Journal of Infrastructure, Policy and Development 2024, 8(10), 8239.
https://doi.org/10.24294/jipd.v8i10.8239

Article

A comparative analysis of the conceptual perception of neuromarketing

A. Selcuk Koyluoglu

Department of Marketing, Selcuk University, Konya 42130, Turkey; askoyluoglu@selcuk.edu.tr

CITATION

Koyluoglu AS. (2024). A comparative analysis of the conceptual perception of neuromarketing. Journal of Infrastructure, Policy and Development. 8(10): 8239. https://doi.org/10.24294/jipd.v8i10.8239

ARTICLE INFO

Received: 28 July 2024
Accepted: 9 August 2024
Available online: 30 September 2024

Abstract: Researchers need to seek the opinions of individuals about what they think related to neuromarketing and its applications. This study is intended to reveal the conceptual perception of neuromarketing. In this context, a comparative analysis was designed for university students studying in social sciences and health sciences due to the interdisciplinary nature of neuromarketing. Thus, it was investigated in which areas the conceptual perception of neuromarketing was higher and how it was perceived at the same time. Survey method was used to collect data. The relevant literature was scanned to determine the questions in the survey, and previous studies in this field were taken into account. Accordingly, the survey consists of two parts. In the first part, there are 6 questions to determine the demographic characteristics of the participants. In the second part, 14 questions were included to determine the conceptual perception of neuromarketing. The questions to the participants were evaluated with a 5-point Likert scale (from 1 = disagree strongly to 5 = agree strongly). It was concluded that there were 499 valid surveys (n = 499). As a result, it was seen that participants in social sciences and health sciences differed significantly in the conceptual perception of neuromarketing (p = 0.000). It was found that the perception level of social sciences is higher than health sciences.

Keywords: consumer neuroscience; neuromarketing; neuromarketing perception; neuroscience

1. Introduction

Interdisciplinarity refers to the general phenomenon of combining or integrating disciplinary perspectives. Klein (2010) defines the concept of interdisciplinary as a way of solving problems and answering questions that cannot be satisfactorily addressed using a single method or approach. Rhoten et al. (2008) regards interdisciplinarity as both a process and a practice which form arrangements for a variety of purposes and a sense of community, and ultimately integrates ideas with others. The definitions show that the concept of interdisciplinary is an effective approach that is process-oriented, and that it emphasizes integration and solves problems (Barry et al., 2008; Bergmann et al., 2005; Epton et al., 1983; Pohl and Hirsch, 2007).

Neuromarketing can also be seen as an output of this approach because understanding how the subconscious affects people's decision-making process has led to the development of new approaches recently. In other words, it is not right to evaluate consumers rationally only when talking about subconscious, emotional intelligence, persuasion, irrational decisions and many other new concepts (Du Plessis, 2011; Hazeldine, 2013). In this sense, the inclusion of neuroscience went far beyond a need (Mukherji and Mukherji, 1998).

Thus, disciplines such as neuroscience, psychology, anthropology and ethnographic studies have also found a place for themselves and contributed to

neuromarketing reaching an interdisciplinary format (Hubert and Kenning, 2008). Therefore, neuromarketing can be characterized as an interdisciplinary field that brings together neuroscience, psychology and marketing, and it focuses on measuring the cognitive and emotional responses of consumers (Karmarkar, 2011).

Regarding the perception of neuromarketing, in a quote from Bronowski (1978), it is mentioned that perceptions of the accessible world have changed in character. Three important main ideas emerge here, and one of them is the role of perception. Bronowski emphasizes the eye-brain relationship in perception. He clarifies the purpose of neuromarketing as linking frameworks of interpretation to better understand consumer behavior. Because consumer behavior is not a subject that can be easily understood. At the same time, perception is among the psychological factors that affect consumer behavior (Ismajli et al., 2022; Penz and Hogg, 2011). Murphy et al. (2008) identified a small gap between perception and conscious awareness. They see tracking purchasing decisions as manipulating the consumer unwittingly. This perspective approaches neuromarketing as unethical. Butler (2008) argued that the power of use of neuromarketing is higher than the knowledge of perception. While the paradigm changes with traditional marketing research techniques, Ulman et al. (2015) stated that neuromarketing gives the protection of consumer respect even more prominent. Perhaps, Palmer and Hedburg (2013) made the most obvious statement about the perception of neuromarketing. According to them, the biggest concern with the concept of neuromarketing is that it allows advertisers to manipulate consumer behavior. In their research, Egrie and Bietsch (2014) reiterate the consumer's concern about information privacy and consent-based marketing. However, the concept of neuromarketing is not only approached negatively. Murphy et al. (2008) also stated that neuromarketing techniques are not new, these advertising methods already exist. On the other hand, Egrie and Bietsch (2014), in their study, stated that most of the participants were not familiar with the concept of neuromarketing, but the number of those who found the concept of neuromarketing interesting and wanted to hear more about the concept of neuromarketing was high. However, there are many studies that positively approach the concept and applications of neuromarketing (Kenning et al., 2007; Luna-Nevarez, 2021; Mostafa, 2014; Zurawicki, 2010).

Many studies have been conducted on neuromarketing perception. This study was performed to reveal the perception of the concept of neuromarketing comparatively. With the expectation that the level of knowledge about neuromarketing would be high, the research was applied to university students. Because there is a serious industry for university education all over the world (Hirsh-Pasek et al., 2009).

Neuromarketing of educational products, especially universities, is increasing day by day. Thus, there is no doubt about the contribution of neuroscience to educational design (Goswami, 2006). Some studies, on the other hand, approach the educational applications of neuromarketing with concern (Beck, 2010; Lindell and Kidd, 2011). On the other hand, there is a striking gap that needs to be developed between education and neuromarketing, and the contribution of this study is to fill this gap. While studies have confirmed that neuroscience content makes scientific reasoning more satisfying, it has not examined whether neuroscientific content influences people's perceptions of educational products (Lindell and Kidd, 2011).

The study was not applied to potential consumers but to university students, as they were thought to be more knowledgeable about a new field such as neuromarketing. Because researches show that ordinary people are ill-equipped to evaluate scientific explanation (Goswami, 2006; Weisberg et al., 2008). The comparison was made among university students studying in social sciences and health sciences. Faculty of medicine was chosen for health sciences and faculty of business for social sciences. These two different fields were chosen since neuromarketing was an interdisciplinary field, and to get different replies. Survey method was used to collect data. The study was conducted with 499 valid surveys. There were 14 questions to determine the conceptual perception of neuromarketing. For the questions in this section, the study of Eser et al. (2011) was used. The questions to the participants were evaluated with a 5-point Likert scale. The data were coded in accordance with the SPSS 21 program and the testing phase was started. It was observed that participants in the social sciences and health sciences differed significantly in their conceptual perception of neuromarketing ($p = 0.000$). The study differs from other studies since it is aimed at the conceptual perception of neuromarketing, it is applied to university students, it compares different disciplines of neuromarketing' s conceptual perception, and it is a quantitative study in the field of neuromarketing.

The study continued with a literature review after the introduction. The third part is the methodology part. This section is about the purpose, method and design of the study. The fourth section contains the findings. The findings in the conclusion and discussion part are interpreted in comparison with the literature. The study was completed with the limitations of the study and suggestions for future research.

