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ARAŞTIRMA MAKALESİ/RESEARCH ARTICLE

Placebo effect of gemstones

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Abstract

The placebo effect can be explained as a response other than the specific influence of a treatment which comes from the psychosocial forces surrounding the treatment. This effect can be observed all over the world when people use healing stones. In this study, the perception of healing stones was investigated using the questionnaire technique. A popular online site helped reach 415 volunteers who participated in an online survey. Evaluation of the results revealed that gemstones, which are promoted as healing tools and give hope for getting better, have a positive effect on people. On the other hand, even if gemstones are preferred only for use as ornamental stones, jewelry and accessories, then no positive effect is expected from their healing power.

Keywords: Gemstones, healing stones, placebo effect, online survey

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1. INTRODUCTION

Natural stones, which have been mostly perceived as healing tools by all civilizations, are also indicators of beauty, power and social status (Çalık et al. 2018; Hatipoğlu et al. 2018). Here the general term "natural stones" is used to define both precious and semi-precious gems and also colourful rocks. Besides just having eye-catching colours, natural stones are also used for healing purposes (Truter, 2006; Bishop, 2007; Gienger and Maier, 2009). Their positive effects on health are related to certain beliefs and the social environment (Ishaque et al. 2009). The healing perception of gemstones is that their mineralogical properties facilitate healing, which include: their perfect crystal structure, brilliance, eye-catching colours and electrical and magnetic properties (Çalık, 2020). Therefore, they are widely used to heal physical and emotional problems (Micke et al. 2010; Seraj et al. 2011; Atodaria et al. 2017). On a global scale, the market size of natural stones is expected to reach $443 billion in 2022 (GGJM, 01.10.2021). In recent years, a synthetic version of popular gemstones produced in the laboratory has also entered the market intensively (Renfro et al. 2010; Calik et al. 2019). Knowing that most of the stones in the market are synthetic due to excessive demand, it is possible that the expected healing from these stones is the placebo effect in psychology. The placebo can be explained as an effect other than the specific outcome of any treatment (Brody, 1982). Pavlov's classical conditioning theory can also be adapted to the placebo effect (Montgomery and Kirsch, 1997). The expectation of recovery contributes to the recovery process of the patient (Frank, 1986; Miller et al. 2009; Jütte, 2013). The placebo effect usually comes from the psychosocial forces surrounding the treatment process (Zion and Crum, 2018).

The purposes for using natural stones all over the world are very similar. Therefore, the perception of healing stones on people can be investigated using the questionnaire technique. In this study, a total of 415 people participated in an online survey. Outcomes indicated that natural stones, which are considered to have medicinal properties and give people hope for getting better, have a positive effect on treatment progress.

2. MATERIALS AND METHODS

2.1. Theoretical Framework

The placebo effect became a new area of research in clinical pharmacology after the publication of Beecher's classic work entitled "The Powerful Placebo" (Beecher, 1955). He defined placebo as a form of medical treatment used for its symbolic effect, or an attempt to accelerate medical treatment, which the physician believes will not be of particular efficacy for the condition being treated. On the other hand, the placebo was also explained as the effects other than the specific outcome of a treatment, the therapeutic effects of biomedically ineffective drugs and the therapeutic effects of drugs that cannot be explained by their pharmacological properties, and also a combination of these three treatments (Brody, 1982). Apart from their unique effects, drugs and medical procedures also contribute to the healing process of the patient with the "healing expectation" symbolically aroused in human consciousness (Frank, 1986). The most widely accepted theory for modelling the placebo response is that it can be expressed as expectation and conditioning that includes conscious and unconscious mental processing. How these mechanisms shape the placebo response is not fully understood. According to this theory, the person's expectation about the substance taken or the procedure applied also reveals the placebo effect. When Pavlov's classical conditioning theory is adapted to the placebo effect, such effect can be expressed as both the conditioned stimulus and the conditioned response (Montgomery and Kirsch, 1997). Given the limited evidence for the clinical significance of placebo effects, experimental studies aiming at translating scientific understanding of the placebo effect into improved patient care are recommended (Miller et al. 2009). Recent research shows that expectation is an integral part of the placebo effect (Jütte, 2013). Placebo effects mediate a variety of processes, including learning, anticipation, and social cognition, and can affect a variety of clinical and physiological outcomes related to health (Wager and Atlas, 2015). It has also been shown that the placebo response can be conceptualized as the reaction of a distributed neural

system within the central nervous system (Puviani and Rama, 2016). Finally, the placebo effect comes from the psychosocial forces surrounding the patient and the treatment, not the contrived practices themselves (Zion and Crum, 2018).

