequencies of light and color on the person's body to put a positive impact on health including the psychological as well as the physical well-being comprising the behavior, emotion, mood and fitness & treatment. This treatment has its great potential in the various areas of healthcare, educational as well as the occupational settings; where the different frequencies of the color templates help in stress management containing the promotion of mindfulness, lowering the anxiety and serve as a complementary therapy to the medical treatment merging the traditional knowledge with the patient diagnostic. To verify the usefulness of color therapy in human healthcare, data from 206 participants was analyzed across different age groups and gender using RapidMiner tool for analysis and visualization by focusing the various attributes surrounding the physical conditions as well as effects of the colors on the health & diagnosis visualization. Findings indicate this chromotherapy positively affects in varying ratios on different demographics. The results show its great effects on mood, behavior, and emotional states, with potential applications in healthcare, workplaces, and educational settings and can be considered as a sustainable complementary therapy and wider recognition and enhancement in the process with further research into its mechanisms.

Keywords: Color Therapy, Chromotherapy, Emotion, Stress, Psychological, Mood, Health.

I. INTRODUCTION

Color therapy is an innovative approach that augments technology with tradition. It can be a major benchmark for the sustainable health practices that address the behavior, stress, attitude, mood, and other psychological conditions [1] [2] [3] [4] [7] [8] of the human that cannot be categorized as a patient. However, it aids in making the daily life pleasant, patient and positive and even medically treat the patient's conditions like calmness, lack of concentration, anxiety and stimulate towards a particular wavelength frequency of the light and colors. [10] This creative treatment is able to develop an eco-friendly environment in hospitals, educational complexes, auditoriums and even at home to promote mindfulness and well-being. The various studies conducted on 'virtual reality chromotherapy' [10] show significant improvement in the emotional balancing and relaxation and color therapy can complement sustainable healthcare initiatives by reducing the dependencies on

a pharmaceutical treatments i.e. allopathic medicine and foster a sustainable, green, positive patient-centric environment as acclaimed in ancient literature. It is based on a psychological well-being and potential of the different color scheme to diagnose the patient conditions. [1] [8][9] [10] The present study investigates the perceived effectiveness of colors for influencing human well-balancing. It explores the perception of the potential of colors [2] [3] to diagnose and treat illnesses by individuals of different age groups and genders. A structured questionnaire was used to solicit the responses of 206 participants towards belief of the effect of colors on mood, emotions, [3] [4] health and behavior. Participants have certain opinions based on varying human experiences on the usefulness of color therapy in the diagnosis of certain diseases and as an accompanying factor to physical conditions. [8][9]

Different colors seem to provide great impact on the human body in terms of mental and physical well-being [1] [6] and thus, should be more extensively researched for their usefulness as complementary forms of therapy. The observations show that exposure to specific colors can influence behavior, [5] for instance, it is analyzed from the data collected from 206 participants that blue and green tones are often associated with calmness and relaxation, while red and orange hues may evoke energy and motivation [1][5]. Conversely, darker shades or excessive brightness may exacerbate anxiety, stress, or headaches, underscoring the importance of balanced chromatic environments [8][10]. In various studies, it is described that in healthcare settings, chromotherapy has been explored as a complementary therapy for pain management, stress reduction, and patient recovery, offering eco-friendly alternatives to pharmacological interventions. In the same way the educational institute and workplace setting can be graphical as per the required space or purpose. This way, color-integrated design helps in developing strategies that enhance concentration, creativity, and emotional strengths [1] [2][4] [9]. Collectively, these findings highlight the potential of color therapy to serve as an adaptable, sustainable model in creating an eco-friendly healthy environment across diverse contexts.

II. METHODOLOGY USED

A questionnaire is generated containing 35 questions categorized into three sections out of which MCQs, True/False, Short answer, Statement based questions and others are asked from the participants. Apart from the basic information like name, gender, age, qualification, affiliation, present status, rest of the questions focused on the various parameters of color therapy to get the insights about how the people think about the significance of colors in real life. [1] [2] [4] The different questions focused on the applications of color therapy in identifying the user's mood, emotions, health and fitness, physical conditions, behavior on the basis of various colors [2][4] [5]. A total of 206 participants filled the questionnaire out of which, 79 participants were females and 127 were males. The total age groups are six - under 18, 18 - 24, 25 - 34, 35 - 44, 45-54, 55 and above. Different tools used in doing this research are Google Docs, Excel sheet for storing the data, Google Forms containing the 5-point Likert scale questions along with the others, RapidMiner for data analysis. The various attributes to examine the color association with human well-beings are taken as:

- Certain colors can improve my mood. [3] [4].
- Seeing specific colors can influence my behavior [5] [6] like anxiety, calm & relaxed, anxious or stressed, sad or depressed, headache or soothing, conducive to sleep, energetic & motivating, and emotional association with different colors. [2] [4] [10].
- Colors might be helpful in diagnosing certain diseases.
- Color therapy could be a complementary therapy for certain physical conditions, hospitals or healthcare settings,

workplaces as well as educational settings. [8][9].