2. Literature review

2.1. Consumer neuroscience

Especially in the last two decades, there has been a significant increase in the integration of neuroscientific theory, methods and findings into the consumer behavior discipline (Kenning and Linzmajer, 2010). The innovative approach of consumer neuroscience has a great role in this development (Braeutigam, 2005; Singer and Fehr, 2005). Consumer neuroscience uses neuroscience methods and results as a tool to investigate consumption and marketing problems (Fugate, 2007; Lee et al., 2007). Because, researches made with traditional marketing methods cannot interpret the complicated consumer behaviors that occur as a result of brain and body correlation (Howard and Sheth, 1969). In this regard, techniques such as electroencephalography for the analysis of consumer behavior have started to be used in the field of marketing, although they are not very new. The inclusion of techniques such as fMRI and PET provided a different perspective on the process (Alsharif and Mohd Isa, 2024; Kenning et al., 2007; Plassmann et al., 2007).

Using neuroscience techniques in consumer behavior has several advantages over traditional methods. Neuroscience research offers an objective perspective on the brain. Thus, subjective evaluations of the brain are prevented. Observation of the brain as a whole paves the way for the emergence of new mechanisms in consumer behavior. In addition, this field facilitates the questioning of the current theoretical framework based on neuro systems in consumer behavior (Huettel et al., 2009). Therefore,

neuroscience makes the unexplained issues in consumer behavior research understandable by integrating it with the biological structure of the human being (Riedl et al., 2010). Based on this understanding, this study believes that consumer neuroscience will contribute to a better understanding of human behavior. Neuromarketing, on the other hand, falls under the title of consumer neuroscience and refers to the managerial application of the findings obtained with consumer neuroscience. In this way, effective company strategies can be developed for a better understanding of customer needs and product marketing (Ariely and Berns, 2010; Kalkova et al., 2023; Möser et al., 2010).

2.2. Neuromarketing

Chaotic Various reports were published in 2002 on the use of neuromarketing techniques. A department for fMRI was created for use in marketing research (Fisher et al., 2010). With the rapid development in technology, neuromarketing techniques received great attention to explore consumer preferences (Murphy, et al., 2008). These techniques have increased so much that the need arose to group them within themselves. A triple grouping can be mentioned as metabolic activity recording in the brain, and with and without electrical activity recording in the brain. The most used techniques in this grouping can be listed as fMRI, EEG, MEG, PET, Facial Coding, Eye Tracking (Bercea, 2013; Kenning et al., 2007).

There are many views approaching neuromarketing from different ways. For this reason, a wide variety of definitions have been made about neuromarketing. According to some researchers, neuromarketing is defined as the field of neuroscience, research field, study field (Eser et al., 2011; Lee et al., 2007; Murphy et al., 2008; Perrachione and Perrachione, 2008). Some researchers see it as a part of marketing (Fisher et al., 2010). On the other hand, there are approaches that regard neuroeconomics as a subfield and a separate discipline that connects perception systems (Butler, 2008; Garcia and Saad, 2008; Hubert and Kenning, 2008; Senior and Lee, 2008). However, the relevant literature reveals that the basic distinction about neuromarketing is a way of acquiring scientific knowledge (Butler, 2008; Eser et al. al., 2011; Fisher et al., 2010; Lee et al., 2007; Murphy et al., 2008; Senior and Lee, 2008;) and a tool of commercial marketing (Fugate, 2007; Green and Holbert, 2012; Hubert and Kenning, 2008; Orzán, et al., 2012; Perrachione and Perrachione, 2008; Vecchiato, et al., 2012). Based on these approaches, the definition of neuromarketing can be placed within the following general framework: Neuromarketing is defined as the application of neuroimaging techniques through cortical responses to understand human behavior related to marketing and markets (Lee et al., 2007; Weinstein et al., 1984). There are two important aspects of this definition (Weinstein et al., 1984): (i) demonstrating that the focus of neuromarketing is not merely commercial interests, (ii) extending the scope of neuromarketing research beyond inter-institutional and in-house research.

As a matter of fact, when the concept of neuromarketing is evaluated from an interdisciplinary perspective, many authors have confirmed this relationship. Murphy et al. (2008), Butler (2008), Senior and Lee (2008), Hubert and Kenning (2008), and Morin (2011) have linked neuromarketing with neuroscience as the cortical region is effective in consumer behavior. However, some researchers have suggested some

fundamental distinctions in associating neuromarketing with neuroscience. According to these researchers, the scope of neuroscience is broader. Neuromarketing, on the other hand, is the application or adaptation of the results with neuroscience. The implication here is that neuroscience data is simply applied to neuromarketing (Fisher et al., 2010; Lee et al., 2007). Apart from this, there are also approaches that associate neuromarketing with more than one science. Senior and Lee (2008) associated neuromarketing with social psychology, econometrics and social sciences. Page (2012) associated it with neuroscience, experimental psychology, and experimental economics. Garcia and Saad (2008) and Hubert and Kenning (2008) associated neuromarketing with marketing, neurobiology, and neuroscience. However, the majority of research builds this relationship on marketing and neuroscience (Butler, 2008; Fisher et al., 2010; Fugate, 2007; Hubbert and Keening, 2008; Ohme and Matukin, 2012; Page, 2012; Perrachione and Perrachione, 2008; Vecchiato et al., 2012).

2.3. Conceptual perception of neuromarketing

It is the scientist's primary duty to involve the public in discussions about new developments in technology and to consult society's views on these developments. As discussed in this article, researchers need to seek the opinions of individuals about what they think related to neuromarketing and its applications. New fields in science, such as neuromarketing, can only develop in this way by including the opinions and criticisms of the society. In this respect, it should not be forgotten that individuals have an important role in this interaction. Otherwise, as Arlauskaité and Sferle (2013) stated, the lack of knowledge in neuromarketing perception may cause neuromarketing to be labeled as intrusive, revealing privacy and threatening autonomy. This perception leads up misconceptions and misconceptions. As a matter of fact, this situation is encountered in many studies that reveal the perceptual aspect of neuromarketing.

Egrie and Bietsch (2014) investigated how consumers feel about neuromarketing. According to the results of the research, it was determined that most of the participants were not familiar with the concept of neuromarketing. However, there are many who find neuromarketing interesting and want to hear more about the concept of neuromarketing. Some researchers argue that companies can direct consumer buying behavior with neuromarketing. In this case, the fact that consumers become transparent to companies negatively affects the perception of neuromarketing (Fugate, 2007; Javor et al., 2013; Lee et al., 2007; Morin, 2011).

In other words, consumers feel vulnerable with neuromarketing (Fisher et al., 2010; Murphy et al., 2008). Employment of doctors in neuromarketing companies stirs up this negative perception. In this regard, neuromarketing is subject to heavy criticism due to health reasons (Dinu et al., 2010). Another perception is that the techniques used by neuromarketing for more effective marketing communication will cause consumption disorders. People who approach the concept in this way think that they will consume excessively or have oniomania (Butler, 2008; Hubert and Kenning, 2008). It is assumed that the use of subliminal messages plays a major role in this situation (Kelly, 1979). On the other hand, there are also studies that are optimistic about neuromarketing. Arora and Jain (2020) stated that neuromarketing can help

introspection of consumer behavior more when making a buying decision. Olteanu (2015) claimed that market researchers use the survey method to collect data and that the collected information cannot be healthy due to the shame and fear of consumers. In this case, she finds it more realistic to apply to neuromarketing applications. Butler (2008) stated that the power of use of neuromarketing is higher than its perception. According to Fugate (2008), neuromarketing helps service providers to satisfy their consumers in terms of quality service. According to Djamasbi et al. (2010), neuromarketing results are more reliable than the results from other research techniques. Hsu (2017) argued that neuromarketing acts as a complement to traditional marketing, not as a substitute due to its interdisciplinary nature. In line with these studies, the H1 hypothesis was developed as follows:

H1: The conceptual perception of neuromarketing is higher in the field of social sciences.