In this study, the conceptual model is based on the perception of healing, hope, interest and placebo. The dependent variables Healing, Hope, and Interest are assumed to have a positive effect on the Placebo Effect, which is considered the dependent variable in Figure 1.

Perceived healing from natural stones occurs due to their excellent crystal structures, brilliance and eye-catching colours (Bishop, 2007; Hatipoğlu et al. 2018; Çalık, 2020; Kutlu et al. 2022). When natural stones are promoted as having healing properties, the psychosocial forces surrounding the treatment are affected (Zion and Crum, 2018). Based on this situation, the H1 hypothesis is that people prefer to use healing stones for therapeutic purposes because they are promoted as healing tools.

Hope of cure and conditioning affects the treatment process positively (Frank, 1986; Montgomery and Kirsch, 1997; Miller et al. 2009). Natural stones are widely used to try to heal emotional problems (Micke et al. 2010; Seraj et al. 2011; Atodaria et al. 2017; Kutlu et al. 2022). Based on this situation, the H2 hypothesis is that people prefer to use healing stones for therapeutic purposes because they are hopeful that using them will help solve problems.

Natural stones are an indicator of beauty, power and social status (Hatipoğlu et al. 2018). Natural stones are also believed to be a source of healing beyond their eye-catching colours (Bishop, 2007; Gienger and Maier, 2009; Çalık, 2020). Based on these concepts, the H3 hypothesis is that people prefer to use healing stones for therapeutic purposes because they find them very interesting.

2.2. Methods

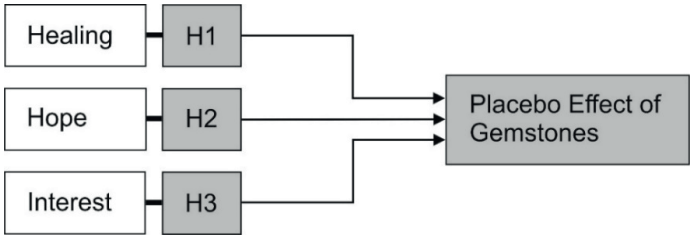
The questionnaire is one of the most basic information gathering tools that is used to determine social trends (Gallup, 1947). Several different survey types have been used including: face-to-face interview, e-mail, telephone and online etc. (Alreck and Settle, 2004; Neuman, 2006; Fowler, 2008; Groves et al. 2009). Before starting a survey, the type of survey, question types, sample size and reliability limits should be determined (Barnett, 2002). A sufficient number of trial questionnaires should also be conducted in advance to evaluate whether there are any problematic factors between the interviewers and the subjects conducting the survey (Fink, 2017). Choosing the data collection method appropriately, being systematic and classifying it properly allows appropriate analysis of the findings (Presser et al. 2004).

Even though the use of medicinal stones in the alternative medicine field all over the world differ in parallel with the cultural structures of societies, the application methods are very similar to each other. Therefore, the perception of healing stones can be investigated using the questionnaire technique. In this study, the online survey technique was employed using different social media.

2.3. Field Works

In this survey, participants were mostly selected from different social media channels. As a selection criterion, people who answered the distinctive question (e. g. Do you know someone who seeks healing from natural stones?) positively were invited to fill up the survey.

Figure 1. Theoretical framework and hypotheses.



In survey studies, the sample size should be at least 10 times higher than the independent variables (Kline, 1994). However, among published studies, the sample size has been at least 15 times higher (Stevens, 1996). The minimum number of subjects can be calculated as N>50+8M, with M being the independent variable (Tabachnick and Fidell, 2007). Within the scope of this study and given these three criteria, 415 people were selected to carry out the survey. The questionnaire for the survey was prepared in consultation with many experts from different fields. The survey consisted of 18 questions/statements in five sections. The first section covered demographics; the second section covered four questions about the Healing variable; the third section covered three questions concerning the Hope variable and the fourth section covered four questions about the Interest variable and the last three questions about the dependent variable, Placebo. Multiple regression was used to examine the relationship between the independent variables and the dependent variable (Berry and Feldmen, 1985; Allison, 1999). Using the IBM SPSS (Statistical Package for the Social Sciences) program (Bryman, 2008). In the data analysis, mean and standard deviation (std.) were used for each questionnaire. The skewness and kurtosis values for all expressions were calculated between -2 and +2 (George and Mallery, 2010).