III. DATA ANALYSIS

To verify the usability of the color therapy in human health care [8] [9], data from the 206 participants has been collected. A subset comprising the columns Age-Group, Color Therapy Influences Certain Physical Conditions, Color Therapy usage in Healthcare, Colors_diagnosing_diseases, Effect of Specific Colors on Physical Health and Gender have been considered. There are five age groups categorized as 18-24, 35-44, 25-34, 45-54 and Under 18. A total of 127 participants are females and 79 are the males out of the 206 participants. The visualization is done in Rapid miner tool to show the differential views of the participants diversified in different age groups and gender as males and females. The normalization is done on this subset containing a data set of six columns. The data subset is normalized into four tables with Age-Group and Gender as a compulsory attribute in all the tables. In the first table, there are three attributes: Age-Group, Colors_diagnosing_diseases and Gender. The Age-Group is capital X axis and Colors_diagnosing_diseases is taken as the value attribute Age-Group group by column and Gender is selected in the 'color group' option in Bar Chart; the count function is used as the aggregation function for the visualization. The generated visualization is given in Figure 1.

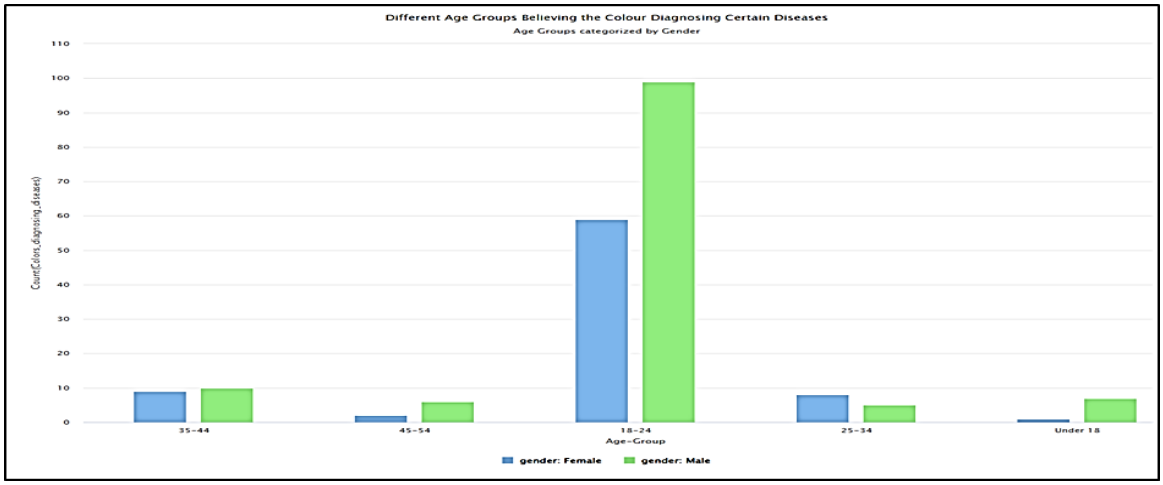

Figure 1: Bar chart shows the 'Age-Group, Colors_diagnosing_diseases' attributes values group by Gender.

The bar chart shows that the participants between the age group of 18 to 24 are of the opinion that certain colors diagnose the disease. A total of 158 participants are in favor of the opinion that colors can help in diagnosis of the disease, and people between the age group of 45 to 54 are least interested in the colors and their influences on disease diagnosis. 0.767 per cent of the people favoring that yes, color may diagnose certain diseases as compared to the other age groups with least fractions of 0.092, 0.063, 0.039 and 0.039 as shown in table 1.

Table 1: Shows the fractions for participants for attribute "Colors_diagnosing_diseases" under different age groups.

Index	Nominal Value	Absolute Count	Fraction
1	18-24	158	0.767
2	35-44	19	0.092
3	25-34	13	0.063
4	45-54	8	0.039
5	Under 18	8	0.039

For the age group under 18, ratio 0.039 may be due to the little knowledge about the facts, and between the ages of 45 to 54, it may be due to their stickiness to own chores and less explorative towards the different dimensions and reasons of the disease and other possible natural treatments apart from the rigid medical procedure. Therefore, it can be said that the youngsters are more explorative and interested in taking on new challenges, learning new things, trying to find new pathways and are more experimental and courageous. It means they love the colors and experiment with those colors and believe that the certain colors may also influence our lives and the medical conditions. The ratio of the female participants is less compared to the male i.e. 0.617 and 0.383 against 127 and 79 given in table 2.