Due to its interdisciplinary nature, neuromarketing is related to the field of health sciences as well as different disciplines. As per the subject, its conceptual perception in this area should also be mentioned. In that case, Collaboration in psychology, anatomy, and neuroeconomics studies has been successfully applied in the development of neuromarketing.

Recently, neuromarketing has been increasingly used in drug advertisements, especially in the pharmaceutical industry. Because the developments in medical information technologies necessitated the formation of new fields such as neuromarketing (Senior and Lee, 2013). In other words, neuromarketing applications are used in the analysis of patient responses. Therefore, neuromarketing techniques are used to create the right promotion of drug advertisements and to introduce safe drugs. However, it should be noted that advertisements for drugs used in the treatment of serious diseases such as cancer, sexually transmitted diseases, diabetes and tuberculosis are prohibited. Because the risks of these drug advertisements on potential patients should not be forgotten (Ventola, 2011).

In the light of this information, the conceptual perception of neuromarketing in health sciences has been the subject of many studies. Mnushko et al. (2016) stated that non-traditional techniques such as neuromarketing have a key role in the process of introducing pharmaceutical products to the market. A group of researchers found that the connection between neuromarketing and neurology has an impact on patients' pathophysiological needs (Javor et al., 2013). In a study, neuromarketing is seen as a branch of psychiatry and a study of human behavioral factors (Kumar and Singh, 2015). In the study conducted by Unguryan (2014), it was determined that the conceptual perception of neuromarketing in pharmacies is high and that neuromarketing methods should be developed in pharmacies. In the study by Malyi et al. (2015), the conceptual perception of neuromarketing is not positive. Because, according to the result of the study, neuromarketing manipulates the minds of buyers by causing hasty purchases. Studies reveal that the perception of neuromarketing in the field of health is both positive and negative. However, although there are studies on the negative perception of the concept of neuromarketing, appropriate technology, accurate and controlled practices can help health technologies assessment (HTA). In a study by Max Planck Institute neuroscientists, while researchers imaged participants' brains with magnetic resonance, they were asked to press a button with their right or

left hand and record the moment. Interestingly, using imaging data, the researchers were able to predict a decision exactly seven seconds before participants even realized they had made a decision (Smith, 2008). Neuromarketing practices are also important in dentistry (Hall, 2020). It was seen that including a photograph of dental instruments or dental treatment on a website related to dentistry makes patients uneasy. Instead, it is stated that posting photos of young adults for young adults, posting a photo of a woman with a beautiful smile for women, or posting a family image for family dentistry will work better. Another thing to be aware of on dentistry websites is to stay away from praising words and being more arrogant. Because potential patients are either moving away or acting very distant because of such websites. Instead, it works much better to design a website that is more affordable, kinder and more friendly, and more welcoming (Hall, 2020).

For example, in a case study of a leading dental group clinic with the number one Google ranking in a major metropolitan area of the United States, the harsh and arrogant tone of the homepage was reduced to a more professional and more realistic tone. Thus, phone calls increased from 160 to 260 per month. This showed how well neuromarketing methods work for a more successful dental practice (Van Praet, 2014). Neuromarketing companies established by biomedical engineers working at the crossroads between engineering and medicine are also highly appreciated. Because these companies demonstrate the feasibility of biomedical signal processing applications in the field of consumer neuroscience. These applications illustrate the rapid transition of the field of consumer neuroscience from the analysis of TV commercials to the assessment of consumers' brain activity. Thus, there is no doubt that the field of consumer neuroscience will attract worldwide biomedical engineers in the near future (Babiloni, 2012). The H2 hypothesis designed as a result of the literature review in the field of health sciences is as follows:

H2: The conceptual perception of neuromarketing is higher in the field of health sciences.

The literature review on the conceptual perception of neuromarketing in both social and health sciences generally raises concerns about whether neuromarketing will cause consumption disorders. In this perspective, behavioral disorders such as shopping addiction and excessive consumption are emphasized. Despite this negative perception, it is understood from the researches that there is a great potential that want to learn more about neuromarketing, even if they are not familiar with neuromarketing. Because determining the needs of people in the most accurate way and producing products for this opens the way for current fields such as neuromarketing. For this, future research is needed. In terms of future prediction, it can be said that the conceptual perception of neuromarketing has the potential to clearly understand the emotional behavior of consumers as a result of the literature review.

3. Methodology

In this part of the study, information will be given about the purpose, method, sample and hypothesis. First, the aim of the study is to comparatively examine the conceptual perception of neuromarketing on students studying in the fields of social sciences and health sciences. In this study, which was carried out on students who

continue their education in the field of social sciences and health sciences at Selcuk University, the survey method was used to collect data. The relevant literature was scanned to determine the questions in the survey and previous studies in this field were taken into account. In the first part, there are 6 questions to determine the demographic characteristics of the participants. In the second part, 14 questions were included to determine the perception of neuromarketing.

The questions in this section consist of the questions developed by Eser et al. (2011). The questions to the participants were evaluated with a 5-point Likert scale. After its initial design, the survey was examined and finalized by academics specialized in neuromarketing in terms of intelligibility and suitability. Questionnaire forms were filled by face-to-face interviews with Selcuk University students. After the survey forms were collected, it was concluded that there were 499 valid survey forms. The obtained data were coded in accordance with the SPSS 21 program and the testing phase was started. At this stage, the demographic priorities of the participants were examined separately for the fields of social sciences and health sciences. Then, the averages of the responses given by the participants in both fields to the survey questions were taken, and then the factorization structure of the scale was examined with explanatory factor analysis. Finally, difference analyzes were performed with the t test. Through these analyses, the developed hypotheses were tested:

Conceptual perception of neuromarketing.

H1: Higher in social sciences (Arora and Jain, 2020; Butler, 2008; Dinu et al., 2010; Djamasbi et al., 2010; Fisher et al., 2010; Fugate, 2008; Hsu, 2017; Hsu and Chen, 2020; Hubert and Kenning, 2008; Murphy et al., 2008; Olteanu, 2015;).

H2: Higher in health sciences (Babiloni, 2012; Hall, 2020; Javor et al., 2013; Kumar and Singh, 2015; Malyi et al., 2015; Mnushko et al., 2016; Smith, 2008; Unguryan, 2014; Van Praet, 2014).

4. Results

In the study, participants were asked questions about gender, age, income, place of birth, scientific field and neuromarketing experience. The results regarding the demographic characteristics of the participants are shown in **Table 1**.

Table 1. Demographic characteristics of the participants.

