


EYE-TRACKING AS A PHYSIOLOGICAL CORRELATE OF CONSUMER BEHAVIOR: A SYSTEMATIC LITERATURE REVIEW

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Objective: This study analyzes, through a systematic literature review, the main approaches used in research on consumer behavior that used eye-tracking as an identifier of physiological reactions.

Method: The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol was used to identify and select empirical studies published in the last five years, between 2019 and 2023, in nine research databases (Web of Science, Science Direct, Scopus, Springer, Emerald, Wiley Online, Sage, Taylor & Francis, and Google Scholar). Thus, 243 studies were included in the review.

Results: The analyzed studies are mainly classified into four different themes of neuromarketing application: purchase decision, behavioral prediction, advertising effects, and customer retention. The main segments analyzed were e-commerce and retail. The predominance of quantitative studies and the need to control sociodemographic variables in the models is highlighted. In summary, there is a suggested need for more multimethod approaches that combine eye-tracking with quantitative and qualitative methods (retrospective interviews), as well as integrate it with other techniques such as Electroencephalography (EEG), Magnetic Resonance Imaging (MRI), Galvanic Skin Response (GSR), facial biometrics, among others.

Theoretical/Methodological Contributions: This research advances the understanding of the state of the art on eye-tracking and its application in neuromarketing, providing insights into methodological pathways.

Originality/Relevance: Therefore, the main applications and emerging themes that can be explored in future studies are discussed. The proposal was previously registered in PROSPERO (CRD42022315763) and at the time of registration, there was no similar protocol.

Keywords: Consumer behavior. Marketing. Neuromarketing. Eye-Tracking

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1 Introduction

In recent years there has been a notable integration of neuroscience with areas of management and business, especially in the marketing field (Modi & Singh, 2023; Zhang et al., 2023). From this perspective, Neuromarketing stands out, an emerging field that combines behavioral psychology, economics, technology and neuroscience to study consumer behavior (Mo, Yang, & Hu, 2023; Wang, Tang, & Tsai, 2022a), seeking to understand the effect that psychological, physiological and emotional phenomena have on purchasing decisions (Pawar et al., 2023; Yu, Droulers, & Lacoste-Badie, 2022).

Given the need to analyze, in a more comprehensive way, how consumer choices and their purchasing decision process occur, the academic and business context has shown increasing interest in the use of neuromarketing techniques (Mo et al., 2023; Pawar et al., 2023). One of the most widely used methods is eye-tracking (González-Mena et al., 2022; Pentus et al., 2020), which allows one to identify patterns associated with visual attention, recognizing the elements that most attract the observer's attention and lead to a preference or choice (Peschel, Orquin, & Loose, 2019; Zuscke, 2020).

Individuals' visual attention reflects, for example, the way in which advertising content messages are processed (Bigne et al., 2021; Modi & Singh, 2023). In this way, eye-tracking is a technique that directly informs what the user is seeing, perceiving and where they are fixing their gaze (González-Mena et al., 2022; Liu et al., 2023). Therefore, different product/service standards can contribute to attracting potential consumers (Oliveira & Giraldi, 2019; Zhang et al., 2023), such as logo and slogan (Lourenção et al., 2020), packaging designs and location of objects (Jiang, 2019), colors that attract the public's attention the most to spark their interest (González-Mena et al., 2022), brands, amount of information, as well as various textual and non-textual aspects (Sielicka-Różyńska et al., 2021).

Recent research has used eye-tracking to study consumer behavior in different market segments, such as e-commerce, digitalization, online games and social networks (Mo, Sun, & Yang, 2021; Modi & Singh, 2023; Muñoz-Leiva et al., 2021); retail (Li et al., 2021; Pentus et al., 2020; Zhang et al., 2023); healthy eating (Abell & Biswas, 2023; Yang et al., 2022a, 2022b); alcoholic beverages (Barbierato et al., 2023; Gómez-Carmona et al., 2022; Liu et al., 2022); tourism (Liu et al., 2023; Zhu et al., 2023); sports (Dos Santos et al., 2019a; Oboudi et al., 2023; Toh, Leng, & Phua, 2023); clothing and accessories (Boardman & McCormick, 2019; Kim & Lee, 2020); beauty and personal care (Cuesta, Paidá, & Buele, 2020; Frierson et al., 2022).