The averages of the scales ranging from one to five in Table 1 were evaluated by considering the Five-Point Likert scale intervals (Pimentel, 2019). In binary scales such as Y/N, between 1.0-1.50 was evaluated as 'Yes' and between 1.51-2.0 as 'Not'.

3. RESULTS

The study was conducted in 2020. The demographics were evaluated by frequency analysis. Accordingly, 68% of the attendees were female and the rest were male. Participants mostly consist of people between the ages of 18-50, having at least an undergraduate education and monthly incomes ranging from $401 to $2000 (Table 2).

Table 2. Demographic statements

	Frequency	**Percent**
S1. Gender.		
Female	282	68.0
Male	133	32.0
Total	415	100.0
S2. Age.		
<18	1	0.2
18-30	104	25.1
31-50	261	62.9
51-70	47	11.3
70<	2	0.5
Total	415	100.0
S3. Education level.		
Primary	1	0.2
Middle-High	14	3.4
Associate	16	3.9
Graduate	109	26.3
Postgraduate	275	66.3
Total	415	100.0
S4. Income rate.		
<$200	15	3.6
$200-$400	20	4.8
$401-$1000	115	27.7
$1001-$2000	231	55.7
$2000<	34	8.2
Total	415	100.0

Table 1. Five-Point Likert Scale interval

Scale	**Interval**	**Difference**	**Mean**		
1	1.0-1.79	0.79	Never	Definitely Not	Never
2	1.80-2.59	0.79	Slightly	Probably Not	Rarely
3	2.60-3.39	0.79	Moderately	Possibly	Sometimes
4	3.40-4.19	0.79	Very	Probably	Most of the time
5	4.20-5.0	0.80	Extremely	Definitely	Always

With regard to the having hope in natural stones, 87% of the participants stated that some natural stones can heal, 57.6% stated that healing from natural stones is based on scientific findings, and at a moderate level, some participants believed that natural stones can be healing tools and used to cure some ailments in society (Table 3).

Table 3. Statements about variable Healing

	Frequency	Percent	Mean	Std.
S5. Do you think some ornamental stones are can heal?				
Yes	361	87.0	1.13	0.34
Not	54	13.0		
Total	415	100.0		
S6. Do you think that healing using natural stones is grounded in science?				
Yes	239	57.6	1.42	0.50
Not	176	42.4		
Total	415	100.0		
S7. How effective do you think that the stones are in healing?				
Never	24	5.8		
Slightly	77	18.6		
Moderately	213	51.3	2.97	0.85
Very	92	22.2		
Extremely	9	2.2		
Total	415	100.0		
S8. How effective do you think that healing stones can help people recover from some diseases?				
Never	11	2.7		
Slightly	87	21.0		
Moderately	229	55.2	2.96	0.75
Very	83	20.0		
Extremely	5	1.2		
Total	415	100.0		

While eye-catching colours are moderately effective in influencing natural stone preference for treatment, the belief that they can cure aliments and their promotion as having medicinal properties are also highly effective (Table 4).

When questions about the level of interest in natural stones were examined, 39.3% of the participants stated that they knew the name of the natural stone that represents their zodiac sign, 33% said that they tried to heal by using natural stones and a moderate level of participants kept natural stones in their living environments. Therefore, results suggested that a moderate number of the participants were interested in natural stones if they were introduced as having medicinal properties (Table 5).

Table 4. Statements about variable Hope.