Table 2: fraction of males and females.

Index	Nominal Value	Absolute Count	Fraction
1	Female	79	0.383
2	Male	127	0.617

If we see the visualization i.e. bar diagram in figure 1, it seems that males are more interested in the colors and various treatments. However, when we rigorously analyze the results statically and compare the participation of the males and females with their total ratios like 59 out of 79 and 99 out of 127. We conclude that in the age group of 18 to 24, male and females are almost having the same opinion, whereas in the age group of 25 to 34, 45 to 54, 35 to 44 and under 18, it is more in case of females than males as shown in table 3.

Table 3: Distribution of Participants by Gender and Age Category

Ratios of participation of males and females of different age groups	Age Groups					Total number of participants
	18-24	35-40	25-34	45-54	Under 18	
Observed ratio of females to their total	1, 1/79=0.12	8, 8/79=.101	59, 59/79=.7468	2, 2/79=.222	9, 9/79=.113	79
Observed ratio of males to their total	7, 7/127=.0555	5, 5/127=.039	99, 99/127=.779	6, 6/127=.047	10, 10/127=.078	127

Therefore, we can say that a common belief about the females that they are more explorative, experimental and innovative towards the colors as compared to males is true. So, this analysis shows that the importance of colors in diagnosis of certain diseases is right and it is also proved that females are more explorative and towards colors though this is not the part of our study.

The second data set contains age, gender, and “Color Therapy Influences Certain Physical Conditions” in order to show the different participants' perspectives that color therapy could be a complementary therapy for certain physical conditions. The pie chart shows that 32 percent of the participants have the view that colors could influence the diagnosis of physical conditions of humans whereas 49 % participants are not sure as shown in fig. 2.

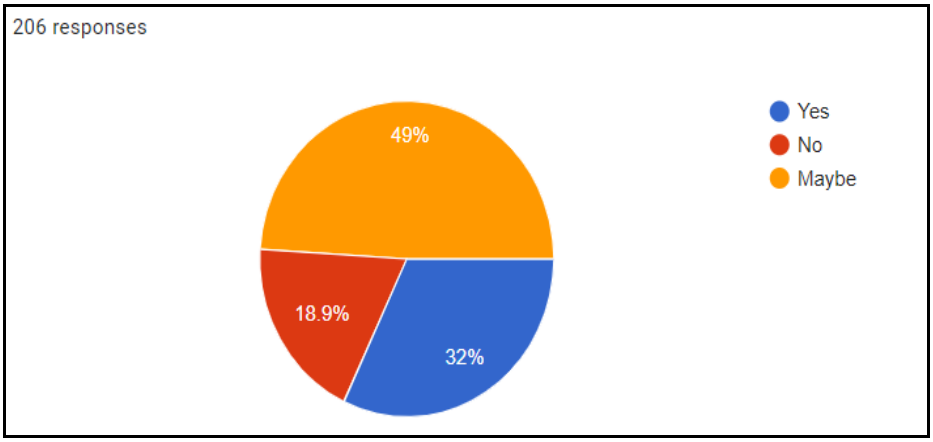

Fig. 2: Shows people perspectives about "Color Therapy Influences Certain Physical Conditions"

For the clear data analysis, a bar chart is developed to showcase data, enhance visual comprehension, simplify comparative analysis, and illustrate data patterns as shown in figure 3.

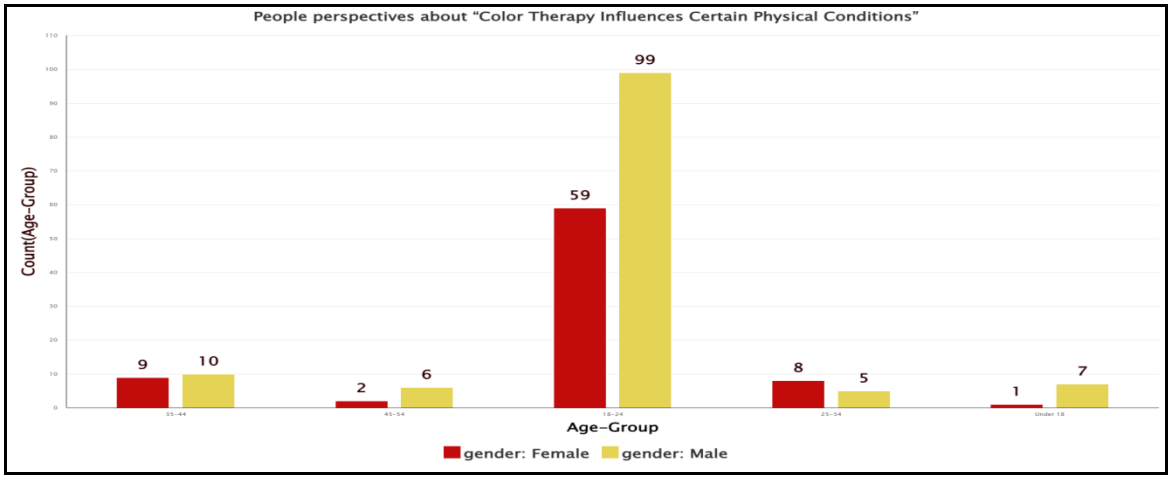

Figure 3. Bar chart shows the 'Age-Group, Color Therapy Influences Certain Physical Conditions' attributes values group by Gender.