In this context, understanding consumer behavior and visual attention generates evidence that can assist in more effective marketing planning (Bhardwaj et al., 2023), market value creation (Huddleston, Coveyou, & Behe, 2023; Mo et al., 2023), establishing customer-facing strategies and customization (Boardman & McCormick, 2022), customer loyalty and retention (Badenes-Rocha et al., 2022a, 2022b), interface and product designs (Modi & Singh, 2023; Pawar et al., 2023), as well as various marketing interventions based on the drivers that lead individuals to purchase decisions (Bhardwaj et al., 2023; Boerman & Müller, 2022; Hamelin et al., 2022).

In summary, although eye-tracking has been widely studied, there are still important questions that need to be addressed and it is necessary to understand what these gaps are (Bhardwaj et al., 2023; González-Mena et al., 2022). The literature highlights the lack of consensus on the best way to interpret and apply data generated by eye-tracking (Chen et al., 2022a). There is little guidance/discussion on how multi-method strategies can be undertaken to develop more effective neuromarketing research (Barbierato et al., 2023; Kislov et al., 2022; Michael et al., 2019) and little is still known about the topics that are becoming increasingly important for companies and academia (Mo et al., 2023; Modi & Singh, 2023; Muñoz-Leiva et al., 2021). Furthermore, it is necessary to analyze whether there is standardization in relation to the methods used (Berčík, Paluchová, & Neomániová, 2021; Boardman & McCormick, 2022; D'Ambrogio et al., 2023).

This lack of systematized information on what has been produced academically and where new studies might fit in is also seen as a significant barrier to the advancement of knowledge on this topic (Bhardwaj et al., 2023). In this context, a systematic review of studies on this topic theoretically contributes to providing new research perspectives (Bhardwaj et al., 2023; González-Mena et al., 2022).

In view of the above, this systematic review study is based on the following research question: What approaches have been identified in research that uses the eye-tracking method as an identifier of physiological reactions in studies on consumer behavior? Therefore, the objective of this systematic review is to elucidate how eye-tracking has been applied in neuromarketing studies on consumer behavior. Furthermore, this work seeks to contribute to the literature, presenting a synthesis of existing empirical evidence, in order to provide directions for future research.

To advance existing knowledge, the results of this systematic review present possibilities for using eye-tracking in marketing research, including identification of key

journals covering a variety of topics in neuromarketing and eye-tracking, the types and methods of research, segments and topics covered, as well as insights for future research. Therefore, as a contribution, this review presents a broad set of references and provides an analysis of relevant and recent studies, highlighting key gaps in the literature and offering researchers, marketing professionals and those interested in the topic, an updated view on the application of eye-tracking in predicting consumer behavior and how this technique has enabled the measurement of physiological reactions to study preferences and motivations that influence decision-making.

2 Methodology

This study was guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses protocol (PRISMA), because the recommendations of the aforementioned protocol (Checklist with 27 items) are widely adopted in systematic reviews, so their use is associated with more complete and robust systematic reviews (Page et al., 2021). For this reason, PRISMA guided the selection and analyzes through inclusion and exclusion criteria, at all stages of the review (Page et al., 2021). Furthermore, this proposal was previously registered in the International prospective register of systematic reviews, PROSPERO (CRD42022315763) and, at the time of registration, there was no other similar protocol, which demonstrates the originality and relevance of this study.