	Frequency	Percent	Mean	Std.
S9. How effective are the therapeutic powers of the stones when people are hopeful about getting better?				
Never	18	4.3		
Slightly	35	8.4		
Moderately	136	32.8		
Very	168	40.5	3.51	0.98
Extremely	58	14.0		
Total	415	100.0		
S10. How effective do the colours of them reinforce the idea that the stones can heal?				
Never	28	6.7		
Slightly	73	17.6		
Moderately	116	28.0	3.28	1.09
Very	152	36.6		
Extremely	48	11.1		
Total	415	100.0		
S11. How effective do well-presented stones bring about therapeutic purposes?				
Never	11	2.7		
Slightly	36	8.7		
Moderately	119	28.7		
Very	184	44.3	3.62	0.94
Extremely	65	15.7		
Total	415	100.0		

Table 5. Statements about variable Interest.

	Frequency	Percent	Mean	Std.
S12. Do you know the name of the natural stone that represents your horoscope?				
Yes	163	39.3		
Not	252	60.7	1.61	0.49
Total	415	100.0		
S13. Have you ever tried to heal using the stones?				
Yes	137	33.0		
Not	278	67.0	1.67	0.47
Total	415	100.0		
S14. How interested are you in healing stones?				
Never	53	12.8		
Slightly	133	32.0		
Moderately	170	41.0	2.61	0.97
Very	42	10.1		
Extremely	17	4.1		
Total	415	100.0		
S15. How often do you wear natural stones or keep them in your living spaces?				
Never	57	13.7		
Rarely	99	23.9		
Sometimes	164	39.5	2.77	0.86
Most of the time	73	17.6		
Always	22	5.3		
Total	415	100.0		

Participants' belief in the ability of the human body to heal itself was at a moderate level. Also, their confidence in the treatment process was very important. When they were desperate, their tendency to try a method other than modern medicine was very high (Table 6).

Table 6. Statements about variable Placebo

	Frequency	Percent	Mean	Std.
S16. Would you rather use an alternative method rather than a medical treatment for an incurable disease?				
Definitely Not	15	3.6		
Probably Not	92	22.2		
Possibly	33	8.0		
Probably	197	47.5	3.56	1.14
Definitely	78	18.8		
Total	415	100.0		
S17. How effective do you think it is to believe in your medical treatment for the recovery process to be successful?				
Never	5	1.2		
Slightly	34	8.2		
Moderately	136	32.8		
Very	191	46.0	3.59	0.85
Extremely	49	11.8		
Total	415	100.0		
S18. To what extent can the human body recover from an illness itself without any medical support?				
Never	26	6.3		
Slightly	89	21.4		
Moderately	186	44.8	2.99	0.95
Very	92	22.2		
Extremely	22	5.3		
Total	415	100.0		

The skewness and kurtosis values for all expressions were calculated between -2 and +2. These values are within the desired reliability limits (George and Mallery, 2010). Cronbach's Alpha values of 0.70 and above indicate that the questionnaire used is reliable (Nunnally, 1978). In this study, the calculated values were above 0.70 for all group questions. In studies on social sciences, although the determined variables are considered independent, there is also a link between them. Therefore, the Oblimin with Kaiser Normalization technique should be used in factor analysis (Kaiser, 1958; Clarkson and Jennrich, 1988). In addition, values of the factorial weight should be above 0.5 (Hulland, 1999). In this study, the Oblimin with Kaiser Normalization technique was preferred in the factor analysis for the independent variables (Healing, Hope and Interest) and the dependent variable (Placebo).

In the distribution of the factorial weight, presented in Table 7, there is no transitive between the factors and the smallest value is above 0.5. In addition, the total variance of the factors should be at least 50% (Dawson, 2016). In the current study, the total variance value (58.598%) was above 50%. If the Kaiser-Meyer-Olkin (KMO) is at least 0.5 and the Bartlett p value is at most 0.05, then it can be assumed that the sample size and the collected data are suitable for factor analysis (Kaiser, 1974; Snedecor and Cochran, 1989). In this study, the KMO value was calculated as 0.837 and the p value as 0.000 (Table 7).