		Scientific Field		**Total**
		Social Sciences	**Health Sciences**	
Gender	Female	116	126	242
	Male	133	124	257
Total		249	250	499
Age	17	6	2	8
	18	21	25	46
	19	33	58	91
	20	75	86	161
	20 years and older	114	79	193
Total		249	250	499

Table 1. (*Continued*).

		Scientific Field		Total
		Social Sciences	**Health Sciences**	
Income	1000 TL and below	19	154	173
	2000 TL	121	66	187
	3000 TL	84	18	102
	4000 TL	25	8	33
	5000 TL and above	0	4	4
Total		249	250	499
Birth	Metropolis	196	28	224
	Province	33	81	114
	County	18	132	150
	Village	2	9	11
Total		249	250	499
Neuromarketing Experience	Yes	10	23	33
	No	239	227	466
Total		249	250	499

When the demographic characteristics of the participants are examined, it is seen that 249 students are from social sciences and 250 students are from health sciences. Again, according to the table, it is understood that 242 of the participants are women, 257 are men and 193 of them are over 20 years old. In the case of income, the majority of people is in 2000 TL group, and the minority of people is in 5000 TL and above group. When the birthplaces of the participants are examined, it is seen that those born in the metropolitan area are more than the others. When we look at their experiences in the field of neuromarketing, it is understood that 10 people in the field of social sciences and 23 people from the field of health sciences have experience in this field.

After determining the demographic characteristics of the participants, the averages and standard deviations of the answers given to the items for social sciences and health sciences were examined. As seen in **Table 2**, the item with the highest average for social sciences was “Neuromarketing techniques are ethical” (4,9960), and for health sciences the item ‘‘neuromarketing should be included in researches” (4,0680). The items with the lowest average were “The side effects of medical devices on subjects in neuromarketing studies are worrying” (3,3915) for social sciences, and “The inclusion of young people as subjects in neuromarketing studies are worrying” (2,2800) for health sciences. At the same time, according to this test, it was concluded that both groups differed statistically and significantly from each other ($p = 0.000$).

Explanatory factor analysis was performed to investigate the unidimensionality of the variables constituting the scale and to determine the internal reliability of the dimensions. Before the factor analysis, the Kaiser-Meyer-Olkin (KMO) test was used to determine the level of correlation between the variables and how suitable it was for factor analysis. The results of this test are shown in **Table 3**.

Table 2. Scores of participants in social sciences and health sciences by items.

	Scientific Field	Average	Std. deviation
1. The concept of neuromarketing is to be aware.	Social Sciences	4.7912	0.46290
	Health Sciences	3.5360	1.00636
2. Neuromarketing research is about knowledge.	Social Sciences	4.7952	0.43327
	Health Sciences	3.7840	0.86506
3. Neuromarketing is a new and more scientific way of doing research about consumers.	Social Sciences	4.0884	0.29822
	Health Sciences	3.7600	0.085400
4. More attention should be paid to neuromarketing in the future.	Social Sciences	4.0924	0.29013
	Health Sciences	3.5960	0.93610
5. Neuromarketing has a unifying role between marketing and medical science.	Social Sciences	4.0964	0.29571
	Health Sciences	3.7840	0.92345
6. Neuromarketing techniques are ethical.	Social Sciences	4.9960	0.06337
	Health Sciences	3.6960	1.01573
7. The cost of neuromarketing research is high.	Social Sciences	4.3936	0.49770
	Health Sciences	3.6920	0.98846
8. There are some difficulties in finding subjects in neuromarketing research.	Social Sciences	4.3936	0.49770
	Health Sciences	3.7120	0.89457
9. Neuromarketing is a manipulative way that makes you spend on unnecessary things.	Social Sciences	3.4116	0.47122
	Health Sciences	2.3400	0.96962
10. The inclusion of young people as subjects in neuromarketing research is a concern.	Social Sciences	3.4016	0.49121
	Health Sciences	2.2800	0.95354
11. In neuromarketing research, the side effects of medical devices on subjects are of concern.	Social Sciences	3.3915	0.39151
	Health Sciences	2.3040	0.83809
12. Neuromarketing is an exciting experience for participants.	Social Sciences	4.9880	0.19012
	Health Sciences	3.7480	0.92516
13. Neuromarketing is an interesting experience for participants.	Social Sciences	4.9861	0.13337
	Health Sciences	3.8400	0.83498
14. Neuromarketing should be included in researches.	Social Sciences	4.8960	0.10337
	Health Sciences	4.0680	0.93963

Table 3. KMO values of the scale.

Scales	KMO	Bartlett	*p*
Conceptual Perception of Neuromarketing	0.888	2462.384	<0.001

The fact that the KMO value is not lower than 0.5 and the "*p*" value is significant (Ang et al., 2000) shows that the scale is suitable for factor analysis and that significant groups can be formed. The results of the factor analysis performed after this test are shown in **Table 4**.

Table 4. Factor analysis results.

Item Number	Item	F1: Interest and Participation	F2: Awareness and Knowledge	F3: Ethic	Total Variance (%)
3	Neuromarketing is a new and more scientific way of doing research about consumers.	0.596			
4	More attention should be paid to neuromarketing in the future.	0.691			
12	Neuromarketing is an exciting experience for participants.	0.793			
13	Neuromarketing is an interesting experience for participants.	0.813			
1	The concept of neuromarketing is to be aware.		0.799		
2	Neuromarketing research is about knowledge.		0.778		
7	The cost of neuromarketing research is high.		0.596		60.50%
8	There are some difficulties in finding subjects in neuromarketing research.		0.571		
14	Neuromarketing should be included in researches.		0.731		
6	Neuromarketing techniques are ethical.			0.669	
9	Neuromarketing is a manipulative way that makes you spend on unnecessary things.			0.765	
10	The inclusion of young people as subjects in neuromarketing research is a concern.			0.834	
11	In neuromarketing research, the side effects of medical devices on subjects are of concern.			0.815	
Variance (%)		24.067	17.188	12.806	
Eigenvalue		5.123	1.859	1.392	
Cronbach Alfa		0.704	0.738	0.771	

Note: 5. the variable item was excluded from the scale due to its low total correlation.

As seen in the table above, the variables in the scale are loaded on three different factors. The first of these factors was named interest and participation, the second awareness and knowledge, and the third ethics. In the explanatory factor analysis, the eigenvalues of the factors were required to be greater than 1 and the factor loads were greater than 0.5. According to the results of the analysis, it is understood that each factor meets the minimum requirements, the cronbach alpha values are above 0.70 and the total explained variance is 60.50%. The 5th item in the scale was removed due to the low item-total correlation, and subsequent analyzes were carried out with 13 items.

A *t*-test was performed to determine whether there was a difference between the three factors determined by factor analysis in terms of social sciences and health sciences. The results of this test are shown in **Table 5**.

Table 5 shows that participants in social sciences and health sciences differed significantly in all three factors ($p = 0.000$). When the average values in the table are examined, it is concluded that the perception levels of those in the field of social sciences are higher in all three factors than those in the field of health sciences.

Table 5. Comparison of social and health sciences by factors.