2.1 Scope and Selection Criteria

The initial search and export of articles was carried out on April 20, 2023 in nine research bases: Web of Science, Science Direct, Scopus, Springer, Emerald, Wiley Online, Sage, Taylor & Francis and Google Scholar. We used some eligibility criteria as filters for selecting articles. In summary, the documents included in this review met the following requirements: (a) written in English, Spanish or Portuguese; (b) published in the last five years (between 2019 and 2023); (c) investigated a neuromarketing intervention with the eye-tracking method; (d) consisted of an empirical study (and) presented metrics and/or inferences about physiological reactions linked to consumer behavior and (f) falls within the field of marketing and consumer behavior research.

As a consequence of the inclusion criteria presented, we excluded theoretical studies, systematic and narrative review, conference abstracts, books and book chapters, meta-analyses, editorial and opinion articles and the like or non-academic sources.

2.2 Search and Selection Strategy

To identify records, we seek to understand, based on research on the topic in the literature, what are the main keywords to search for documents on the topic in question. Furthermore, we performed word validation, which included conducting a pilot search to test the effectiveness of search terms in retrieving relevant studies. Thus, the search terms defined to be combined were: “Eye-Tracking”, “Eye-Tracker”, “Neuromarketing”, “Consumer behavior”, “Neuroscience”, “Marketing”, “Retail”, “E-commerce”, “Advertising”.

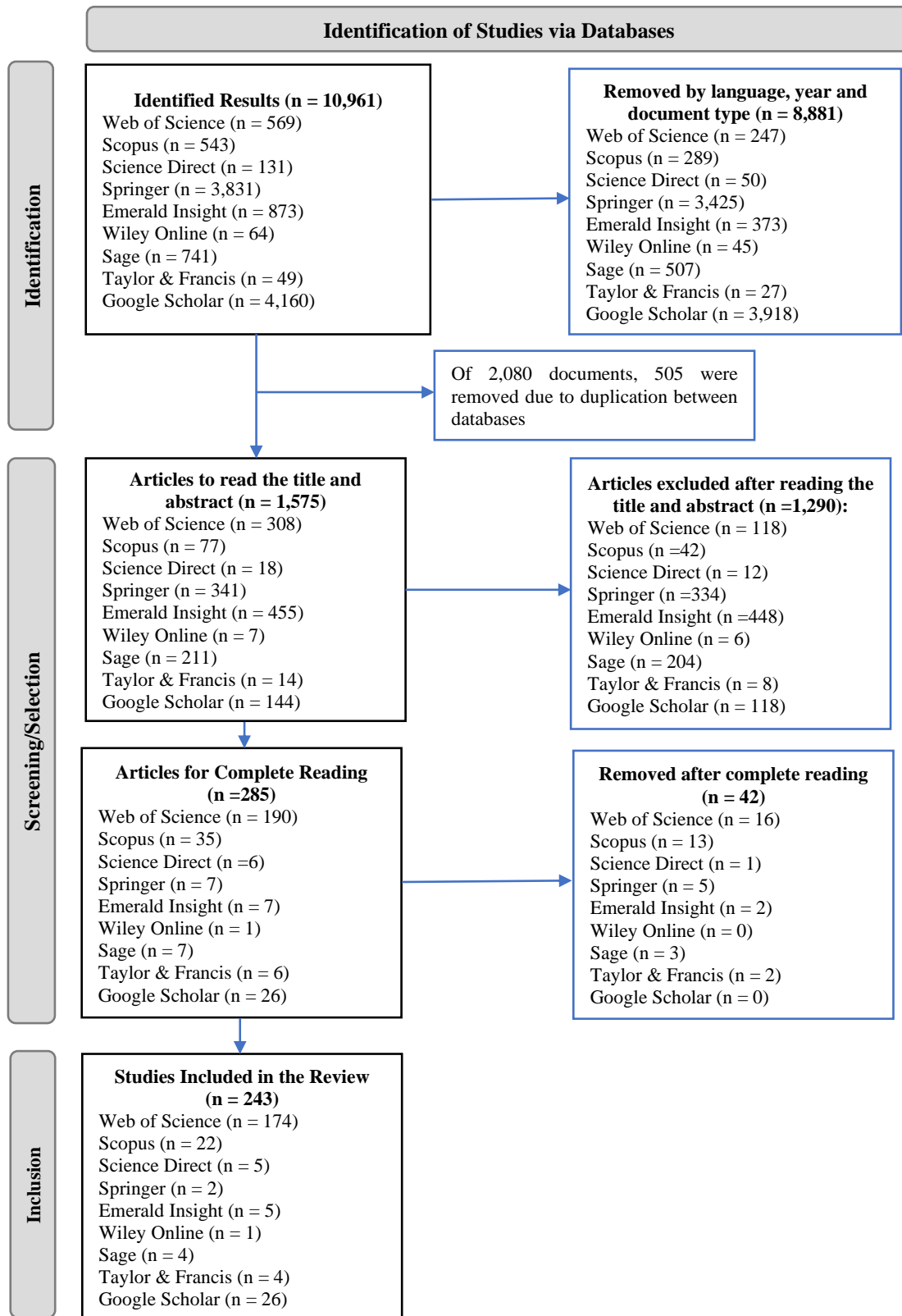
Regarding the search fields indicated in the databases, it is worth noting that we considered the title, abstract and keywords. Furthermore, the complete search string with the respective connectors was as follows: ((Neuromarketing AND (Eye-Tracking OR Eye-Tracker)) OR (Consumer behavior AND (Eye-Tracking OR Eye-Tracker)) OR (neuroscience AND marketing AND (Eye-Tracking OR Eye-Tracker)) OR (retail AND (Eye-Tracking OR Eye-Tracker)) OR (E-commerce AND (Eye-Tracking OR Eye-Tracker)) OR (Advertising AND (Eye-Tracking OR Eye-Tracker))).

