

## THE EFFECT OF HEALTHCARE APPLICATION LOGO DESIGNS ON USER’S RELIABILITY PERCEPTION

Asiye BİLGİLİ  
Haliç Üniversitesi, Türkiye  
asiyetunar@halic.edu.tr  
<https://orcid.org/0000-0002-9776-5119>

Emre AKADAL  
İstanbul Üniversitesi, Türkiye  
emre.akadal@istanbul.edu.tr  
<https://orcid.org/0000-0001-6817-0127>

<i>Atıf</i>	Bilgili, A. & Akadal, E. (2025). The Effect of Healthcare Application Logo Designs on User’s Reliability Perception, <i>Yeni Medya Elektronik Dergisi</i> , 9 (2), 150-170.
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### ABSTRACT

The aim of this study is to examine the sense of trust that the logos of applications operating in various subcategories in the field of health evoke in users. The study evaluated application logos in different categories such as health, nutrition, child health, fitness, medicines, first aid, chronic diseases, mental health, therapy, and sleep. This study is a cross-sectional survey study conducted using the quantitative research method. The aim of the study is to examine the effect of the logo designs of health applications on the perception of trustworthiness of users. Since it is known that the color in the logo directly affects user trust, all logos were converted to black and white in order to eliminate this effect. This study examined the effects of the logo designs of health applications on the perception of trustworthiness of users. Participants evaluated a total of 55 logos in 10 different categories using a Likert scale ranging from 1 to 9. The obtained data revealed that there were significant differences in terms of perception of trustworthiness among the subcategories of health applications. These differences show that the first impression and sense of trust created by logo designs on users vary according to the content and purpose of the application.

**Keywords:** *Logo, Reliability, Mobile Application, Health.*

## SAĞLIK UYGULAMALARININ LOGO TASARIMLARININ KULLANICI GÜVENİLİRLİK ALGISI ÜZERİNE ETKİSİ

### ÖZ

Bu çalışmanın amacı, sağlık alanında çeşitli alt kategorilerde faaliyet gösteren uygulamaların logolarının kullanıcılarda uyandırdığı güven duygusunu incelemektir. Çalışmada uygulama logoları sağlık, beslenme, çocuk sağlığı, fitness, ilaçlar, ilk yardım, kronik hastalıklar, ruh sağlığı, terapi ve uyku gibi farklı kategorilerde değerlendirilmiştir. Bu çalışma, nicel araştırma yöntemi kullanılarak yürütülen kesitsel bir anket çalışmasıdır. Çalışmanın amacı, sağlık uygulamalarının logo tasarımlarının kullanıcıların güven algısı üzerindeki etkisini incelemektir. Logodaki rengin kullanıcı güvenini doğrudan etkilediği bilindiğinden bu etkiyi ortadan kaldırmak amacıyla tüm logolar siyah beyaza dönüştürülmüştür. Bu çalışmada sağlık uygulamalarının logo tasarımlarının kullanıcıların güven algısı üzerindeki etkileri incelenmiştir. Katılımcılar toplam 55 logoyu 1'den 9'a kadar değişen Likert ölçeği kullanarak 10 farklı kategoride değerlendirmişlerdir. Elde edilen veriler, sağlık uygulamalarının alt kategorileri arasında güven algısı açısından anlamlı farklılıklar olduğunu ortaya koymuştur. Bu farklılıklar, logo tasarımlarının kullanıcılarda yarattığı ilk izlenimin ve güven duygusunun, uygulamanın içeriğine ve amacına göre farklılık gösterdiğini göstermektedir.

**Anahtar Kelimeler:** Logo, Güvenilirlik, Mobil Uygulama, Sağlık.

## INTRODUCTION

With rapidly developing technology, it is important for individuals to access the right information quickly in daily life. In order for digital transformations to be successfully integrated into professional life as well as daily life and to be adopted by users, it is necessary to offer high usability products to users in the institutional and cultural context (Sandnes, 2021). However, sometimes the use of systems is difficult due to both the user base and the design. In order to prevent this situation, researchers and practitioners are working in the field of Human-Computer Interaction - HCI.

HCI is an interdisciplinary field that focuses on the interaction between computers and users, while also focusing on interface design to improve this interaction (Kim, 2020). HCI is instantly affected by the development of technology due to its structure. In this field, which aims to produce technology according to human needs, it is ensured that technology adapts to humans, not humans to technology (Çağıltay, 2018).