Factors	Scientific Field	*N*	Average	Standard deviation	*t*	*p*
F1: Interest and Participation	Social Sciences	249	4.5412	0.16669	21.928	0.000
	Health Sciences	250	3.7360	0.55501		
F2: Awareness and Knowledge	Social Sciences	249	4.6739	0.20869	25.724	0.000
	Health Sciences	250	3.7584	0.52153		
F3: Ethic	Social Sciences	249	3.8002	0.36752	29.580	0.000

Finally, the conceptual perception of neuromarketing was compared in terms of social sciences and health sciences. The results of the comparison are given in **Table 6**.

Table 6. Comparison of conceptual perception of neuromarketing in social sciences and health sciences.

	Scientific Field	*N*	Average	Standard deviation	*t*	*p*
Conceptual Perception of Neuromarketing	Social Sciences	249	4.3642	0.17051	40.184	.000
	Health Sciences	250	3.4120	0.33296		

When **Table 6** is examined, it is seen that there is a significant difference (p = 0.000) in the conceptual perception of neuromarketing among the participants in the fields of social sciences and health sciences. When the average values in the table are examined, it is concluded that the perception levels of those in the field of social sciences are higher than those in the field of health sciences.

5. Conclusion and discussion

Understanding how the subconscious affects people's decision-making process has led to the development of new approaches. In other words, it is not right to evaluate consumers rationally when talking about subconscious, emotional intelligence, persuasion, irrational decisions and many other new concepts (Du Plessis, 2011; Hazeldine, 2013). In this understanding, neuroscience is involved (Mukherji and Mukherji, 1998). Thus, disciplines such as neuroscience, psychology, anthropology, and ethnographic studies have also found their place and contributed to neuromarketing reaching an interdisciplinary format (Hubert and Kenning, 2008). Therefore, neuromarketing can be characterized as an interdisciplinary field that combines neuroscience with psychology and marketing and it focuses on measuring the cognitive and emotional responses of consumers (Karmarkar, 2011).

A review of the literature on the conceptual perception of neuromarketing, in both social and health sciences, has generally expressed concerns over consumption disorders of neuromarketing (Butler, 2008; Hubert and Kenning, 2008). This perspective focuses on behavioral disorders such as shopping addiction and overconsumption (Palmer and Hedburg, 2013). Despite this negative perception, it was found out from the studies that there is a great potential (Arora and Jain, 2020; Djamasbi et al., 2010; Fugate, 2008) who want to learn more about neuromarketing, even though they are not so familiar with it (Egrie and Bietsch, 2014; Hsu, 2017).

In this study, which was conducted to reveal the conceptual perception of neuromarketing, the neuromarketing perceptions of university students studying in social sciences and health sciences were analyzed comparatively. At this stage, the demographic priorities of the participants were examined separately for social sciences and health sciences. Then, the averages of the answers given by the participants in both fields to the survey questions were taken, and then the factorization structure of the scale was examined with explanatory factor analysis. For this, firstly, the demographic characteristics of the participants were determined. After the demographic characteristics, the averages and standard deviations of the responses to the items for the social sciences and health sciences were examined. In terms of social sciences, the item with the highest and positive average was "Neuromarketing techniques are ethical" (4.9960) and in terms of health sciences, "The subject of neuromarketing should be included in research" (4.0680). The items with the lowest and negative averages were "Side effects of medical devices on subjects in neuromarketing research are worrying" (3.3915) for social sciences, and "The use of young people as subjects for neuromarketing research concerns" (2.2800) for health sciences.

At the same time, according to this test, it was concluded that both groups differed statistically and significantly from each other ($p = 0.000$). Explanatory factor analysis was performed to investigate the unidimensionality of the variables constituting the scale and to determine the internal reliability of the dimensions. Before the factor analysis, the Kaiser-Meyer-Olkin (KMO) test was used to determine the level of correlation between the variables and how suitable it was for factor analysis. The KMO value was not less than 0.5 and the "*p*" value was significant (Ang et al., 2000). In factor analysis, variables in the scale were loaded on three different factors. The first of these factors was named interest and participation, the second awareness and knowledge, and the third ethics. According to the results of the factor analysis, it was understood that each factor met the minimum requirements, the cronbach alpha values were above 0.70 and the total explained variance was 60.50%. Afterwards, a t-test was conducted to determine whether there was a difference between the three factors determined by factor analysis in terms of social sciences and health sciences. Accordingly, it was determined that the participants in the social sciences and health sciences differed significantly in all three factors ($p = 0.000$).

Finally, the conceptual perception of neuromarketing was compared in terms of social sciences and health sciences. There was a significant difference ($p = 0.000$) in the conceptual perception of neuromarketing among participants in social sciences and health sciences. In other words, it was concluded that university students studying in the field of social sciences had higher neuromarketing perception levels compared to university students studying in the field of health sciences. According to this result, H1 hypothesis 'The conceptual perception of neuromarketing is higher in the field of social sciences' was accepted. Therefore, studies that talk about the coexistence of social sciences and neuroscience have come to the fore here. However, these researches in social sciences have positive (Arora and Jain 2020; Butler, 2008; Djamasbi et al., 2010; Fugate, 2008; Hsu, 2017; Olteanu, 2015) and negative (Dinu et al., 2010; Fisher et al., 2010; Fugate, 2007; Javor et al., 2013; Lee et al., 2007; Morin, 2011; Murphy et al., 2008) approaches to neuromarketing in themselves. Considering

the averages of responses given to the items in this study, among the reasons for the low perception of neuromarketing in health sciences, the items "Side effects of medical devices on subjects in neuromarketing studies are of concern" (3.3915), and "The use of young people as subjects in neuromarketing studies is worrying" (2.2800) can be justified. Although the first of these items caused a negative and low perception of neuromarketing in the field of social sciences, it may have triggered the low perception in health sciences since the item is actually related to health sciences. Since the second item has the lowest average in health sciences, it played the biggest role in the low perception level.

5.1. Limitations and future research suggestions

When Increasing the number of samples in the study may provide more different results. Therefore, the current sample size indicates the limitation of this study. In addition, programs such as JAMOVI can also be used as well as SPSS programs. Different analysis techniques such as SEM can be applied. In a field such as neuromarketing, sticking to only quantitative techniques is also among the limitations of the study. Therefore, apart from these techniques, qualitative techniques such as EEG, fMRI, MEG, PET, eye tracking, facial coding, which are used by neuromarketing, can also be applied. On the other hand, carrying out the study only in the fields of health sciences and social sciences is another limitation.

Identifying the changing human needs in the most accurate way and producing products for this paves the way for contemporary fields such as neuromarketing. For this, future research is needed. Apart from this study, comparisons can be made in different academic fields and in the private sector. Differences in demographic characteristics can be examined. This study was conducted on university students.

Future studies can be built to measure the perception of senior company executives, industry experts, business professionals, academics or society in general. In future studies, particular attention should be paid to the synchronized harmony of business life and academy. Because neuromarketing, by its nature, will ensure its development with the joint action of business professionals and the academic community.

In other words, a synergy will emerge from the unity of theory and practice. With the study, it was determined that the perception of neuromarketing in health sciences was low. Other factors, especially the psychological effects that cause this, can be emphasized. Future studies can be performed to increase this perception. Information technologies and communication tools should be utilized to a great extent. In terms of future projection, it should not be forgotten that the conceptual perception of neuromarketing has the potential to clearly understand the emotional behavior of consumers (Egrie and Bietsch, 2014), and this issue should be approached seriously in future studies.

