



Drivers of Brand Choice and Purchase Behavior in Over-the-Counter Vitamin and Mineral Supplements

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ABSTRACT

This study, based on data from 210 participants, examined the determinants of over-the-counter (OTC) vitamin/mineral supplement purchasing behavior using multiple linear regression, independent samples t-tests, and one-way analysis of variance (ANOVA). Regression analysis results showed that consumer-brand interaction, brand image, and word-of-mouth marketing significantly influenced purchasing behavior. However, brand trust and brand loyalty were found to have no significant impact on purchasing behavior. Participants most frequently used vitamin D and magnesium, and 74% consulted a physician or pharmacist before purchasing OTC mineral/vitamin supplements. ANOVA and t-tests revealed that marital status, gender, income level, and brand preference significantly influenced brand perceptions. From a marketing perspective, relational and social factors (interaction, image, word of mouth) appear more effective than loyalty-based tools in this category of OTC mineral and vitamin products. On the other hand, from a management science perspective, these findings offer a predictive model for resource allocation. To maximize the return on marketing investment, budgets can be reallocated from brand trust and loyalty to word-of-mouth and professional consulting channels.

1. Introduction

Today, due to changes in individuals' lifestyles, the difference in healthy living has become increasingly visible. To protect against disease and maintain a healthy, high-quality life, consumers have become more interested in vitamin and mineral supplements. These supplements play an important role in addressing nutritional deficiencies caused by environmental factors such as busy lifestyles, inadequate and unbalanced nutrition, and stress. These supplements are particularly in demand by consumers for strengthening the immune system and improving overall health. The over-the-counter (OTC) vitamin and mineral supplement market has experienced rapid growth in recent years. Especially after the COVID-19 pandemic, awareness of staying healthy increased, and a significant increase in demand for healthy living products has been observed [1]. In this context, the

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market's growth has brought the determinants of consumer preferences into focus. The market for OTC vitamin supplements features numerous similar products and brands. Intense competition is reported, particularly in the vitamin D, magnesium, Omega-3, and multivitamin groups [2]. In this highly competitive environment, understanding why consumers prefer certain brands is crucial for businesses. Furthermore, since OTC products are trust-based, brand image, trustworthiness, and user experiences are key factors for consumers [3]. This highlights the need to investigate the fundamental factors influencing brand preference. In our increasingly digital world, consumers make purchasing decisions based on social media reviews, product evaluations, and user experiences. Therefore, researching word-of-mouth (WOM) and consumer-brand engagement in the context of OTC product purchasing behavior addresses a current consumer need.

The problem addressed in this study is to clearly identify the factors that influence consumer brand preferences when purchasing vitamin and mineral supplements. Furthermore, unlike previous studies, variables will be evaluated holistically rather than individually. On the other hand, analyzing consumer behavior within a product group directly related to health will yield contributions with both theoretical and practical implications. This study aims to explain the factors that determine consumer brand preferences in vitamin and mineral supplements. Accordingly, the effects of variables such as brand trust, brand image, consumer-brand engagement, brand loyalty, and WOM on purchasing behavior will be analyzed. The unique aspect of this study is that while it includes relationship-based marketing perceptions in the context of vitamin and supplement products, it also incorporates variables based on consumer perceptions into the model. Additionally, it is significant to provide current and local data to the literature by focusing on consumers in Türkiye regarding OTC vitamin and mineral supplements.

Vitamin and mineral supplements are among the product groups where consumers cannot directly observe the product's effectiveness and efficiency in the short term. Therefore, consumers make purchasing decisions based on the relationship they have established with the brand, perceived quality, and other users' reviews. It has been stated that in consumer-brand engagement, consumers form an emotional bond with the brand, and their purchasing behavior is guided by this bond [4]. Similarly, brand image and brand trust shape consumers' perceptions of quality and prestige, while WOM is an important source of information for reducing uncertainty in selecting health products [5]. On the other hand, studies on consumer-brand engagement, brand image, and WOM in the purchasing behavior of OTC vitamin and mineral supplement products are quite limited. The scarcity of empirical studies in this area, particularly in Türkiye, makes this research expected to fill an important gap by offering various contributions both academically and sectorally. From an academic perspective, it contributes to the literature on OTC health products and consumer purchasing behavior, while guiding brands producing vitamin and mineral supplements regarding the determinants of purchasing behavior. It is anticipated that consumer-brand engagement, long-term relational marketing, and brand image management will provide businesses with significant strategic insights.

In the case of OTC vitamin and supplement products, which are directly related to health, consumers place greater emphasis on factors such as physician/pharmacist opinions, trust, image, and consumer reviews when making purchasing decisions. However, they may experience misinformation, a lack of information, and indecision during this process. It is expected that these uncertainties will be addressed, and the fundamental dynamics influencing consumer purchasing behavior will be revealed. Based on the reasons explained above, the following research questions were formulated:

- i. Does consumer-brand engagement influence vitamin and mineral supplement purchase behavior?
- ii. Does brand image have a significant effect on consumers' purchasing behavior?
- iii. Is WOM effective in OTC vitamin supplement purchasing behavior?
- iv. Do brand trust and brand loyalty influence vitamin supplement purchase behavior?
- v. Do consumers' preferences for vitamin and mineral products differ depending on the brand?
- vi. Do consumers' demographic and behavioral characteristics create significant differences in latent variables related to branding?

A quantitative research method was used to test the research questions and measure the effects of variables. Data from 210 participants were collected via an online survey and analyzed using multiple linear regression, t-tests, and analysis of variance (ANOVA). Multiple linear regression is preferred because it allows the effects of multiple independent variables on purchasing behavior to be tested within the same model. ANOVA and t-tests, on the other hand, were employed to examine whether demographic and behavioral variables create significant differences across the latent variables included in the study.