When the studies in this field are examined, it is seen that the focus is on the role of psychology in HCI (Carroll, 1997), the development of information technology between 1990 and 2008, the use and impact of information technology (Zhang, Li, Scialdone, & Carey, 2009), user-centered approaches and design rules (Park & McKilligan, 2018), explainable artificial intelligence (XAI) that creates a reliable communication environment between human-computer interaction and artificial intelligence (Nazar, Mansoor, Yafi, & Su'ud, 2021), and usability (Mortezaei, Rabiei, Asadi, & Emami, 2023).

The rapid development and proliferation of digital technologies deeply affects our daily lives. In this context, mobile applications have become an indispensable part of modern society. According to Statista's 2023 report, the number of smartphone users worldwide has exceeded 6.8 billion, indicating that more than 85% of the world's population has access to mobile devices (Statista, 2023). This widespread access has increased the use of mobile applications in many areas, from communication to entertainment, from finance to health.

In recent years, the importance of visual elements in digital communication has been increasing. The study by Mayer and Moreno (2003) revealed that people process visual and auditory information faster and more effectively than text-based content. This finding has led to the prominence of visual elements in the design of social media platforms and mobile applications. The popularity of visual-heavy platforms such as Instagram and TikTok confirms this trend.

In this context, the logos of applications stand out as a critical visual element that users first interact with and form their first impressions of the application. The

success or failure of logo design directly affects the user's interaction with the application (Xueying & Bingjian, 2020). Henderson and Cote's (1998) study emphasized that logos are powerful symbols that represent the identity of a brand or application and convey its values and promises. Logos have the ability to present complex information in a simple, memorable, and aesthetic form. Research on logo design examines the effects of various design elements on user perception. Labrecque and Milne's (2012) study on color psychology has shown that colors affect the perception of brand personality. For example, blue tones evoke a sense of trust and professionalism, while green is associated with health and growth. In addition, Van der Lans et al.'s (2009) study revealed the effect of logo shapes and symmetry on brand recognition. Mobile applications in the health field have become increasingly popular in recent years. According to the report by Research2Guidance (2023), the global digital health market reached \$292.7 billion in 2023 and is expected to reach \$958.5 billion by 2030 with an annual growth rate of 12.8%. Due to the impact of the COVID-19 pandemic, the demand for remote health services has increased, which has accelerated the use of health applications (Budd et al., 2020). Health applications offer a wide range of services. Applications operating in various areas such as fitness tracking, nutrition planning, mental health support, medication reminders, and telemedicine services facilitate users' health management. The widespread use of mobile devices and the ability to personalize users' experiences through applications pose a threat to privacy and security (Vollero, et al., 2017). In addition, in a sensitive subject such as health, it is critical for an application to stand out and be preferred by users to instill a sense of trust. When users choose an application that will share their personal health data and affect their health decisions, the perception of reliability comes to the fore. The study by Zhao, Ni, and Zhou (2018) emphasized the impact of the trust factor on user acceptance and retention in healthcare applications. At this point, the application's logo is the first visual element that triggers users' sense of trust. The human brain has the ability to process visual information quickly. Lindgaard et al.'s (2006) research has shown that people can evaluate the visual appeal of a website in just 50 milliseconds. This finding emphasizes the importance of logo design, as logos are often the first point of contact between an application and the user. In this short period of time, the color, shape, and overall aesthetics of the logo design can evoke certain emotions and associations in users.

Health applications offer services in different subcategories, and each category addresses different user needs. For example, fitness applications should provide a sense of motivation and energy, while mental health applications should provide a sense of calm and confidence. Applications related to medicines should provide a sense of certainty and reliability. These differences should also be

reflected in the logo design. In addition, the impact of demographic factors on logo perception should not be ignored. Factors such as age, gender, and cultural background can play a role in the perception of logo designs. The study conducted by Cyr, Head, and Larios (2010) on intercultural web design perception showed that color and design preferences of different cultures can vary. This finding is an important factor to consider in the logo design of global health applications.

This study aimed to examine the sense of trust that the logos of applications operating in various subcategories in the field of health evoke in users. The study evaluated the logos of applications in different categories such as health, nutrition, child health, fitness, medicines, first aid, chronic diseases, mental health, therapy, and sleep. Through an online survey, participants were asked to evaluate these logos in a short time and rate their feelings of trust. The effect of demographic factors on this perception was also included in the study.