A total of 10,961 records were identified, without eliminating duplicate documents and those that are not eligible according to the determined criteria. The documents were exported in BibTeX format. All other stages of the systematic review were conducted in a shared manner between the reviewers, through the Parsifal tool, which contains fields to be filled in by users, including everything from details of the planning phase to data extraction and analysis, providing necessary support for carrying out the systematic review protocol.

To select articles, we carried out independent evaluations by reviewers. The first screening of this study consisted of excluding documents that did not meet the eligibility criteria (language, year and type of document), in which 8,881 records were removed and, subsequently, 505 articles were removed due to duplication between the databases. Thus, 1,575 articles were eligible for reading titles and abstracts. Figure 1 presents, through the PRISMA Flowchart, the number of documents in each of the stages: identification, screening/selection and inclusion.

Figure 1

PRISMA Flow Diagram of Search Results



Source: Authors' own elaboration (2023).

When reading titles and abstracts, we removed 1,290 articles because they did not fit the topic, that is, although they addressed eye-tracking, they were not empirical studies that, in fact, applied this technique to study consumer behavior. As a result, 285 articles were eligible for full-text reading. In a similar way to what occurred in the screening by title and abstract, with a detailed reading of all sections of the articles, it was possible to eliminate 42 studies. The reasons for exclusion when reading the full text were mainly due to the subject not being suitable for the scope of the research, that is, they did not analyze physiological reactions with eye-tracking in the context of neuromarketing. This resulted in 243 studies selected to compose this systematic review.

3 Results

3.1 Descriptive analysis of the results

Regarding the trend of publications per year from 2019 to 2023, the following stands out: 40 articles were published in 2019; 45 were published in 2020; 67 were published in 2021; 68 were published in 2022; and 23 have been published up to April 2023. This result demonstrates a significant increase in the number of studies over time. It's important to note that, in the year 2023, articles published until April 20th were considered, which may account for the lower number of publications in that year. Thus, this rise in the number of publications since 2020 could be a consequence of the popularity of the eye-tracking technique in neuromarketing studies and its relevance in understanding consumer behavior.