The second section of the study presents a literature review on OTC products purchasing behavior, highlighting the gaps that motivated this study. Section 3 details the theoretical framework, introduces the research hypotheses, and describes the methodology, including sampling, data collection, and analytical techniques (multiple linear regression, t-tests, and ANOVA). Section 4 presents empirical results, including regression findings, hypothesis testing, and demographic analyses. Finally, Section 5 gives the conclusions, theoretical and managerial implications, limitations, and directions for future research.

2. Literature Survey

In the pharmaceutical industry, experts are moving away from the traditional approach focused solely on solving health problems and adopting a patient-centered (consumer) approach. This approach aims to maximize patient satisfaction and the quality of service provided, while also laying the groundwork for establishing long-term relationships. Parallel to this transformation, the importance and scope of marketing in the pharmaceutical industry are continuously increasing [6]. In many European countries, regulations concerning the healthcare system are increasingly evolving towards a more consumer-oriented structure [7]. This highlights the growing importance of pharmaceutical marketing and emphasizes the need to examine consumer behavior, particularly in the context of OTC products. A literature review on OTC studies is shown in Table 1.

Table 1
 Studies on OTC products

Author(s)	Subject and key findings	Method
Šapić <i>et al.</i> [8]	The relationship between factors influencing purchasing and loyalty in OTC products was examined. It was found that consumers loyal to OTC products were more willing to purchase them.	Survey
Rajini & Madhumita [9]	A study among female consumers in India on OTC products found that brand trust positively impacts brand loyalty.	Multiple regr. analysis
Oppong [10]	The herbal product group of OTC products was examined. It was noted that well-packaged herbal medicines increase brand awareness loyalty, and value.	SEM
Hassan & Siddique [11]	Purchase decisions in the OTC drug market were examined. According to the study's findings, five factors were identified as influencing purchase decisions: brand reputation, information, brand preference, brand likability, and willingness to pay.	Factor analysis

Table 1 (continued)

Author(s)	Subject and key findings	Method
Alarsali & Aghaei [5]	In digital pharmaceutical marketing, the use of OTC products by consumers in Cyprus was investigated. The variables positively influencing consumers' purchasing decisions were identified as digital marketing, WoM, and experience.	Regression analysis
Wake <i>et al.</i> [12]	Several globally operating pharmaceutical companies in the OTC sector were examined. The results showed that various marketing strategies and brand-building approaches of these companies significantly impacted on the sales performance of their OTC products.	Literature review
Rasmussen [13]	Danish consumers' OTC prescription product purchasing decisions were examined. The findings indicated that the most influential factors in consumers' purchasing decisions were, in order of importance, brand trust, product quality, ease of access, and finally, price.	Mixed research methodology (MRM)
Basile [3]	The OTC market in Italy was evaluated. Strong influences of brand awareness and image on consumer purchasing decisions were found.	MRM
Hasnin <i>et al.</i> [14]	OTC prescription drug preferences were analyzed specifically in Saudi Arabia. The findings indicate that education level plays a significant moderating role in improving the relationship between customer awareness and brand trust.	SEM
Mason <i>et al.</i> [15]	Consumer preferences for OTC pain relievers in the US were investigated. The findings indicate that brand awareness is the most important factor in consumer product preference.	Factor analysis
Aufegger <i>et al.</i> [16]	OTC product purchase intentions were investigated among German consumers. The results show that perceived quality, perceived risk, and perceived value are influential factors in purchasing intention.	Multiple linear regression analysis
Zafar <i>et al.</i> [17]	The effects of digital marketing and social groups on consumer preferences for OTC products were investigated. Recommendations from family and friends had no significant impact on purchasing decisions.	SEM
Kevrekidis <i>et al.</i> [18]	This study presents insights into consumer behavior in Greece by identifying key demographic factors influencing OTC drug selection. Consumers with lower levels of education and retirees tend to prefer a single pharmacy.	ANOVA
Memişoğlu [19]	The marketing communication types of OTC drug companies in Türkiye were examined. The findings indicate that the OTC market in Türkiye will grow, highlighting the need for oversight and regulation and emphasizing the importance of health literacy.	In-depth semi-structured interview
Swe [20]	Consumer purchasing criteria for OTC prescription drugs in Myanmar were investigated. The most important criteria, ranked from most to least important, are country of origin, price, experience, healthcare professional recommendation, and digital marketing.	Regression analysis
Anis [21]	Research has examined OTC drug purchasing decisions in Malaysia. The results show that digital marketing and social media marketing play a significant role in consumer decisions.	MRM
Dheeraj [22]	General statistical data on OTC product usage were researched for the USA, Europe, and India. According to the findings, consumers value brand loyalty, and digital marketing plays a prominent role in their purchasing decisions.	Descriptive evaluation
Taylor <i>et al.</i> [23]	In a Canadian province, consumers were given 15 samples of OTC medications and asked to evaluate them. The results indicated that consumers found the products they were familiar with to be more effective and reliable.	Survey questionnaire application
Dwyer <i>et al.</i> [24]	In the US, 30 brands from three sectors were surveyed regarding the use of OTC drugs. The results showed that public relations had a 2.1 times greater impact on consumer purchasing intentions than advertising.	MRM
Garg <i>et al.</i> [25]	A study in Delhi, Mumbai, Bangalore, Chennai, and Kolkata investigated the effects of OTC drug use on consumer purchase intention. Brand affection and trust influence brand loyalty. Loyal customers are willing to pay more.	SEM

When the literature review in the table is evaluated as a whole, it appears that brand-centric studies are conducted in the OTC general health products market. The effects of variables such as brand awareness, brand loyalty, brand image, and perceived quality on purchase intention have been discussed [15,25]. Similarly, it is stated that communication-oriented variables, such as social media marketing, digital marketing, and past experiences, significantly affect purchasing decisions, as examined in the OTC sector through the lens of WOM [17,21]. A large part of the studies has discussed the relationship between brand loyalty and consumer purchase intention. It has been found that brand trust positively affects brand loyalty, and as a result, loyal customers are willing to pay more [8,25]. It is stated that consumers perceive products from brands with high brand awareness and trust as more effective and of higher quality [23]. However, studies indicate that demographic variables can influence OTC product preferences [14,18]

Studies in the literature generally focus geographically on India, the USA, Europe, and the Middle East. Studies conducted in Türkiye tend to focus on sector structure and marketing communication, health literacy, and consumer purchasing behavior [19]. There are very few studies that specifically investigate the relationships among consumer-brand engagement, brand image variables, and OTC product purchasing behavior.