This study includes findings aimed at understanding the effect of logo designs of healthcare applications on user perception of trustworthiness. The findings obtained can guide application developers and designers in creating more effective and trustworthy logos for their target audiences. In addition, this study can form the basis for future research on the role of logo design in the fields of health communication and digital health.

In the findings section of this study, the effects of logos in different healthcare application categories on user perception of trustworthiness are presented in detail. The mean scores, standard deviations and confidence intervals obtained for each category are analyzed, and comparisons between categories are made. In the conclusion section, the practical and theoretical implications of these findings will be discussed. In particular, it is discussed which logo features create higher perception of trustworthiness, the reasons for the differences in perception between different healthcare categories and how this information can be used by application developers and designers. In addition, the limitations of the study and suggestions for future research will be presented in this section. This research is expected to bring a new perspective to the logo design strategies of healthcare applications and highlight the role of logo design in building user trust.

As a result, in the rapidly digitalizing healthcare sector, establishing and maintaining user trust is of critical importance. Logo design is the first step in building this trust. Therefore, understanding the impact of healthcare application logos on user perception is both valuable from an academic perspective and important in terms of practical applications.

## **METHODOLOGY AND FINDINGS**

This section discusses the design of the study, the data collection process, and analysis methods.

### **Research Design**

This study is a cross-sectional survey conducted using a quantitative research method. The aim of the study is to examine the effect of logo designs of health applications on users' perception of trustworthiness. Since it is known that the color in the logo directly affects user trust, all logos were converted to black and white in order to eliminate this effect.

### **Participants**

A total of 58 participants were included in the study. Participants voluntarily participated in the online survey announced through social media platforms. Although the age distribution of the participants covered a wide range, a concentration was observed in the 20-25 and 35-40 age ranges. However, there was a generally homogeneous distribution.

### **Data Collection Tools**

Data were collected through an online survey created through the Google Surveys platform. The survey consists of three main sections:

Demographic Information: Age, gender, and income status information of the participants were collected. The following categories were used for income status:

- Less than 17,000 TL
- 17,000 - 30,000 TL
- 30,001 - 50,000 TL
- 50,001 - 70,000 TL
- 70,001 - 99,999 TL
- 100,000 TL and more

Logo Evaluation: Participants were shown a total of 55 logos from 10 different health application categories. The categories and logo numbers are as follows:

- General health search: 10 logos
- Nutrition: 5 logos
- Child health: 5 logos
- Fitness: 5 logos
- Medicines: 5 logos
- First aid: 5 logos
- Chronic diseases: 5 logos
- Mental health: 5 logos
- Therapy: 5 logos
- Sleep: 5 logos

Credibility Assessment: For each logo, participants were asked to evaluate their perception of credibility using a Likert scale from 1 to 9 (1: lowest credibility, 9: highest credibility).

### **Logo Preparation Process**

The logos used in the research were converted to black and white tones in order to control the effect of the color factor. This process was carried out using Adobe Photoshop software. The logos were recreated using a 100% black and white color palette, preserving the basic features of their original designs.

### **Data Collection Procedure**

The survey was announced to the participants via social media platforms (Instagram, X-Twitter and LinkedIn). Participants accessed the online survey via their own devices. At the beginning of the survey, participants were informed about the purpose of the study, the privacy policy and that participation was voluntary.

During the logo evaluation phase, participants were asked to examine each logo for 1-3 seconds. Immediately after the logo was displayed, participants were asked to score their perception of trustworthiness on a scale of 1-9.

## Data Analysis

The collected data were analyzed using Google Surveys service's own tools, Google Tables and Microsoft Office Excel software. Descriptive methods were used in the analyses. At this stage, upper and lower limits were calculated depending on the sum and difference of the mean, median, standard deviation, variance, mean and standard deviation of the data. Scatter images were obtained by drawing candlestick charts with the obtained data.

## Limitations

There are some limitations of this study:

1. The sample size ( $n=58$ ) is relatively small, which may limit the generalizability of the findings.
2. The online survey method may have excluded potential participants who did not have internet access or who had low digital literacy.
3. The presentation of logos in black and white, although necessary to control for the effect of color, may have created a deviation from real-world conditions.

These limitations will be taken into account in the interpretation of the results and in future research.

## Findings

This study examined the effect of logo designs of healthcare applications on users' perception of trustworthiness. As a result of the evaluations of a total of 58 participants, it was observed that there were significant differences between the perceptions of trustworthiness of logos belonging to different healthcare application categories. Participants evaluated a total of 55 logos in 10 different categories using a Likert scale ranging from 1 to 9.