The bar chart shows that the participants between the age group of 18 to 24 are of the opinion that Color Therapy Influences Certain Physical Conditions. A total of 158 participants (99 Males and 59 Females) is in favor of the opinion that color therapy can have a great influence on Physical Conditions, and people between the age group of 45 to 54 are least interested in the colors and their influences on physical conditions. 0.320 per cent of the people favoring that yes, color may influence physical conditions as compared to the other age groups with least fractions of 0.490, 0.189 as shown in table 4.

Table 4: Fraction of people showing their opinion regarding influence of colors on physical conditions

Index	Nominal Value	Absolute Count	Fraction
1	Maybe	101	0.490
2	Yes	66	0.320
3	No	39	0.189

IV. RESULTS AND DISCUSSION

The present study aimed to investigate the perceived effects of chromotherapy in a number of dimensions of the human being's well-being such as affective states, manifestations of their behavior,

physiological health and bodily conditions. An empirical questionnaire was used to collect accounts of chromotherapy and people's beliefs about its efficacy from 206 people. The resulting dataset was processed in the software RapidMiner with the goal of trying to identify latent patterns and to understand the correlational relationships between color preferences and perceived therapeutic benefits. The key findings are listed below:

1. Color Perception and Experience:

- The predominant modes of experience of participants exposed to color therapy were through the sense of vision (48.20%) and through reflection (23.5%).
- A significant proportion (54%) agreed that colors can affect one's mood and behavior.
- Fewer respondents said they gave a strong response to the color variable having an effect on anxiety levels.

2. Color and Emotional States:

- White and blue were the colors most commonly chosen for use as promoting calmness and relaxation.
- Black and red were related to stress.
- Black was also associated with sadness and sleeping problems.
- White and green were seen as relaxing while blue was seen as stimulating and motivational.

3. Color Therapy in Education:

- Nearly half (48.1%) of participants thought color therapy could improve the environment of education.
- Only 19.4% of them disagreed on the impact of color on education.

4. Color Therapy and Health:

- There is a large group (32%) that believed color therapy could make a difference on physical problems.
- However, 49% were still unsure about whether or not it works.
- Younger participants were more willing to use color therapy for diagnostic and physical health purposes.
- Follow-up and Cross Studies Females were more likely than males to believe in the potential benefits of color therapy.

The results of this study indicate that color therapy contains the ability to favorably affect various aspects of human well-being. Participants demonstrated improvements in mood, behavior and emotional states [3] [4][7] by being exposed to certain colors. Moreover, Color therapy and its benefits catch the attention towards complementary therapy for physical conditions. It is also a field for educational purposes. The conducted questionnaire draws attention toward a few **key data points, including:**

- **Individual differences:** The impact of color therapy depends on individuals due to personal preferences, experiences, and psychological factors.
- **The role of age:** Younger participants were more likely to be open to the idea of color therapy, potentially reflecting a greater openness to new ideas and approaches.
- **Gender differences:** Females were more likely than males to perceive benefits of chromotherapy suggesting that gender may determine attitudes and beliefs toward alternative therapeutic modalities

CONCLUSION AND FUTURE RESEARCH

The present study shows the gender wise perceptions regarding the influences of color therapy for disease diagnosis and certain physical conditions among the different age groups. It is concluded that people are less aware of the color therapy; however, significant knowledge of the color impacts. Color therapy has great potential in improving mood, behavior and emotional well-being and could represent a promising additional therapy for people who want to improve their overall quality of life. This study provides deep insights into public perception, highlighting a potential area for further research to definitively establish the role of color therapy in healthcare. Although the study is conducted on 206 participants,

there is still a need for more research to clarify the underlying mechanism and to demonstrate the efficacy of color therapy. The advanced AI learning tools can be applied to future research for better perceptions. Future investigations should also outline the specific mechanisms of color therapy in exerting its effects and measurements. Investigation of the possible uses of color therapy in varied environments, such as healthcare facilities, office buildings and educational institutions where colors could have beneficial effects on the learning environment and a better education ecosystem.

Declaration by Authors

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Conflict of Interest: The authors declare no conflict of interest.

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