Furthermore, the effects of brand trust, brand loyalty, brand image, and consumer-brand communication on purchasing behavior will be analyzed holistically. Given that WOM is primarily studied in the e-commerce and tourism sectors, the aim is to examine physician recommendations and WOM in the healthcare sector in detail using data, without conflating them. Additionally, while research on OTC healthcare products is more common in Europe and the USA, it is a more recent topic in Türkiye. The fact that this research will be conducted specifically in Türkiye will make unique contributions to the literature by providing insights into local consumer behavior. In the healthcare sector, there are relatively few studies on the vitamin and mineral group, which are considered a high-risk product group. This study aims to fill these gaps.

3. Theoretical Framework and Methodology of Research

This section will first present the research's institutional framework. To this end, the following section will provide discussions and hypotheses regarding the relevant components.

3.1 Consumer-Brand Engagement

Consumer brand engagement is a relatively new concept in branding and strategic marketing [26]. Essentially, Brodie *et al.* [27] stated consumer brand engagement as “an interactive effort within creating shared value and marketing activities”. Some studies have linked consumer brand engagement to greenwashing. It is reported that customers forgive brands and give them another chance when they interact with them frequently [28]

The reason businesses place special emphasis on consumer brand engagement is their desire to build a long-term, two-way, and valuable relationship with their customers. Therefore, customer engagement is considered a top priority for marketing managers [29,30]. Essentially, consumer brand engagement is linked to higher advertising effectiveness [27], customer loyalty, customer satisfaction, trust, and compliance [30]. From a business perspective, consumer brand engagement, along with customer interaction, provides advantages such as customer loyalty, competitive advantage, increased sales, financial gains, and improved corporate performance [4,27]. In this context, it is thought that when a customer finds a brand trustworthy, they will show greater brand engagement, interest in the brand's other products, and intention to repurchase, thus demonstrating brand loyalty.

Consumer-perceived attitudes, feelings, benefits, and experiences create certain associations in memory related to the brand [31]. Brand associations may not always be positive. Any information or experience that consumers have is stored in their thought memory, whether positive or negative, and is associated with the brand [32]. It has been found that consumer brand engagement increases brand performance, brand loyalty, and brand usage intention [29,33].

3.2 Brand Image

Brand image encompasses symbolic meanings associated with a brand's prominent features and is defined as the consumer's mental image of a particular good or service [34]. This concept can also be expressed as the totality of feelings, perceptions, and emotions that a brand evokes in the consumer. In the healthcare sector, brand image is defined as the sum of consumer perceptions that differentiate a healthcare brand from other comparable brands, such as reliability and reputation [35].

It has been observed that unethical business practices negatively affect brand image [36]. For example, a study conducted in the United Kingdom indicated that because of these unethical practices, consumers completely stopped purchasing products from a particular brand [37]. Therefore, a business's transmission of false or insufficient information to strengthen its brand damages its corporate identity.

3.3 Word of Mouth

It has been stated that customers engage in WOM communication to seek opinions from close contacts before making a purchase, to discuss the matter with those individuals after the purchase, to share their experiences (positive or negative) after use, and to exchange information [38]. WOM is noted as effective in reducing uncertainty and lowering risk for customers before making a decision [39].

It has been stated that customers who participate in brand engagement trust, believe in, and are proud of the brand become passionate brand advocates and supporters by spreading positive WOM [27,28]. It has been found that when customer engagement is strong, the likelihood of brand switching is lower because it fosters customer loyalty, thereby extending the brand's product lifecycle and spreading positive WOM [4,29]. Strong brand engagement allows consumers to support the brand and recommend its products or services to others. Positive WOM is one of the most important pillars of brand engagement [4]. In this context, it is thought that when a consumer trusts a brand, they refrain from expressing negative opinions or giving bad advice about it and instead provide positive feedback and advice. It has been stated that consumers' relationships and behavioral responses to a brand affect their trust in that brand. Positively implemented WOM positively affects brand trust, brand loyalty, and brand affection [40]. WOM is considered a significant element of marketing strategy today and directly influences purchasing decision processes [41,42]. Consumers turn to WoM to obtain sufficient information about a product or brand [43].

3.4 Brand Trust

For businesses to establish healthy long-term relationships with their stakeholders, honesty, transparency, consistency, and verifiable elements are of great importance. Brand trust is critically important, especially in a high-risk sector like healthcare. Therefore, brands need to be in a trustworthy position with consumers and maintain that position sustainably. Brand trust is the level of trust and loyalty consumers form based on perceptions of a health brand's transparency, reliability, and adherence to ethical principles [35].

Factors such as the relationship consumers establish with the brand and the value they attribute to the brand directly affect brand trust. Businesses must be able to respond to consumer expectations at the highest level. If expectations are not met, the resulting skepticism will negatively affect consumer perceptions and undermine trust. Therefore, consumers who are hesitant about trust develop negative brand attitudes, and their likelihood of purchasing decreases as a result of low brand trust [44]. In this vein, it is understood that brand trust shapes customer relationships in the long term, influencing not only consumer satisfaction but also purchase intention and brand loyalty.