The obtained data reveal that there are significant differences in terms of perception of trustworthiness among the subcategories of healthcare applications. These differences indicate that the first impression and sense of trust created by logo designs on users vary according to the content and purpose of the application. In the following, first, a general evaluation of all categories will be presented, then each category will be considered separately and analyzed in detail.



**Table 1**

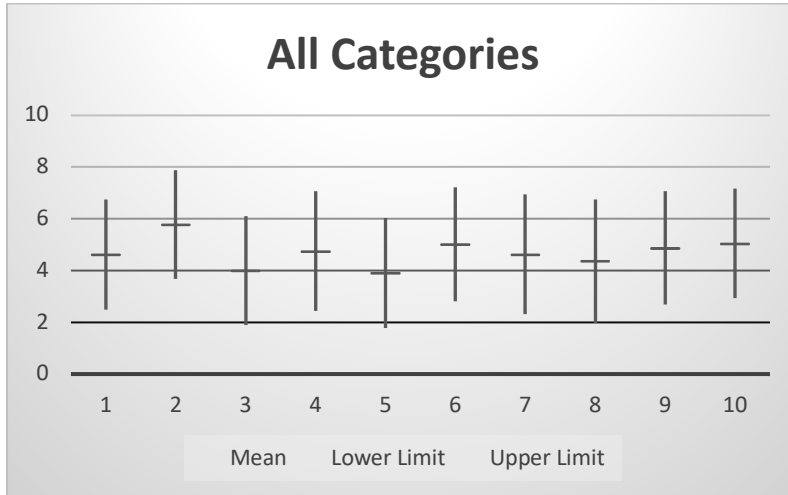
*All Categories*

ALL CATEGORIES			
Category	Mean	Standard Deviation	Variance
Nutrition	5,779	2,101	4,417
Sleep	5,047	2,111	4,46
First Aid	5,006	2,202	6,086
Therapy	4,877	2,184	4,774
Fitness	4,755	2,321	5,389
Chronic	4,63	2,309	5,335
Health	4,618	2,132	4,548
Mental Health	4,366	2,389	5,709
Child Health	3,996	2,098	4,404
Medication	3,908	2,128	4,532

When all categories are examined, significant differences are observed in terms of the sense of trust that the logo designs of health applications evoke in users. The highest perception of trust belongs to applications in the nutrition category with an average score of 5.78. This result shows that the logos of nutrition applications evoke more trust in users compared to other categories. This is followed by the sleep category with an average score of 5.05 and the first aid category with an average of 5.01. On the other hand, the lowest perception of trust belongs to applications in the medicine category with an average score of 3.91. This situation reveals that the logos of medicine applications evoke less trust in users compared to other categories. The medicine category is followed by the child health category with an average score of 4.00 and the mental health category with an average of 4.37. These results show that there are significant differences in the perception of trust in logo designs among the subcategories of health applications and that this situation may affect users' application preferences. Figure 1 shows the candlestick charts for all categories.

**Figure 1**

*All Categories*



In the graph where the average, lower limit and upper limit of all categories are shown, the categories are given by numbering. Accordingly, the numbers between 1-10 represent the categories of health, nutrition, child health, fitness, medicine, first aid, chronic, mental health, therapy and sleep, respectively. The average reliability score for each category is shown with a center line in the candlestick chart. These lines show the general tendency of the perception of reliability among the categories, while the lower and upper limits show the distribution of the perception of reliability. When looking at the health and nutrition categories, it is possible to say that the average values are quite high and the distribution is wide. The average of the nutrition category is particularly high and the perception of reliability has one of the widest ranges. This situation indicates that this category has both a high perception of reliability among users and a great variety of evaluations. The average values in the child health and fitness categories are lower compared to the other categories. This shows that users generally find the health applications in these categories less reliable. The perception of reliability in these categories is more homogeneous compared to the other categories due to both the lower average values and the closeness of the lower and upper limits. When looking at the chronic and mental health categories, it is seen that the average values are at the middle-upper levels and the lower-upper limits are quite wide. This indicates that there is a diversity in the perception of reliability among users and that a generally positive perception prevails. In the therapy and sleep categories, although the average is high, the distributions are narrow. This shows that the perception of reliability is generally

positive and that there is a consensus in the participants' evaluations regarding these categories.