Table 7. Pattern Matrix

		Factor Loading				Cronbach's
Variable	**Item**	**1**	**2**	**3**	**4**	**Alpha**
Healing	S5	-0.788				0.81
	S6	-0.782				
	S7	0.724				
	S8	0.509				
Interest	S12		0.771			0.76
	S13		0.713			
	S14		-0.695			
	S15		-0.674			
Hope	S9			0.795		0.70
	S10			0.704		
	S11			0.641		
Placebo	S16				0.767	0.72
	S17				0.737	
	S18				0.733	
Rotation method: Oblimin with Kaiser Normalization						
Total variance of factors:58.598%						
Kaiser-Meyer-Olkin (KMO): 0.837						
Bartlett's Test of Sphericity (Chi-Square:1452.579 df:91 p=0.000)						

The significance of the p value (0.000b) in the Anova table (Table 8) was less than 0.005, indicating that at least one of the independent variables was related to the dependent variable. In addition, the regression model used, f(3.411)=28.635, explained approximately 20% of the variance (Adjusted R Square: 0.201) in the dependent variable (Bartlett, 1936; Cochran and Cox, 1992).

Tolerance (Tol) and Variance Inflation Factor (VIF) values are used to determine the multicollinearity problem between variables. A tolerance value less than 0.10 and a VIF value greater than 4 indicate a multicollinearity problem (Hair et al. 2009). The tolerance values calculated in this study were above 0.10. VIF values were below 10. Therefore, there is no question of multicollinearity among the independent variables (Table 9).

In multiple regression analysis, for a hypothesis to be valid, the β value is expected to be greater than 0.10 and the p value less than 0.05 (Berry and Feldman, 1985). In this study, for hypothesis H1, the β value (0.304) was greater than 0.10 and the p value (0.000) was less than 0.05. That is, there is a strong positive correlation between the Healing independent variable and the Placebo dependent variable. For hypothesis H2, the β value (0.191) was greater than 0.10 and the p value (0.001) was less than 0.05. In other words, there was a strong positive correlation between the Hope independent variable and the Placebo dependent variable. For hypothesis H3, the β value (0.057) was less than 0.10 and the p value (0.274) was greater than 0.05. This indicated that there was no positive correlation between the independent variable of Interest and the dependent variable of Placebo (Table 9). Within the scope of this study, the H1 and H2 hypotheses were accepted and the H3 hypothesis was rejected.

4. DISCUSSION

Our findings are as follows; hearsay and promotions have control over the behavioral approaches. In fact, the natural stones are promoted as "healing tools" and this is effective in influencing the preference for them hope of cure. In this study, there is a strong positive correlation between Healing (independent variable) and Placebo (dependent variable). This supports previous studies (Bishop, 2007; Ishaque et al. 2009; Seraj et al. 2011; Atodaria et al. 2017; Çalık et al. 2018; Hatipoğlu et al. 2018; Çalık, 2020). Also, "Hope of cure" or "expectation" affected the treatment process positively (Frank, 1986; Montgomery and Kirsch, 1997; Miller et al. 2009; Micke et al. 2010; Atodaria et al. 2017; Zion and Crum, 2018). Contrary to previous studies, it can be stated that the interest in natural stones due to their eye-catching colors is not related to their therapeutic use. Color and specific shape do not play any role in the selection of cure related usage.

5. LIMITATIONS

People with undergraduate level predominated the survey participants. The tendency towards higher education levels may cause bias in the results. In addition, since there is no control group in our survey, it is good to hold that the results obtained may be subjective to a certain extent. Despite these issues, we believe that the results still provide descriptive results.

Table 8. Anova values

Model		Sum of sq.	df	Mean sq.	f	p
1	Regression	40.424	3	13.475	28.635	0.000[b]
	Residual	193.404	411	0.471		
	Total	233.827	414			

Table 9. Test of hypotheses

Hypotheses	β	t	p	Tol.	VIF	Outcome
H1	0.304	5.841	0.000	0.742	1.347	Accepted
H2	0.191	4.181	0.001	0.964	1.038	Accepted
H3	0.057	1.096	0.274	0.746	1.340	Rejected
Adjusted R Square:0.201			*Dependent variable: Placebo*			

6. CONCLUSION

There is a strong positive correlation between independent variables (Hope and Healing) and dependent variable (Placebo). On the contrary, there is not a positive correlation between independent variable (Interest) and dependent variable (Placebo).

In other words, we may conclude that if the natural stones are introduced as medicinal, they are used by people with the expectation of being cured regardless of their shape or color. On the other hand, the stones with eye-catching colors and shapes are used only for jewelry and are not preferred for therapeutic purposes.

It is very strongly suggested that the word "Healing", which is preferred in the promotion of natural stones, should be banned legally, to avoid disrupting and exploiting the medical treatment process.

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