3.5 Brand Loyalty

Brand loyalty is defined as a customer's reaction to price or feature changes and their likelihood of switching to competing brands [45]. Another definition describes it as a customer's commitment and dedication to any good or service [46]. Brand loyalty is said to result from customer trust and the mutual desire of the customer and the brand to maintain and develop high-quality relationships. It is also conveyed that customers generally show loyalty to brands that can enhance their identity [47].

From these definitions, brand loyalty is understood to be, firstly, a tendency to switch to competing brands, and secondly, a measure of the closeness customers feel towards brands. Consumer loyalty to health brands is defined as the commitment individuals develop, based on a strong, positive attitude, towards a particular health brand [48]. This commitment manifests as repeated purchasing from the same health brand over time.

3.6 Purchase Behavior

Purchasing behavior is defined as the set of decisions consumers make in selecting, purchasing, and using goods and services to satisfy their basic needs [49]. Purchasing behavior encompasses the decision-making process by evaluating alternatives to meet consumers' needs and desires. This process consists of problem awareness, information-seeking, option evaluation, and purchasing stages. Furthermore, individual, social, cultural, and psychological factors significantly influence consumers' purchasing decisions [50]. It is stated that purchasing behavior cannot be considered in isolation, but rather as only one stage of the consumption process. According to the literature, the purchasing process consists of three main stages: before purchase, purchase, and post-purchase. The pre-purchase stage involves identifying the need, researching options, and evaluating alternatives. The purchase stage includes the actual purchasing and use of the product. Finally, the post-purchase stage encompasses consumer experience and evaluation, providing feedback, and finalizing the purchase process [51].

3.7 Research Methodology

In conducting scientific studies, it is often difficult, and sometimes impossible, to access all the units involved in the problem. At this point, sampling is necessary. Various sampling methods can be used. However, in this research, due to the large population size, time savings, economic advantages, and ease of access, purposive sampling was adopted [52]. The adequacy of the sample size used in the research was evaluated against accepted criteria in the literature. MacCallum *et al.* [53] state that a sample of 200 people has a "fair" level of adequacy, especially in the context of factor analysis. Consistent with this viewpoint, the multivariate data analysis and regression literature generally suggests that a sample size of 100-200 observations provides an optimal benchmark for achieving stable parameter estimates and balanced statistical power [54,55]. Therefore, the current sample of 210 participants is considered reasonable and sufficient for the scope of this study. On the other hand, budget and time are significant constraints when resorting to sampling. Taking these

constraints into account, the sample of 210 people in the present study is considered sufficient for conducting the research. Furthermore, given time and cost constraints, consumers who used the OTC vitamin and mineral supplement in question were reached via an online Google Forms survey.

In this study, data were analyzed using multiple linear regression analysis. Multiple regression analysis is a statistical method for inferring how a dependent variable (outcome) is affected by multiple independent variables. This method focuses on predicting by measuring the relationship between variables rather than establishing a cause-and-effect relationship [56]. In this study, multiple regression analysis allows us to understand the extent to which the dependent variables explain purchasing behavior and which variables are most influential. The basic model in multiple regression analysis is shown below:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n + \varepsilon, \quad (1)$$

here, Y is the predicted outcome (dependent) variable, X_1, X_2, \dots, X_n are the independent (influencing) variables, β coefficients represent the magnitude of the influence, and ε represents the error margin.

In line with the reasons stated previously, the research hypotheses are formulated as follows:

- H_1 – Consumer brand engagement positively influences purchasing behavior;
- H_2 – Brand image positively influences purchasing behavior;
- H_3 – WOM positively influences purchasing behavior;
- H_4 – Brand trust positively influences purchasing behavior;
- H_5 – Brand loyalty positively influences purchasing behavior.

In addition to multiple linear regression, which examines the simultaneous linear effects of brand loyalty, brand image, WOM, brand trust, and brand faithfulness on purchasing behavior, various inferential analyses will be conducted using one-way ANOVA and independent-samples t-tests. This will allow for comparison of mean differences in purchasing behavior and other variables among categorical demographic or usage-based groups (e.g., age groups, frequency of OTC supplement use, education levels). The independent-samples t-test will be used to test whether there are significant differences between groups in the main study variables by gender (male/female) and marital status. ANOVA will be used, especially in comparisons involving more than two groups. For example, differences in purchasing behavior between different educational backgrounds or monthly spending categories will be evaluated using ANOVA. Furthermore, post hoc tests will be used to determine whether the groups differ significantly. The significance level is set at $p < 0.05$ for all analyses. The following hypotheses will be tested within this framework:

- H_6 – Marital status creates a significant difference in the latent variables included in the study;
- H_7 – Gender creates a significant difference in the latent variables included in the study;
- H_8 – The type of person/source consulted creates a significant difference in the latent variables included in the study;
- H_9 – The type of product used creates a significant difference in the latent variables included in the study;
- H_{10} – Brand preference creates a significant difference in the latent variables included in the study;
- H_{11} – Income level creates a significant difference in the latent variables included in the study;

H_{12} – Education level creates a significant difference in the latent variables included in the study.

4. Results

This study examines consumer purchasing trends within the vitamin and mineral product group, which falls under the OTC product category. Purchasing behavior was the dependent variable, while consumer brand engagement, brand image, WOM, brand trust, and brand loyalty were the independent variables. The studies from which the scales were taken were consumer brand engagement [57], brand trust [58], brand image [59], purchasing behavior [60], WOM [61], and brand loyalty [62]. Data from 210 participants were analyzed.

According to the multiple linear regression analysis, the established model is statistically significant ($F=53.630$, $p<0.001$). The model's power to explain the dependent variable (adjusted $R^2=0.557$) was found to be at a good level of 55.7%. Consumer brand engagement ($\beta=0.360$, $p<0.001$), brand image ($\beta=0.355$, $p<0.001$), and WOM ($\beta=0.138$, $p<0.05$) were observed to have significant effects on purchasing behavior. However, no significant effects of brand trust and brand loyalty on purchasing behavior were found. Variance inflation factor (VIF) values below 10 indicate the absence of multicollinearity.