These 243 articles were published in 172 different journals. However, around 63% of the total journals recorded less than 3 publications. This may indicate that the topic is multidisciplinary, with a tendency to accept different types of journals. Table 1 presents the main journals, which cover a variety of topics in neuromarketing and eye-tracking, and the respective number of articles published, as well as the authors.

Table 1

Main Journals That Are Publishing this Type of Empirical Approach

Journal	Number of Publications	Author(s)
Frontiers in Psychology	12	Ausin-Azofra et al. (2021); Chen et al. (2022b); Juarez et al. (2020); Kim e Kim (2020); Kim e Lee (2021); Mañas-Viniegra et al. (2020b); Mengual-Recuerda et al. (2020); Ouyang e Jia (2022); Pawar et al. (2023); Wang, Tang e Tsai (2022a); Zito et al. (2021); Escandon-Barbosa e Rialp-Criado (2019)
Food Quality and Preference	9	Bialkova et al. (2020); Kleih e Sparke (2021); Kleih, Lehberger e Sparke (2022); Leon, Spers e de Lima (2020); Machín et al. (2019); Melendrez-Ruiz et al. (2022); Peng-Li et al. (2020a); Puerta et al. (2022); Songa et al. (2019)
Journal of Business Research	9	Bigne et al. (2021); Bogomolova et al. (2020); Giray et al. (2022); Krefeld-Schwalb e Rosner (2020); Laski et al. (2020); Sheng et al. (2020); Vriens, Vidden e Schomaker (2020); Yang et al. (2022a); Zuschke (2020)
Appetite	8	Castro et al. (2021); Machín et al. (2020); Peng et al. (2021); Peng-Li et al. (2021); Peschel, Orquin e Loose (2019); Robertson e Lunn (2020); Steinhäuser, Janssen e Hamm (2019b); Tanner, McCarthy e O'Reilly (2019)
Journal of Retailing and Consumer Services	7	Espigares-Jurado et al. (2020); Gidlöf et al. (2021); Huddleston, Coveyou e Behe (2023); Ladeira et al. (2021); Ladeira et al. (2022); Ladeira et al. (2023); Yu et al. (2022)
Psychology & Marketing	7	Badenes-Rocha et al. (2022a); D'Ambrogio et al. (2023); Londoño e Ruiz de Maya (2022); Meng et al. (2022); Pozharliev, Rossi e De Angelis (2022); Savelli et al. (2022); Ye et al. (2020)
Sustainability	7	Aguiló-Lemoine et al. (2020); Chen et al. (2022a); Chiang et al. (2022); Maccioni, Borgianni e Basso (2019); Mañas-Viniegra et al. (2019); Proi et al. (2023); Pelau et al. (2022)
Behaviour & Information Technology	5	Boardman, McCormick e Henninger (2022); Deng e Gu (2021); Hsieh et al. (2021); Hwang e Lee (2022); Krajina (2022)
Foods	4	Berčík, Paluchová e Neomániová (2021); Mehlhose, Schmitt e Risius (2021); Peng-Li et al. (2020b); Thomas et al. (2022)
Nutrients	4	Bossuyt et al. (2021); Mansfield et al. (2020); Rantala et al. (2022); Steinhäuser, Janssen e Hamm (2019a)
Physiology & behavior	4	Dos Santos et al. (2019b); García-Madariaga et al. (2019); Muñoz-Leiva et al. (2019); Sargezeh et al. (2019)
Electronic Commerce Research	3	De Keyzer, Dens e De Pelsmacker (2021); Jin et al. (2021); Zahmati et al. (2023)
Food Research International	3	Ballco, de-Magistris e Caputo (2019); Siegrist et al. (2019); Tórtora, Machín e Ares (2019)
Applied Science	3	David et al. (2021); González-Mena et al. (2022); Schröter et al. (2021)
Behavioral Sciences	3	Levrini e Jeffman dos Santos (2021); Rúa-Hidalgo et al. (2021); Wei, Khachatryan e Rihn (2019)
Other journals	155	*
<i>Total</i>	243	

* **Nota:** Due to the number of references, we chose to highlight in the table only authors from the 15 main journals, that cover a large number of articles in this systematic review and publish on the topic most frequently. Each of the “Other journals” presented less than three publications.