When looking at all categories, the 5 categories with the highest perception of trust were examined in more detail within the scope of the study. Table 2 provides a general evaluation of the Nutrition category.

**Table 2**

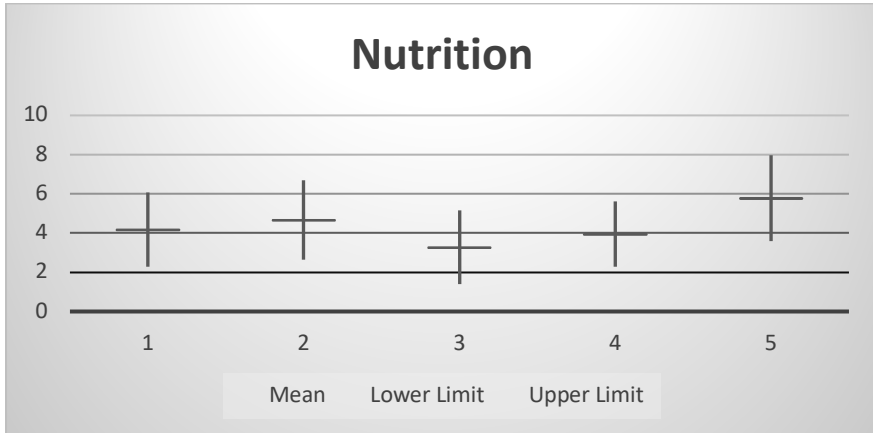
*Nutrition Category*

NUTRITION		
Mean	Standard Deviation	Variance
4,169491525	1,89511661	3,59146698
4,677966102	2,02944428	4,11864407
3,271186441	1,87387215	3,51139684
3,949152542	1,6756237	2,80771479
5,779661017	2,1898496	4,79544126

In the Nutrition category, the 5th logo had the highest perceived reliability with a score of 5.77, while the 3rd logo was evaluated as the lowest with 3.27. Although the 5th logo has the highest average score, it may be found less reliable by some users due to its wide range. Figure 2 shows the candlestick chart of the Nutrition category.

**Figure 2**

*Nutriton Category*



Logos 1, 2 and 5 have a wide range of reliability. This shows that there is a wide variation in the perception of reliability of these logos among users. Logo 5 in particular has both a high average score and a wide range of evaluations. This means that some users find it very reliable while others find it less reliable. Logos 3 and 4 have narrower ranges of reliability. These logos are evaluated more consistently among users and there is less variation in perception of reliability. Table 3 shows the general evaluation of the Sleep category.

**Table 3**

*Sleep Category*

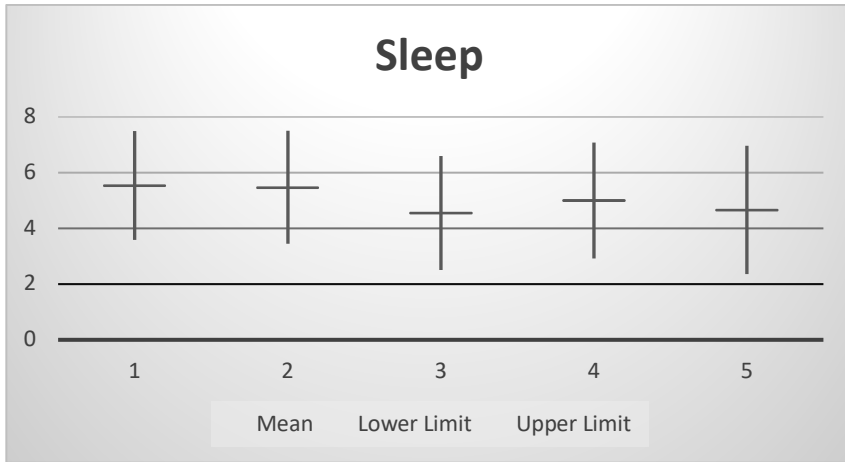
SLEEP		
Mean	Standard Deviation	Variance
5,542372881	1,95925772	3,83869082
5,474576271	2,02872418	4,1157218
4,559322034	2,04493644	4,18176505
5	2,084425	4,34482759
4,661016949	2,30150003	5,2969024

The average scores of the logos vary between 4.56 and 5.54. In general, there is a perception of medium and high levels of reliability. The candlestick chart for the Sleep category is given in Figure 3.