According to demographic findings, the majority of participants (69%) were women, and most participants overall (50.5%) had consulted a physician before using the product (Table 2). In the vitamin and mineral supplement product group, the most preferred products were Vitamin D and Magnesium, respectively. The most frequently used vitamin and mineral supplement brands were Ocean, followed by Solgar and Supradyn. In summary, this shows that consumers seek support from healthcare professionals, use supplements based on their needs, and make brand choices based on their relationship with the brand, brand awareness, and user recommendations/advice.

Participants reported consulting a physician most frequently before purchasing a supplement (50.5%). After physicians, pharmacists were the most frequently consulted group. On the other hand, vitamin D and magnesium were the most commonly used vitamins and mineral supplements, with Ocean, Solar, and Supradyn being the most frequently preferred brands. The fact that 15.2% of participants consulted online sources is noteworthy, given that consumers are making decisions about a sensitive issue such as health. However, it shows that the majority used professional sources trained in this field. Vitamin D (35.7%) is widely used in the vitamin and mineral supplement product category. This result may be related to the increasing public awareness of the benefits of vitamin D for bone health and the immune system. It was also noted that vitamin D deficiency is generally observed in Türkiye [63]. Following vitamin D, the second-most-frequently used OTC product was magnesium (22.3%). The relatively high preference for magnesium can be attributed to its effects on stress regulation, sleep patterns, and muscle health. Vitamin C supplementation was the third-most-preferred product among participants. Consumers may prefer vitamin C because it supports collagen production, helps improve skin texture, increases iron absorption, and exhibits antioxidant effects. The low use of multivitamins (9.5%) and Omega 3 (7.6%) may indicate a preference for needs-based supplements rather than general supplements. Overall, the findings suggest that participants take vitamin and mineral supplements to maintain bone health and strengthen immunity.

Participants were asked about the brands they use. Accordingly, the most preferred product brand was Ocean (30.5%). Following Ocean, Solgar (10%) and Supradyn (10%) shared second place. Nutraxin (8.1%) ranked third, while Pharmaton (5.7%) and Orzax (5.7%) tied for fourth. According to the findings, the higher preference for the Ocean brand can be explained by its relatively wide product range, brand awareness, and brand trust. Furthermore, Ocean's presence in frequently used

product groups, such as children’s supplements, Omega-3 supplements, and Vitamin D, may also have contributed to this. Brands like Solgar and Supradyn, which have been on the market for a long time in the vitamin supplement sector, also showed high preference rates. This suggests that participants prefer well-known brands that convey a sense of trustworthiness.

Table 2
 General characteristics and preferences of the participants

Variable	Category	Frequency	Percent
Gender	Female	145	69.05
	Male	65	30.95
Marital status	Single	109	51.90
	Married	101	48.10
Type of consultant for OTC Product Recommendation	Pharmacist	50	23.81
	Physician	106	50.48
	Family-friends	10	4.76
	Internet	32	15.24
	No one	7	3.33
	Other	5	2.38
Preferred type of vitamin/mineral supplement	Vitamin C	37	17.60
	Vitamin D	75	35.70
	Magnesium	47	22.30
	Omega 3	16	7.60
	Multivitamin	20	9.50
	Other	15	7.10
Preferred brand	Solgar	21	10.00
	Supradin	21	10.00
	Pharmaton	12	5.71
	Dynavit	7	3.33
	Nutraxin	17	8.10
	Diğer	46	21.90
	Redoxon	4	1.90
	Nature’s Supreme	3	1.43
	Ocean	64	30.48
	Orzax	12	5.71
Zade Vital	3	1.43	

Based on data obtained from 210 participants, a descriptive analysis was conducted on six brand-related variables. Mean scores for these variables ranged from 3.5683 (Brand Loyalty) to 3.9786 (Purchasing Behavior), indicating generally positive brand perceptions among consumers. Standard deviations ranged from 0.5469 (Brand Trust) to 0.8308 (WOM), suggesting moderate individual differences across the sample. Skewness and kurtosis were examined to assess the normality of the variable distributions. Studies in the literature indicate that values between -2 and +2 are acceptable. However, according to the criteria proposed by Tabachnik & Fidell [61], skewness and kurtosis values between -1.5 and +1.5 are considered acceptable for the normality assumption. All variables examined in this study fall within this range (absolute skewness values range from 0.135 to 0.808, and absolute kurtosis values range from 0.165 to 1.109). These findings indicate that the distributions of the variables used in the analyses approximate normality, thus meeting a fundamental assumption for parametric statistical tests, including independent-samples t-tests, one-way ANOVA, and multiple

linear regression. In this context, regression analysis will primarily be used to explain consumer purchasing behavior. Table 3 shows the goodness-of-fit results for the regression model.

Table 3
 ANOVA results for the regression model

Model	Sum of Squares	Degree of Freedom (df)	Mean Square	F	p
Regression	41.333	5	8.267	53.630	.000
Residual	31.445	204	0.154		
Total	72.779	209			

Examining the ANOVA results in Table 3, it is seen that the established regression model is statistically significant ($F=53.630$, $p<0.001$). Accordingly, when the independent variables are considered, they can significantly explain the dependent variable. In addition, the model’s explanatory power for the dependent variable was 0.557, indicating that the independent variables explain 55.7% of the dependent variable (adjusted R-squared: 0.557).

According to the analysis results in Table 4, the variables Consumer Brand Engagement ($\beta=0.360$, $p<0.001$), Brand Image ($\beta=0.355$, $p<0.001$), and WOM ($\beta=0.138$, $p<0.05$) have a statistically significant positive effect on purchasing behavior. The analysis findings indicate that the primary variable most influential on purchasing behavior is consumer brand engagement, followed by brand image. However, no significant effects were found for the Brand Trust and Brand Loyalty variables. Furthermore, VIF values below 10 indicate the absence of multicollinearity.