Source: authors’ own elaboration (2023).

Eye-tracking has potential for application in studies in the most diverse market segments, so that marketers can use this technique to study consumer behavior in different types

of businesses. Table 2 presents the frequency distribution of the market segments evaluated in the articles.

Table 2

Frequency Distribution of Market Segments Researched

Main Segments Covered	Number of Articles	%
E-commerce, digitalization, online games and social networks	77	31.69%
Retail (market, toys, packaging, physical ads)	48	19.75%
Healthy Foods	21	8.64%
Alcoholic beverages	13	5.35%
Tourism	11	4.53%
Sports	10	4.12%
Clothing and accessories	7	2.88%
Beauty and Personal Care	6	2.47%
Finance, career and jobs	5	2.06%
Other segments	45	18.52%
Total	243	100%

Source: Authors' own elaboration (2023).

Articles associated with the “other segments” category include: electronic products (Aslan & Özbeyaz, 2022), customer relationship (Badenes-Rocha et al., 2022b), plants (Behe et al., 2020, 2022; Huddleston, Coveyou, & Behe, 2023), health/warning announcements (Hamelin et al., 2021; Kidanu et al., 2022; Liu et al., 2021; Pham et al., 2022; Wang, Tang, & Tsai, 2022a), ecological products and sustainability (Gidlöf et al., 2021; Gómez-Carmona et al., 2021; Lamberz et al., 2020; Londoño & Ruiz de Maya, 2022; Luan et al., 2023; Maccioni, Borgianni, & Basso, 2019; Mansor & Isa, 2022; Proi et al., 2023), television media (Segijn, Voorveld, & Vakeel, 2021), automotive products (Luo et al., 2022), non-alcoholic beverages (Neuhofer et al., 2020; Salarifar et al., 2020), among other approaches.

The digital sector, involving electronic commerce, brought together the largest number of researches in the literature consulted, reinforcing the potential of eye-tracking techniques to analyze consumer attention in online advertising, web pages and social networks (Bigne et al., 2021; Jiang, 2019; Küçün & Güler, 2021; Mañas-Viniegra et al., 2019; Muñoz-Leiva et al., 2019; Monica et al., 2019; Peker et al., 2021; Rúa-Hidalgo et al., 2021), user perception in online games (Cuesta-Cambra et al., 2019), as well as the influence of celebrities as advertising spokespersons (D'Ambrogio et al., 2023; Pelau et al., 2022; Wang et al., 2020; Zahmati et al., 2023).

Additionally, the retail sector stands out with the second largest number of approaches, using eye-tracking for a variety of analyses, such as: individuals' perception of a new brand (Aslan & Özbeyaz, 2022; Hamelin et al., 2021), effects of different types of advertisements among consumers of different genders (Hamelin et al., 2022; Luo et al., 2022; Yarosh, Kalkova, & Reutov, 2021), attention given to logos, brand, texts, product colors and packaging (García-Madariaga et al., 2019; Juarez et al., 2020; Ploom et al., 2020; Russo et al., 2021), visual merchandising elements and physical retail environments (Kim & Lee, 2021; Mengual-Recuerda et al., 2020), print media (Şik & Soba, 2021; Zito et al., 2021), among other applications.

In summary, some segments shown in Table 2 are receiving attention from researchers (healthy foods, alcoholic beverages, tourism, sports, clothing and accessories, beauty and personal care, finance, career, and jobs). Although less explored, these segments are becoming emerging sectors compared to those predominantly analyzed in eye-tracking research. For Abell and Biswas (2023) and Giray et al. (2022), compiling and summarizing evidence on visual attention and other metrics in these new growing sectors becomes relevant, as traditional consumer behavior is changing and challenging marketers.