5.2. Managerial implications

Regarding this result for the conceptual perception of neuromarketing, businesses should develop different strategies by using marketing communication tools more carefully. First, intensive advertising campaigns for the health sector can be launched

to further increase the conceptual perception of neuromarketing in the health sciences (Javor et al., 2013; Mnushko et al., 2016). The neuromarketing field can be made more recognizable with effective neuromarketing techniques such as eye tracking (Gentry, 2007; Maughan et al., 2007), eeg (Harris, et al., 2019), meg, pet, facial coding. In particular, including healthcare professionals in these advertisements will make the process even more effective. These studies should be carried out in every health-related institution and organization such as hospitals, pharmacies (Malyi, et al., 2015; Unguryan, 2014; Ventola, 2011), dental polyclinics. It can be adopted by making intense neuromarketing promotion especially for the health sector on the internet, blogs, radio and on social networks such as facebook and instagram (Harris et al., 2019).

In this way, businesses will use their sales techniques more effectively, which will positively affect their profitability, productivity and growth. However, businesses should always be in contact with the academic community in this process. Because, in order to follow the changes in the field of neuromarketing moment by moment and to be ahead of the competition, it is only possible to put this information into practice in this way. Therefore, university-industry cooperation (Oliveira et al., 2015) comes to the fore here. Various organizations such as conferences, seminars, workshops and symposiums should be organized at universities. Neuromarketing departments should be established at universities and students should be able to progress at an academic level in this field.

Students studying in all departments, from medical school to business, from pharmacy to economics, can be brought together under the umbrella of neuromarketing. Thus, students studying in different disciplines will have the opportunity to brainstorm with each other about neuromarketing, and contribute to a multidisciplinary approach with different perspectives (Klein, 2010; Rhoten et al., 2008).

On top of that, an intensive neuromarketing promotion should be made, starting from universities and covering all segments of society. Taking into account the level of education in these promotions is important for the effectiveness of the message to be given. Other demographics may also be considered. In this way, business resources are used effectively and expectations from the target audience are obtained.

On the other hand, although the conceptual perception of neuromarketing is high in social sciences, it should be constantly improved with new methods. In this way, the stagnation of neuromarketing in social sciences is prevented. For example, it can be associated with algorithms such as neuromarketing, machine learning, artificial neural networks, logistic regression, and decision trees (Mohri et al., 2012). For example, buying behavior can be measured with neuromarketing techniques and predicted by machine learning method. Similarly, a collaborative workspace can be created with artificial intelligence (Canepa, 2016). It can be associated with augmented reality (AR). Apart from this, marketing is more dominant in social sciences. Therefore, studies can be carried out in other fields of social sciences such as psychology (Lindell and Kidd, 2011) and anthropology. For example, in psychology, the Five Factor Personality scale can be constructed with neuromarketing research (Goldberg, 1993). Similar researches can be done with ethnographic studies (Hubert and Kenning, 2008). An integration with the communication sector can also be

achieved. In this way, neuromarketing does not get stuck in social sciences and gradually increases its perception in different fields such as health, psychology and communication.

Conflict of interest: The author declares no conflict of interest.

References

Alsharif, A. H., & Mohd Isa, S. (2024). Revolutionizing consumer insights: the impact of fMRI in neuromarketing research. Future Business Journal, 10(1), 79. https://doi.org/10.1186/s43093-024-00371-z

Ang, C. L., Davies, M., & Finlay, P. N. (2000). Measures to assess the impact of İnformation technology on quality management. International Journal of Quality and Reliability Management, 17(1), 42-66. https://doi.org/10.1108/02656710010300135

Ariely, D., & Berns, G.S. (2010). Neuromarketing: The hope and hype of neuroimaging in business. Nat Rev Neurosci, 11, 284-292. https://doi.org/10.1038/nrn2795

Arlauskaité, E., & Sferle, A. (2013). Ethical issues in Neuromarketing. Master Thesis, Lund University School of Economics and Management International Marketing and Brand Management program. Lund University Publications, p. 56.

Arora, H., & Jain, P. (2020). Neuromarketing: A tool to understand consumer psychology. Psychology and Education, 57(9), 3754-3762.

Babiloni, F. (2012). Consumer neuroscience-a new area of study for biomedical engineers. IEEE PULSE, 21-23. https://doi.org/10.1109/MPUL.2012.2189166

Barry, A., Born, G., & Weszkalnys, G., (2008). Logics of interdisciplinarity. Economy and Society, 37, 20-49. https://doi.org/10.1080/03085140701760841

Beck, D. M. (2010). The Appeal of the Brain in the Popular Press. Perspectives on Psychological Science, 5(6), 762–766. https://doi.org/10.1177/1745691610388779

Bercea, M. D. (2013). Quantitative versus qualitative in neuromarketing research. MPRA Munich Personal RePEc Archive, 44134(3), 2.

Bergmann, M., Brohmann, B., Hoffmann, E., et al. (2005). Quality criteria of transdisciplinary research: A guide for the formative evaluation of research projects. Institute for Social-Ecological Research (ISOE), Frankfurt am Main.

Braeutigam, S. (2005). Neuroeconomics—From neural systems to economic behaviour. Brain Research Bulletin, 67(5), 355–360. https://doi.org/10.1016/j.brainresbull.2005.06.009

Bronowski, J. (1978). The Origins of Knowledge and Imagination. Yale University Press: New Haven and London.

Butler, M. J. R. (2008). Neuromarketing and the perception of knowledge. Journal of Consumer Behaviour, 7(4–5), 415–419. Portico. https://doi.org/10.1002/cb.260

Canepa, G.A. (2016). What you need to know about machine learning. Birmingham: Packt Publishing.

Djamasbi, S., Siegel, M., & Tullis, T. (2010). Generation Y, web design, and eye tracking. International Journal of Human-Computer Studies, 68(5), 307–323. https://doi.org/10.1016/j.ijhcs.2009.12.006

Dinu, G., Tanase, A. C., Dinu, L., & Tanase, F. (2010). The new techniques for handling consumer behaviour. In: Proceedings of the International DAAAM Symposium.

Du Plessis, E. (2011). The branded mind: What neuroscience really tells us about the puzzle of the brain and the brand. Kogan Page.

Egrie, J., & Bietsch, S. (2014). Marketing Research Ethics: How Consumers Feel about Neuromarketing, Annual Conference Proceedings Marketing Educators' Teaching Challenges (MEA) and Career Opportunities. Academic Press, 208-215.

Epton, S.R., Payne, R.L., & Pearson, A.W. (1983). Managing Interdisciplinary Research. John Wiley & Sons, New York.

Eser, Z., Isin, F. B., & Tolon, M. (2011). Perceptions of marketing academics, neurologists, and marketing professionals about neuromarketing. Journal of Marketing Management, 27(7–8), 854–868. https://doi.org/10.1080/02672571003719070

Fisher, C. E., Chin, L., & Klitzman, R. (2010). Defining Neuromarketing: Practices and Professional Challenges. Harvard Review of Psychiatry, 18(4), 230–237. https://doi.org/10.3109/10673229.2010.496623

Fugate, D. L. (2007). Neuromarketing: a layman's look at neuroscience and its potential application to marketing practice. Journal of Consumer Marketing, 24(7), 385–394. https://doi.org/10.1108/07363760710834807

Garcia, J. R., & Saad, G. (2008). Evolutionary neuromarketing: darwinizing the neuroimaging paradigm for consumer behavior. Journal of Consumer Behaviour, 7(4–5), 397–414. Portico. https://doi.org/10.1002/cb.259

Gentry, L. (2007). Marketing and eye-tracking machines: research opportunities for an affordable tool. Journal of International Management Studies, 60-65.