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**Figure 3**

*Sleep Category*



When viewed in terms of distribution and average, the 1st logo has a high perception of reliability and diversity in participant opinions. Although the other logos also include different opinions due to wide distribution, there is a negative perception in the 3rd and 5th logos. Table 4 provides the general evaluation of the First Aid category.

**Table 4**

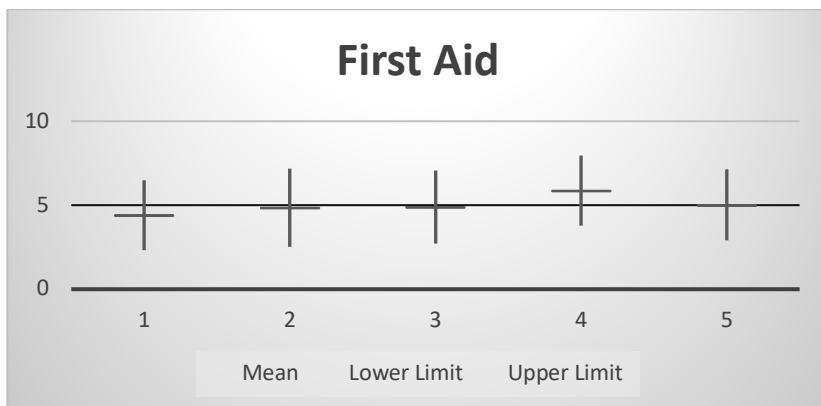
*First Aid Category*

FIRST AID		
Mean	Standard Deviation	Variance
4,406779661	2,08540614	4,34891876
4,847457627	2,3401559	5,47632963
4,898305085	2,17901366	4,74810053
5,86440678	2,09644714	4,39509059
5,016949153	2,1131079	4,46522501

In the First Aid category, the 4th logo had the highest perception of reliability with an average score of 5.86, while the 1st logo had the lowest perception of reliability with 4.4. When considered in general, it is possible to say that the logos in this category have a high perception of reliability. Figure 4 shows the candlestick chart for the First Aid category.

**Figure 4**

*First Aid Category*



The distribution of the 1st, 2nd, 3rd and 5th logos is wide and there are different opinions among the users. The 4th logo also has a wide distribution but its high

average creates a positive perception of trust. Table 5 provides a general evaluation of the Therapy category.

**Table 5**

*Therapy Category*

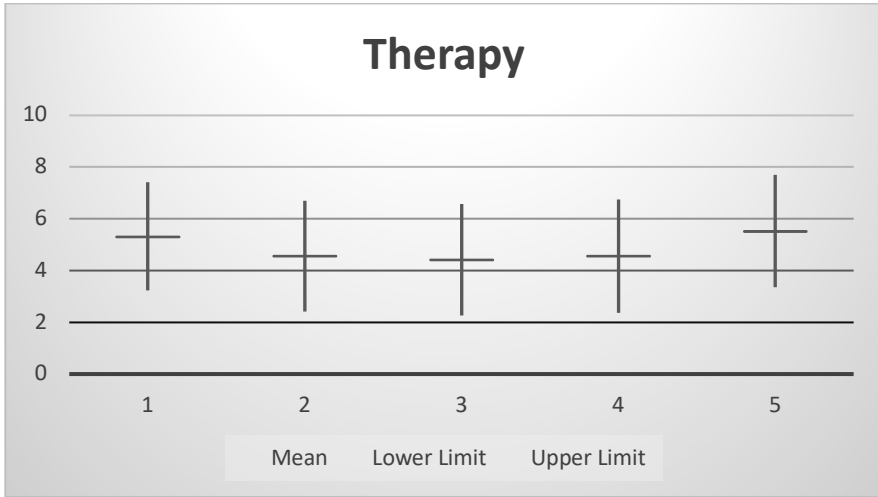
<b>THERAPY</b>		
<b>Mean</b>	<b>Standard Deviation</b>	<b>Variance</b>
5,322033898	2,09630774	4,39450614
4,559322034	2,1437253	4,59555815
4,423728814	2,15920954	4,66218586
4,559322034	2,18356863	4,76797195
5,525423729	2,17632981	4,73641146

The average scores of the logos vary between 4.42 and 5.53. In the Therapy category, there is a general perception of reliability at medium and medium-high levels. The candlestick chart for the Therapy category is given in Figure 5.

The average scores of the logos vary between 4.42 and 5.53. In the Therapy category, there is a general perception of reliability at medium and medium-high levels. The candlestick chart for the Therapy category is given in Figure 5.