Table 4
 Level of explanation of the dependent variable by the independent variables

Code	Coefficients	Unstandardized coeff.		Standardized coeff.	t	p	Collinearity statistics	
		B	Std. error	Beta			Tolerance	VIF
	(constant)	0.984	0.193		5.107	0.000		
X ₁	Brand engagement	0.318	0.059	0.360	5.393	0.000	0.474	2.108
X ₂	Brand trust	-0.001	0.093	-0.001	-0.014	0.989	0.288	3.474
X ₃	Brand image	0.362	0.086	0.355	4.226	0.000	0.300	3.330
X ₄	WOM	0.098	0.043	0.138	2.280	0.024	0.575	1.739
X ₅	Brand loyalty	0.036	0.057	0.043	0.636	0.526	0.473	2.116

In the context of the results in Table 4, the regression equation explaining the purchasing behavior is formulated as specified in:

$$Y_{\text{purchasing behavior}} = 0.984 + 0.318X_1 + 0.362X_3 + 0.098X_4. \tag{2}$$

As shown in the multiple linear regression model in Eq. (2), three independent variables have an explanatory effect on the dependent variable. The model explains a significant portion of purchasing behavior for vitamin and mineral supplements. Among the five independent variables, consumer-brand engagement, brand image, and WOM were found to have statistically significant positive effects on purchasing behavior. These findings suggest that customer purchasing decisions for OTC vitamin and mineral supplements are primarily influenced by consumer-brand interaction, perceived brand image, and user-generated reviews and recommendations, rather than brand trust or loyalty.

In addition to the predictive relationships examined in the regression model, independent-samples t-tests and one-way ANOVA were conducted to examine mean differences in key brand-related variables across demographic groups. This allowed for the testing of hypotheses H_6 - H_{12} . To

present the results more clearly, only findings showing a significant effect will be reported in this analysis. The first test examined the effect of marital status.

Table 5 presents the results of independent samples t-tests comparing married and single individuals on the brand-related variables. The t-test results showed that single individuals reported significantly lower Brand Trust and Purchase Behavior compared to married individuals. The effect sizes for these differences were small to moderate. No other significant differences in the remaining variables were found by marital status. This pattern suggests that being married is associated with slightly more favorable brand trust and purchasing behaviors, potentially due to different daily routines or shared household decision-making responsibilities.

Table 5
 Independent sample t-test results for marital status

Dependent variable	Levene's test	p	t	df	p
Brand trust	6.31	.013	-2.54	204.74	.012
Purchase behavior	7.81	.006	-2.18	203.58	.030

Table 6 presents the findings from independent samples t-tests examining gender differences. The analysis revealed that males reported significantly higher Brand Image and Purchase Behavior scores compared to females. The effect sizes for these differences were small to moderate. These findings imply that, among the surveyed consumers, male participants tend to hold a more positive brand image and exhibit stronger purchase behavior towards OTC supplements than female participants, a difference that warrants further investigation into potential gender-specific marketing cues.

Table 6
 Independent sample t-test results for gender

Dependent variable	Levene's test	p	t	df	p
Brand image	1.11	.294	2.21	208	.028
Purchase behavior	1.98	.161	3.19	208	.002

Table 7 shows the results of the one-way ANOVA regarding whether the type of person consulted affects brand perceptions.

Table 7
 One-way ANOVA results for type of consultant

Dependent variable	Levene's F	p	ANOVA F	df ₁ , df ₂	p	Significant post-hoc comparisons
Brand image	0.59	.707	3.41	5, 204	.006	Internet < Physician; Internet < Other
Brand loyalty	1.34	.249	3.64	5, 204	.004	Consulted No One > Pharmacist, Physician, Internet

The analysis results indicate that Brand Image attitudes vary depending on the type of person consulted (Table 7). In the ANOVA tests conducted in this study, Tukey HSD was used as the post hoc test when homogeneity of variances was ensured. On the other hand, Tamhane T2 was preferred when the homogeneity of variances was not ensured. Post hoc comparisons showed that individuals who consulted the internet had significantly lower Brand Image scores than those who consulted a physician or those in other consultation categories. Significant differences were also observed in comparisons made in the context of Brand Loyalty. The post hoc test showed that participants who did not consult anyone reported significantly higher Brand Loyalty than those who consulted a pharmacist, a physician, or the Internet. These results suggest that reliance on professional or

impersonal online advice may shape brand image differently, while a lack of consultation correlates with stronger brand loyalty.

Table 8 presents the one-way ANOVA results examining the effect of the specific supplement type. A significant main effect of product type was observed for Consumer Brand Engagement. Post-hoc analysis indicated that users of magnesium had significantly higher Consumer Brand Engagement scores than users of Vitamin C. Furthermore, a significant effect was found for WOM, with multivitamin users reporting higher WOM than Vitamin C users. Thus, the type of supplement consumed is associated with varying levels of engagement and recommendation behavior, with magnesium and multivitamin users showing more active brand-related behaviors.

Table 8
 One-way ANOVA results for product type

Dependent variable	Levene's F	p	ANOVA F	df ₁ , df ₂	p	Significant post-hoc comparisons
Consumer brand engagement	0.62	.683	3.13	5, 204	.010	Magnesium > Vitamin C
WOM	1.62	.156	2.68	5, 204	.023	Multivitamin > Vitamin C

Table 9 presents the one-way ANOVA results concerning the influence of specific brand preference on the dependent variables. The analysis showed a significant effect of brand preference on all five dependent variables. For Consumer Brand Engagement, post-hoc comparisons revealed that the Orzax brand had significantly lower scores than Supradin, Pharmaton, Redoxon, Nature's Supreme, and the other brand category. Likewise, for WOM, despite a violation of homogeneity of variances, the ANOVA was significant, and the post-hoc test confirmed that Orzax scored significantly lower than Supradin, Pharmaton, and the other category. These consistent findings highlight that brand choice is a strong differentiator of consumer engagement, trust, image, purchase, and recommendation behaviors.