Goldberg, L. R. (1993). The structure of phenotypic personality traits. American Psychologist, 48(1), 26-34. https://doi.org/10.1037/0003-066X.48.1.26

Goswami, U. (2006). Neuroscience and education: from research to practice? Nature Reviews Neuroscience, 7(5), 406–413. https://doi.org/10.1038/nrn1907

Green, S., & Holbert, N. (2012). Gifts of the neuro-magi: Science and speculation in the age of neuromarketing. Marketing Research, 24(1), 10-14.

Javor, A., Koller, M., Lee, N., et al. (2013). Neuromarketing and consumer neuroscience: Contributions to neurology. BMC Neurology, 13(1), 1-12. http://dx.doi.org/10.1186/1471-2377-13-13

Hall, D. A. (2020). Neuromarketing and the effective dental practicewebsite. Available online: https://www.dentaleconomics.com/practice/marketing/article/14185508/neuromarketing-and-the-effective-dental-practice-website (accessed on 2 May 2024).

Hazeldine, S. (2013). Neuro sell. Kogan Page Limited.

Harris, J. M., Ciorciari, J., & Gountas, J. (2019). Consumer Neuroscience and Digital/Social Media Health/Social Cause Advertisement Effectiveness. Behavioral Sciences, 9(4), 42. https://doi.org/10.3390/bs9040042

Hirsh-Pasek, K., Golinkoff, R.M., Berk, L. E.,& Singer, D. G. (2009). A mandate for playful leaning in preschool. Oxford University Press. https://doi.org/10.1093/acprof:oso/9780195382716.001.0001

Howard, J.A., & Sheth, J.N. (1969). The theory of buyer behavior. Wiley, New York.

Hsu, M. (2017). Neuromarketing: Inside the Mind of the Consumer. California Management Review, 59(4), 5–22. https://doi.org/10.1177/0008125617720208

Hsu, L., & Chen, Y.-J. (2020). Neuromarketing, Subliminal Advertising, and Hotel Selection: An EEG Study. Australasian Marketing Journal, 28(4), 200–208. https://doi.org/10.1016/j.ausmj.2020.04.009

Hubert, M., & Kenning, P. (2008). A current overview of consumer neuroscience. Journal of Consumer Behaviour, 7(4-5), 263-271. doi:10.1002/cb.251 https://doi.org/10.1002/cb.251

Huettel, S.A., Song, A.W., & McCarthy, G. (2009). Functional magnetic resonance imaging, 2nd edition. Sinauer, Sunderland International Journal of Advertising.

Ismajli, A., Ziberi, B., & Metushi, A. (2022). The impact of neuromarketing on consumer behaviour. Corporate Governance and Organizational Behavior Review, 6(2), 95–103. Portico. https://doi.org/10.22495/cgobrv6i2p9

Kalkova, N., Yarosh, O. B., Mitina, E. A., & Velgosh, N. Z. (2023). Neuromarketing Research On Consumers' Visual Perception of Cryptomarking a Product Package. ABAC Journal, 43(1), 69-84.

Karmarkar, U. (2011). Note on neuromarketing. Harvard business school marketing unit case.

Kelly, J. S. (1979). Subliminal Embeds in Print Advertising: A Challenge to Advertisng Ethics. Journal of Advertising, 8(3), 20–24. https://doi.org/10.1080/00913367.1979.10673284

Kenning, P., Plassmann, H., & Ahlert, D. (2007). Applications of functional magnetic resonance imaging for market research. Qualitative Market Research: An International Journal, 10(2), 135–152. https://doi.org/10.1108/13522750710740817

Kenning, P., & Linzmajer, M. (2010). Consumer neuroscience: an overview of an emerging discipline with implications for consumer policy. Journal Für Verbraucherschutz Und Lebensmittelsicherheit, 6(1), 111–125. https://doi.org/10.1007/s00003-010-0652-5

Klein, J.T., (2010). The taxonomy of interdisciplinarity. In: Frodeman, R., Klein, J.T.,Mitcham, C. (editors), Oxford Handbook of Interdisciplinarity. Oxford UniversityPress.

Kumar, H., & Singh, P. (2015). Neuromarketing: An emerging tool of market research. International Journal of Engineering and Management Research, 5(6), 530-535.

Lee, N., Broderick, A. J., & Chamberlain, L. (2007). What is 'neuromarketing'? A discussion and agenda for future research. International Journal of Psychophysiology, 63(2), 199–204. https://doi.org/10.1016/j.ijpsycho.2006.03.007

Lindell, A. K., & Kidd, E. (2011). Why Right-Brain Teaching is Half-Witted: A Critique of the Misapplication of Neuroscience to Education. Mind, Brain, and Education, 5(3), 121–127. Portico. https://doi.org/10.1111/j.1751-228x.2011.01120.x

Luna-Nevarez, C. (2021). Neuromarketing, Ethics, and Regulation: An Exploratory Analysis of Consumer Opinions and Sentiment on Blogs and Social Media. Journal of Consumer Policy, 44(4), 559–583. https://doi.org/10.1007/s10603-021-09496-y

Malyi, V., Timanyuk, I., & Rogulia, O. (2015). Pharmaceutical marketing on a subconscious level. Harvard Review of Psychiatry, Stanford University Press, 16(2), 125-130.

Maughan, L., Gutnikov, S., & Stevens, R. (2007). Like more, look more. Look more, like more: The evidence from eye-tracking. Journal of Brand Management, 14(4), 335–342. https://doi.org/10.1057/palgrave.bm.2550074

Mnushko, Z.M., Pestun I.V., Timanyuk I.V., et al. (2016). Management and marketing in pharmacy. Dialog Publishing Center, Kharkiv.

Mohri, M., Rostamizadeh, A., & Talwalkar, A. (2012). Foundations of Machine Learning. London: MIT Press.

Morin, C. (2011). Neuromarketing: The New Science of Consumer Behavior. Society, 48(2), 131–135. https://doi.org/10.1007/s12115-010-9408-1

M. Mostafa, M. (2014). Functional neuroimaging applications in marketing: some methodological and statistical considerations. Qualitative Market Research: An International Journal, 17(4), 343–372. https://doi.org/10.1108/qmr-06-2011-0003

Möser, A., Hoefkens, C., Van Camp, J., et al. (2009). Simplified nutrient labelling: consumers' perceptions in Germany and Belgium. Journal Für Verbraucherschutz Und Lebensmittelsicherheit, 5(2), 169–180. https://doi.org/10.1007/s00003-009-0531-0

Mukherji, A., & Mukherji, J. (1998). Structuring organizations for the future: analyzing and managing change. Management Decision, 36(4), 265–273. https://doi.org/10.1108/00251749810211054

Murphy, E. R., Illes, J., & Reiner, P. B. (2008). Neuroethics of neuromarketing. Journal of Consumer Behaviour: An International Research Review, 7(4-5), 293-302. https://doi.org/10.1002/cb.252

Ohme, R., & Matukin, M. (2012). A small frog that makes a big difference: Brain wave testing of TV advertisements. IEEE Pulse, 3(3), 28-33. http://dx.doi.org/10.1109/MPUL.2012.2189169

Oliveira, J. H. C. D., Giraldi, J. de M. E., Jabbour, C. J. C., et al. (2015). Improving business innovation and research through the application of neuromarketing with ethics: a framework. International Journal of Business Innovation and Research, 9(1), 52. https://doi.org/10.1504/ijbir.2015.065953

Bercea Olteanu, M. D. (2015). Neuroethics and Responsibility in Conducting Neuromarketing Research. Neuroethics, 8(2), 191–202. https://doi.org/10.1007/s12152-014-9227-y

Orzán, G., Zara, I. A., & Purcarea, V. L. (2012). Neuromarketing techniques in pharmaceutical drugs advertising. A discussion and agenda for future research. Journal of Medicine and Life, 5(4), 428-432.