**Figure 5**

*Therapy Category*



In the Therapy category, each logo has a wide distribution. Although it shows that there are different opinions among users, the 1st and 5th logos create a positive perception with a high average and wide distribution, while the other logos create a negative perception. Table 6 presents the general evaluation of the Fitness category.

**Table 6**

*Fitness Category*

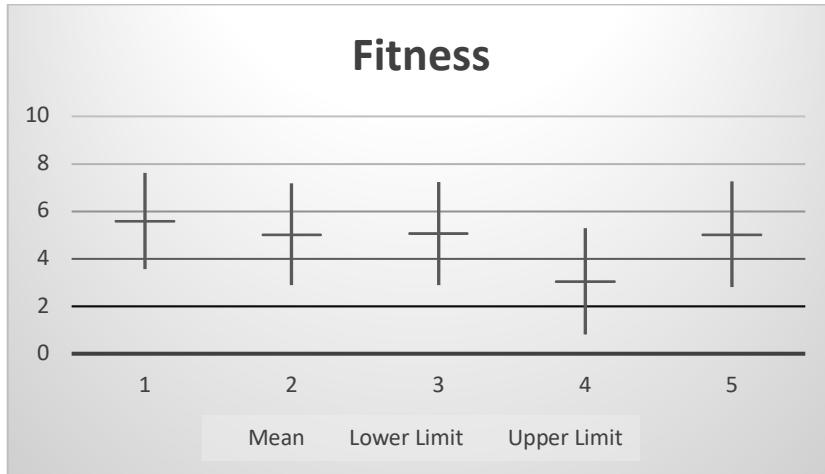
FITNESS		
Mean	Standard Deviation	Variance
5,593220339	2,02670655	4,10753945
5,033898305	2,14127018	4,58503799
5,06779661	2,17243235	4,7194623
3,050847458	2,23933279	5,01461134
5,033898305	2,22808176	4,96434833



Although the 1st logo has the highest perceived reliability with 5.59, all logos except the 4th logo have an average reliability score of around 5. Logo 4 has a lower average of 3.05 compared to the others and is perceived as less reliable. Figure 6 shows the candlestick chart of the Fitness category.

**Figure 6**

*Fitness Category*



Logos 1, 2, 3 and 5 have wide confidence intervals. This shows that there are differences in the perception of the reliability of the logos among the users. On the other hand, logo 4 has the lowest average score and the narrowest confidence interval. This shows that the logo generally has low perception of reliability. Table 6 shows the general evaluation of the Medicine category.

## DISCUSSION

This study has revealed important findings by examining the effects of logo design on users' perception of trust in healthcare applications. The results show that logo designs play a critical role in ensuring user trust. In particular, the fact that logos of nutrition applications received the highest trust score highlights the adaptability of design elements used in this category to other categories. This finding indicates that the design strategies of logos used in healthcare applications may have similar effects in different areas.

On the other hand, the fact that logos in the pharmaceutical category received low trust scores indicates an opportunity for development for designers in this category. These findings show that design is not only an aesthetic element, but also a tool that affects users' perceptions and trust in healthcare services. The study offers concrete suggestions for healthcare application developers and designers and creates opportunities to optimize design strategies to increase user trust.

Among the limitations of the study, the limited sample size in terms of generalizability stands out. The 58-person participant group may not provide sufficient diversity, especially for healthcare applications targeting large audiences. Additionally, the online survey method resulted in the non-representation of groups without internet access or with low digital literacy. This may lead to ignoring particularly elderly or low-income groups.

Finally, although presenting logos only in black and white was a conscious choice to exclude the color factor, it ignored the effects of colored logos on user perception in real-world applications. Future studies can obtain more comprehensive results by including the color factor and cultural differences.

## CONCLUSION

This study has revealed that the effects of logo designs of health applications on user trustworthiness perception are significant. The fact that the logos of nutrition applications have the highest trust score indicates that the design approaches in this area are successful and can be applied to other categories. The fact that the logos in the pharmaceutical category received low trust scores revealed that designs in this category should be reconsidered.

For developers and designers of health applications, these findings indicate that logo designs should be optimized in order to increase user trust. The study also contributes to the academic literature in the fields of health communication and digital health, emphasizing the effects of logo design on user perception. Future research can deepen knowledge in this area by working with larger and more diverse sample groups and taking into account color and cultural factors.

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