Table 9
 One-way ANOVA results for brand preference

Dependent variable	Levene's F	p	ANOVA F	df ₁ , df ₂	p	Significant post-hoc comparisons
Consumer brand engagement	1.05	.404	3.71	10, 199	< .001	Orzax < Supradin, Pharmaton, Other, Redoxon, Nature's Supreme (Tukey HSD)
Brand trust	1.61	.105	2.63	10, 199	.005	No pairwise comparisons were significant at p < .05 (Tukey HSD)
Brand image	1.84	.056	2.98	10, 199	.002	Diğer < Orzax (p = .019, Tukey HSD)
Purchase behavior	0.59	.823	2.40	10, 199	.010	No pairwise comparisons were significant at p < .05 (Tukey HSD)
WOM	2.37	.011	3.60	10, 199	< .001	Orzax < Supradin, Pharmaton, Other (Tamhane)
Brand loyalty	1.73	.077	2.14	10, 199	.023	No pairwise comparisons were significant at p < .05 (Tukey HSD)

Table 10 displays the one-way ANOVA results regarding the impact of income level. The analysis revealed a significant effect of income on Brand Trust. For Brand Image, where homogeneity of variances was met, the lowest-income group again reported lower Brand Image than both higher-income groups. Furthermore, Purchase Behavior also differed significantly, with the lowest-income group having lower scores than the highest-income group. For WOM, the one-way ANOVA yielded a marginally significant result ($p = 0.052$). Although the p-value was slightly above the conventional threshold of 0.05, a post hoc comparison was conducted for exploratory purposes. The results indicated that the lowest-income group (≤ 800 EUR) reported marginally lower WOM scores than the

highest-income group (1600-2400 EUR). However, because the omnibus ANOVA did not reach statistical significance at $\alpha = 0.05$, this finding should be interpreted as a trend rather than a statistically significant difference. Therefore, H_{11} is not supported for the WOM variable.

Table 10
 One-way ANOVA results for income level

Dependent variable	Levene's F	p	ANOVA F	df ₁ , df ₂	p	Significant post-hoc comparisons
Brand trust	4.46	.013	6.36	2, 207	.002	800 EUR or less < 800-1600 EUR, 1600-2400 EUR
Brand image	1.65	.195	8.25	2, 207	< .001	800 EUR or less < 800-1600 EUR, 1600-2400 EUR
Purchase behavior	0.94	.391	6.83	2, 207	.001	800 EUR or less < 1600-2400 EUR
WOM	0.12	.889	3.00	2, 207	.052	800 EUR or less < 1600-2400 EUR

Table 11 summarizes the one-way ANOVA results examining the role of education level on all dependent variables. Analyses showed that education level did not create a statistically significant difference in any of the dependent variables. Although the Levene test indicated a violation of homogeneity of variance for many of these dependent variables, the non-significant ANOVA results indicate that education level did not differentiate consumers in this sample with respect to their perceptions or behaviors towards the brand. In summary, marital status, gender, source of advice, product type, brand preference, and income level emerged as significant factors influencing various brand interaction outcomes, whereas education level did not.

Table 11
 One-way ANOVA results for education level

Dependent variable	Levene's F	p	ANOVA F	df ₁ , df ₂	p
Consumer brand engagement	4.06	.003	0.56	5, 204	.732
Brand trust	6.69	< .001	0.45	5, 204	.813
Brand image	3.53	.008	0.42	5, 204	.832
Purchase behavior	1.26	.286	1.91	5, 204	.094
WOM	1.01	.405	1.76	5, 204	.124
Brand loyalty	0.85	.495	0.29	5, 204	.916

Table 12 summarizes the results of the hypothesis tests. In summary, the findings from the series of independent-samples t-tests and one-way ANOVA analyses reveal that demographic and behavioral factors play a significant yet differentiated role in shaping perceptions of OTC vitamin and mineral supplements. When examined by marital status, married individuals exhibited higher brand trust and purchase behavior than single individuals. Gender also differentiated consumers, as males exhibited more favorable Brand Image and stronger Purchase Behavior than females. The type of person consulted influenced brand perceptions: specifically, consulting the internet was associated with lower Brand Image, whereas consulting no one was linked to higher Brand Loyalty. The specific supplement product type also mattered: magnesium users showed greater Consumer Brand Engagement, and multivitamin users demonstrated higher WOM activity than Vitamin C users. Brand preference was the most consistently influential factor, significantly affecting all six dependent variables, with the Orzax brand consistently scoring lower than several competing brands across multiple dimensions. Income level further differentiated consumers, as the lowest-income group consistently reported less favorable Brand Trust, Brand Image, Purchase Behavior, and WOM than higher-income groups. In contrast, education level did not yield any significant differences across any of the brand-related variables. When these results are assessed, it becomes clear that consumer brand loyalty, trust, image, purchasing behavior, WOM, and fidelity are influenced by various sociodemographic and behavioral characteristics (particularly marital status, gender, source of

advice, product type, brand preference, and income). At the same time, education levels do not have a significant effect. These findings offer valuable insights for marketers and health product manufacturers aiming to segment their audiences and tailor their strategies more effectively in the competitive dietary supplement market.