Recent studies such as those by Barbierato et al. (2023), Damião de Paula et al. (2023), Diouf et al. (2023), Escandon-Barbosa and Rialp-Criado (2019), Gómez-Carmona et al. (2021), Liu et al. (2022), Merdian et al. (2021) and Serrano et al. (2022) highlight scientific evidence on the visual attention of alcoholic beverage consumers. Research in this field is mainly focused on beverage advertisements (Ausin-Azofra et al., 2021; Damião de Paula et al., 2023; Diouf et al., 2023; Oliveira & Giraldo, 2019), attention spent on wine brand labels, variety and vintage year (Ferreiro et al., 2021; Němcová & Berčík, 2019) and packaging/bottle/can design (Barbierato et al., 2023; Escandon-Barbosa & Rialp-Criado, 2019; Merdian et al., 2021).

Ceravolo et al. (2019) and Mañas-Viniegra et al. (2020) used eye-tracking to analyze whether consumers are sensitive to stimuli from financial disclosure documents, arguing that the way information is distributed can make it more attractive. Considering career and job sites, Mičík and Kunešová (2021) adopt eye-tracking with the aim of optimizing such virtual environments for generation Y individuals, demonstrating the intergenerational difference in visual attention patterns. Purchasing decision-making by medical professionals was analyzed by Olarte (2021), which highlighted gender and area of interest as main explanatory variables. Additionally, Lourenção et al. (2020) used Brazilian tourist advertisements and verified the influence of the destination country's logo and slogan on tourists' visual attention.

Despite the differences in each segment studied, understanding how consumer visual behavior works at the time of purchasing decisions can support neuroscientists and entrepreneurs in the creation and/or optimization of products and services, according to the variables that influence the interest of the target group. Thus, researchers from different areas of study can experience gains from such approaches, since the application of eye-tracking makes it possible to analyze which information and product attributes receive the most attention in consumers' eyes and how this visual reaction is related to product choice.

Regarding the methods used in the selected articles, Table 3 presents the results identified.

Table 3

Categories of Identified Studies

Type of Study	Number of Articles	Percentage
Descriptive exploratory (quantitative)	145	59.67%
Descriptive exploratory (mixed)	75	30.86%
Quasi-Experimental (non-randomized)	11	4.53%
Descriptive exploratory (qualitative)	9	3.70%
Experimental	3	1.23%
Total	243	100%

Source: Authors' own elaboration (2023).

These results indicate that there is a wide field to be explored with regard to experimental studies, that can perform robust analyzes with treatment groups (exposed to the given intervention) and control groups (not exposed to the intervention). In this way, the evidence could be expanded, comparing specific groups, as well as marketing research with and without certain neuromarketing techniques, especially with an emphasis on eye-tracking, the subject of this review.

The main results of the studies analyzed are summarized in the following topic, which is accompanied by the analysis of emerging themes.

3.2 Applications of eye-tracking and potential results of the studies analyzed

Among the 243 documents analyzed, we identified that eye-tracking applications, in consumer behavior studies, predominantly four themes are included: (I) Purchase decision, (II) Forecasting, (III) Advertising and (IV) Consumer retention. Bhardwaj et al. (2023) also identified some of these themes when they analyzed studies on neuromarketing. Within the four

themes, some topics are covered more frequently and many variables can explain the results. Table 4 summarizes this analysis.

Table 4

Predominance of the Application of the Eye-Tracking Technique in Neuromarketing

Theme/Application	Topics Discussed	Number of Articles
Purchase Decision	Data-driven decision	88
Forecasting	Behavioral prediction	79
Advertising	Effect of Advertising (ads, comments, endorsers and the like)	52
	Neuromarketing Techniques	7
Consumer Retention	Consumer Experience and Perception	12
Others	Customer relationship	5
Total		243

Source: Authors' own elaboration (2023).

In general, the applications of eye-tracking in the literature focus mainly on the analysis of the Purchasing Decision, which is a topic that involves studies on which data and visual information underlie consumer decisions. Next, the theme of Forecasting stands out, which groups documents on behavioral forecasting, proposing a methodology to predict potential customer behaviors.