Page, G. (2012). Scientific Realism: What 'Neuromarketing' can and can't Tell us about Consumers. International Journal of Market Research, 54(2), 287–290. https://doi.org/10.2501/ijmr-54-2-287-290

Palmer, D., & Hedberg, T. (2012). The Ethics of Marketing to Vulnerable Populations. Journal of Business Ethics, 116(2), 403–413. https://doi.org/10.1007/s10551-012-1476-2

Penz, E., & Hogg, M. K. (2011). The role of mixed emotions in consumer behaviour. European Journal of Marketing, 45(1/2), 104–132. https://doi.org/10.1108/03090561111095612

Perrachione, T. K., & Perrachione, J. R. (2008). Brains and brands: Developing mutually informative research in neuroscience and marketing. Journal of Consumer Behaviour, 7(4-5), 303-318. http://dx.doi.org/10.1002/cb.253

Plassmann, H., Ambler, T., Braeutigam, S., et al. (2007). What can advertisers learn from neuroscience? International Journal of Advertising, 26(2), 151–175. https://doi.org/10.1080/10803548.2007.11073005

Pohl, C., & Hirsch Hadorn, G. (2007). Principles for Designing Transdisciplinary Research. Oekom. https://doi.org/10.14512/9783962388638

Rhoten, D., O'Connor, E., & Hackett, E. J. (2009). The Act of Collaborative Creation and the Art of Integrative Creativity: Originality, Disciplinarity and Interdisciplinarity. Thesis Eleven, 96(1), 83–108. https://doi.org/10.1177/0725513608099121

Riedl, R., Banker, R. D., Benbasat, I., et al. (2010). On the Foundations of NeuroIS: Reflections on the Gmunden Retreat 2009. Communications of the Association for Information Systems. https://doi.org/10.17705/1cais.02715

Senior, C., & Lee, N. (2008). Editorial: A manifesto for neuromarketing science. Journal of Consumer Behaviour, 7(4-5), 263-271. http://dx.doi.org/10.1002/cb.250

Senior, C., & Lee, N. (2013). The state of the art in organizational cognitive neuroscience: The therapeutic gap and possible implications for clinical practice. Frontiers in Human Neuroscience, 7, 808. https://doi.org/10.3389/fnhum.2013.00808

Singer, T. & Fehr, E. (2005). The neuroeconomics of mind reading and empathy. Am Econ Rev, 95,340-345. https://doi.org/10.1257/000282805774670103

Smith, K. (2008). Brain makes decisions before you even know it. Nature.

Ulman, Y. I., Cakar, T., & Yildiz, G. (2015). Ethical issues in neuromarketing: "I consume, therefore I am!". Science and Engineering Ethics, 21(5), 1271-1284. https://doi.org/10.1007/s11948-014-9581-5

Unguryan, L. M. (2014). Analysis of the use of pharmacy neuromarketing. Available online: https://cyberleninka.ru/article/n/analiz-primeneniya-aptechnogo-neyromarketinga (accessed on 2 June 2024).

Van Praet, D. (2014). Unconscious branding: How neuroscience can empower (and inspire) marketing. St. Martin's Press; 115-145.

Vecchiato, G., Kong, W., Maglione, A., & Wei, D. (2012). Understanding the impact of tv commercials: Electrical neuroimaging. IEEE Pulse, 3(3), 42-47. http://dx.doi.org/10.1109/MPUL.2012.2189171

Ventola C.L. (2011). Direct-to-consumer pharmaceutical advertising: therapeutic or toxic? A peer-reviewed journal for formulary management, 36(10), 669-684.

Zurawicki, L. (2010). Neuromarketing. Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-540-77829-5

Weisberg, D. S., Keil, F. C., Goodstein, J., et al. (2008). The Seductive Allure of Neuroscience Explanations. Journal of Cognitive Neuroscience, 20(3), 470–477. https://doi.org/10.1162/jocn.2008.20040

Weinstein, S., Drozdenko, R., & Weinstein, C. (1984). Brain wave analysis in advertising research. Validation from basic research & independent replications. Psychology & Marketing, 1(3–4), 83–95. Portico. https://doi.org/10.1002/mar.4220010309

Appendix

Dear Participant, this questionnaire will be used for academic purposes for a scientific study.

Please mark the scale value that best expresses how you feel. Thank you for your contribution.

Gender:

☐Female ☐Male

Age:

☐ 17 ☐ 18 ☐ 19 ☐ 20 ☐ 20 and above

Income (Turkish Lira):

☐1000TL and below ☐2000TL ☐3000TL ☐4000TL ☐5000TL and above

Birth:

☐ Metropolis ☐Province ☐County ☐Village

Scientifi Field:

☐Social Sciences ☐Health Sciences

Neuromarketing Exp.:

☐Yes ☐No

Neuromarketing: It is a field of marketing communication that applies neuropsychology in marketing research, examining consumers' perceptual motors, cognitive and emotional responses to marketing stimuli.

EXPLANATION ***Likert Scale (5)*** **1—disagree strongly** **2—disagree** **3—undecided** **4—agree** **5—agree strongly**	**disagree strongly**	**disagree**	**undecided**	**agree**	**agree strongly**
1. The concept of neuromarketing is to be aware.	1	2	3	4	5
2. Neuromarketing research is about knowledge.	1	2	3	4	5
3. Neuromarketing is a new and more scientific way of doing research about consumers.	1	2	3	4	5
4. More attention should be paid to neuromarketing in the future.	1	2	3	4	5
5. Neuromarketing has a unifying role between marketing and medical science.	1	2	3	4	5
6. Neuromarketing techniques are ethical.	1	2	3	4	5
7. The cost of neuromarketing research is high.	1	2	3	4	5
8. There are some difficulties in finding subjects in neuromarketing research.	1	2	3	4	5
9. Neuromarketing is a manipulative way that makes you spend on unnecessary things.	1	2	3	4	5
10. The inclusion of young people as subjects in neuromarketing research is a concern.	1	2	3	4	5
11. In neuromarketing research, the side effects of medical devices on subjects are of concern.	1	2	3	4	5
12. Neuromarketing is an exciting experience for participants.	1	2	3	4	5
13. Neuromarketing is an interesting experience for participants.	1	2	3	4	5
14. Neuromarketing should be included in researches.	1	2	3	4	5