Table 12
 Summary of hypothesis testing results

Hypothesis	Statement	Status
H_1	Consumer brand engagement positively influences purchasing behavior	Accepted ($\beta=0.360, p<0.001$)
H_2	Brand image positively influences purchasing behavior	Accepted ($\beta=0.355, p<0.001$)
H_3	WOM positively influences purchasing behavior	Accepted ($\beta=0.138, p<0.05$)
H_4	Brand trust positively influences purchasing behavior	Rejected ($\beta=-0.001, p=0.989$)
H_5	Brand loyalty positively influences purchasing behavior	Rejected ($\beta=0.043, p=0.526$)
H_6	Marital status creates a significant difference in the latent variables included in the study	Partially accepted (significant difference found for Brand Trust and Purchase Behavior only)
H_7	Gender creates a significant difference in the latent variables included in the study	Partially accepted (significant difference found for Brand Image and Purchase Behavior only)
H_8	The type of person/source consulted creates a significant difference in the latent variables included in the study	Partially accepted (significant difference found for Brand Image and Brand Loyalty only)
H_9	The type of product used creates a significant difference in the latent variables included in the study	Partially accepted (significant difference found for Consumer Brand Engagement and WOM only)
H_{10}	Brand preference creates a significant difference in the latent variables included in the study	Accepted (significant difference found for all six dependent variables)
H_{11}	Income level creates a significant difference in the latent variables included in the study	Partially accepted (significant difference found for Brand Trust, Brand Image, Purchase Behavior, and WOM; no significant difference stated for other variables)
H_{12}	Education level creates a significant difference in the latent variables included in the study	Rejected (no significant differences found for any dependent variable)

Our findings are consistent with the study by de Olival Mendonça [64], which found that consumer brand engagement strongly influences OTC brand usage. Similarly, they are consistent with the findings that brand image positively and significantly affects purchasing behavior [3,65]. The finding in our study that WOM positively influences purchasing behavior is consistent with other studies in the OTC field [5,63].

According to our findings, brand loyalty did not have a significant effect on purchasing behavior. However, some studies have shown that brand loyalty positively influences purchasing behavior [8,25]. Similarly, other studies contradict our findings that brand trust does not significantly affect purchasing behavior [9,13]. The presence of different results in the literature can be attributed to the complex nature of the actors influencing purchasing behavior in the OTC product group preferences.

This can be explained by differences across OTC product subgroups (cosmetics, dermatological products, pain relievers, etc.) and variations in sample sizes.

5. Conclusions

This study aimed to examine the brand determinants of vitamin and mineral supplements within the OTC product group. In this context, the dependent variable was purchasing behavior, and the independent variables were consumer brand engagement, brand trust, brand loyalty, brand image, and WOM. Participants were reached via an online survey, and 210 data points were collected and included in the analysis. Purposive sampling was adopted due to time and cost constraints. The data were analyzed using multiple linear regression, t-tests, and ANOVA. The analysis found that consumer brand engagement, brand image, and WOM were influential in consumer purchasing behavior.

Independent-samples t-test results show that married individuals exhibit higher brand trust and purchase behavior than single individuals. This result may be attributed to married individuals having more regular daily routines and making decisions about vitamin/mineral supplement use as a collective household decision. In married couples, a positive health attitude from one spouse can influence the other, reinforcing brand trust. Single individuals, on the other hand, have more individualistic and flexible consumption habits, leading to lower levels of trust and purchase frequency. Similarly, the fact that men exhibit a more positive brand image and stronger purchasing behavior than women suggests that men's cognitive evaluations of brands in the OTC vitamin/mineral product category are clearer and more action-oriented. This difference may be explained by men making more rational, brand-focused decisions when purchasing these products, while women tend to consult a wider range of information sources or their social circles.

One-way ANOVA results revealed that the sources consumers consulted differed significantly in brand image and loyalty. The fact that individuals who consult the internet have a lower brand image than those who consult physicians or other sources suggests that information pollution in the digital environment, unreliable reviews, or comparison sites can negatively affect consumer perception. Conversely, the higher brand loyalty exhibited by individuals who did not consult anyone indicates that this group trusts their own experiences and does not seek external information; therefore, they remain more loyal to their existing brand preferences. The higher consumer brand engagement among magnesium users compared to vitamin C users, and the greater WOM among multivitamin users, demonstrate that different product categories trigger consumer interest and recommendation behavior at different levels. The fact that brand preference has the strongest and most stable effect on all dependent variables confirms that brand loyalty and brand image play a critical role in guiding consumer behavior in the OTC market. The decrease in brand trust, brand image, purchasing behavior, and WOM as income levels fall suggests that economic constraints may lead consumers to seek less well-known or lower-priced alternatives. The lack of significant differences across the dependent variables indicates that education alone is not a determining factor in OTC vitamin/mineral supplement preferences; factors such as income, consultation habits, marital status, and gender are more influential.

The primary factor influencing OTC vitamin and mineral supplement purchasing behavior, according to this study, is consumer-brand engagement. This significant effect of consumer-brand engagement indicates that consumers make purchasing decisions based on an emotional and cognitive bond with the brand. In this regard, brands should develop strategies to enhance user experiences by providing quick, transparent solutions to consumer problems through digital platforms and adopting a two-way communication approach. Secondly, brand image appears to influence purchasing behavior positively. In the OTC product group, because consumers lack direct

product information, brand image can foster trust and quality perceptions, thereby guiding their purchasing decisions. Especially in a high-risk sector like healthcare, brand image has been shown to influence purchasing decisions by reducing perceived risk. Finally, WOM marketing has been found to influence purchasing behavior positively. It is almost impossible for consumers to see quick results from trying OTC products. Therefore, consumers view other users' reviews and experiences as a reliable source of information, thereby partially reducing perceived risk. Since user reviews occur after the purchase, it can be stated that consumers refer to other consumers in their purchasing decisions. In this context, brands can strengthen brand perception by adopting accurate, consistent, and transparent communication strategies to increase positive consumer experiences.

Future studies could focus on different products within the OTC prescription group (cosmetics, pain relievers, dermatological products). Furthermore, models could be built using variables beyond those in this model, such as perceived product content, perceived price, health awareness, and digital and social media marketing. Longitudinal analyses could be conducted to investigate changes in consumer behavior in more detail over time.

Conflicts of Interest

The author declares that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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