Other themes identified were: Advertising, subdivided into two topics: (I) Effect of Advertising, analyzing variables that influence the individual's reactions, given a particular advertising stimulus; as well as (II) Neuromarketing Techniques, which address the use of these stimuli to study neuromarketing techniques and incorporate improvements; Consumer retention, considering the relationship between experience/perception, loyalty and product attributes Furthermore, studies already use the technique to specifically verify post-purchase, investigating the effect of evaluation forums and online comments, as well as customer relations.

Regarding advertising, some of the studies that used eye-tracking were able to identify that the effect is more significant when the brand is strong (Flores et al., 2022; Mandolfo, Di Dalmazi, & Lamberti, 2022; Oliveira & Giraldo, 2019); the logo, size, objects and graphic aspects are positioned centrally, avoiding the background (García-Madariaga et al., 2019; Jiang, 2019) and the slogan must be clear, inducing communication (Lourenção et al., 2020; Şik & Soba, 2021).

Researchers have found the effectiveness of advertisements on social media in increasing the visual attention of the target group (Muñoz-Leiva et al., 2019), especially when

models (personalities chosen for advertising) manage to generate public engagement and/or celebrities are used as brand spokespersons (Abell & Biswas, 2023; Wang et al., 2020; Zahmati et al., 2023). Finally, the effects of advertising, in different media, may be influenced by the individual's gender (Hamelin et al., 2022; Toh, Leng, & Phua, 2023; Zahmati et al., 2023).

Kim and Kim (2020) and Peng-Li et al. (2021) studied multisensory stimuli and suggest that advertising stimuli are more expressive when the eye-tracking technique is combined with soundtracks (ambient music) that transmit messages about the product/service to be sold. This result allows us to reflect on the use of combined techniques and leaves room for researchers to test other senses (touch, smell, etc.), associating them with the visual, in order to improve searches.

With regard to the main predictors of consumer behavior identified in the studies, the factors that stand out are ethnic and cultural (Ploom et al., 2020), intergenerational (Mičik & Kunešová, 2021), gender differences (Hamelin et al., 2022; Luo et al., 2022; Sargezeh, et al., 2019; Yarosh, Kalkova, & Reutov, 2021), brand loyalty and familiarity (Garczarek-Bąk et al., 2021; Kim & Lee, 2021; Peker et al., 2021) and self-esteem (Aguero et al., 2019).

According to Isa and Mansor (2020), consumer response is related to the four components of the marketing mix (price, place, promotion, product), as well as territoriality (regional origin of products) (Russo et al., 2021) and integration with digital media (Mañas-Viniegra et al., 2020a). Another predictor highlighted in the literature is the variable number of children. The studies by Küçün and Güler (2021) and Zito et al. (2021) identified that there are differences in visual behavior patterns between parents and individuals without children.

According to consumers' visual behavior, purchasing decisions can be based on data, i.e., when making a choice, study participants pay more attention to verbal information (Sielicka-Różyńska et al., 2021), graphic information receives more attention than text in other cases (Pawar et al., 2023; Wu & Li, 2021; Zhang et al., 2023). Label design and vintage year (in the case of wines) are important factors (Němcová & Berčík, 2019), information layout (Ceravolo et al., 2019), appearance and engagement of influencers representing the product (Abell & Biswas, 2023; Mañas-Viniegra et al., 2019; Wang et al., 2020; Zahmati et al., 2023), brand value and quality indicators (Levrini & Jeffman dos Santos, 2021; Mañas-Viniegra et al., 2020b) and product usability (Monica et al., 2019).

In cases of sporting events, Aguiló-Lemoine et al. (2020), Boronczyk, Rumpf and Breuer (2022), Dos Santos et al. (2019a), Giakoni et al. (2022), Henderson, Mazodier and Sundar (2019), Herrera, Segado and Manzanares (2021), Oboudi et al. (2023) and Toh, Leng

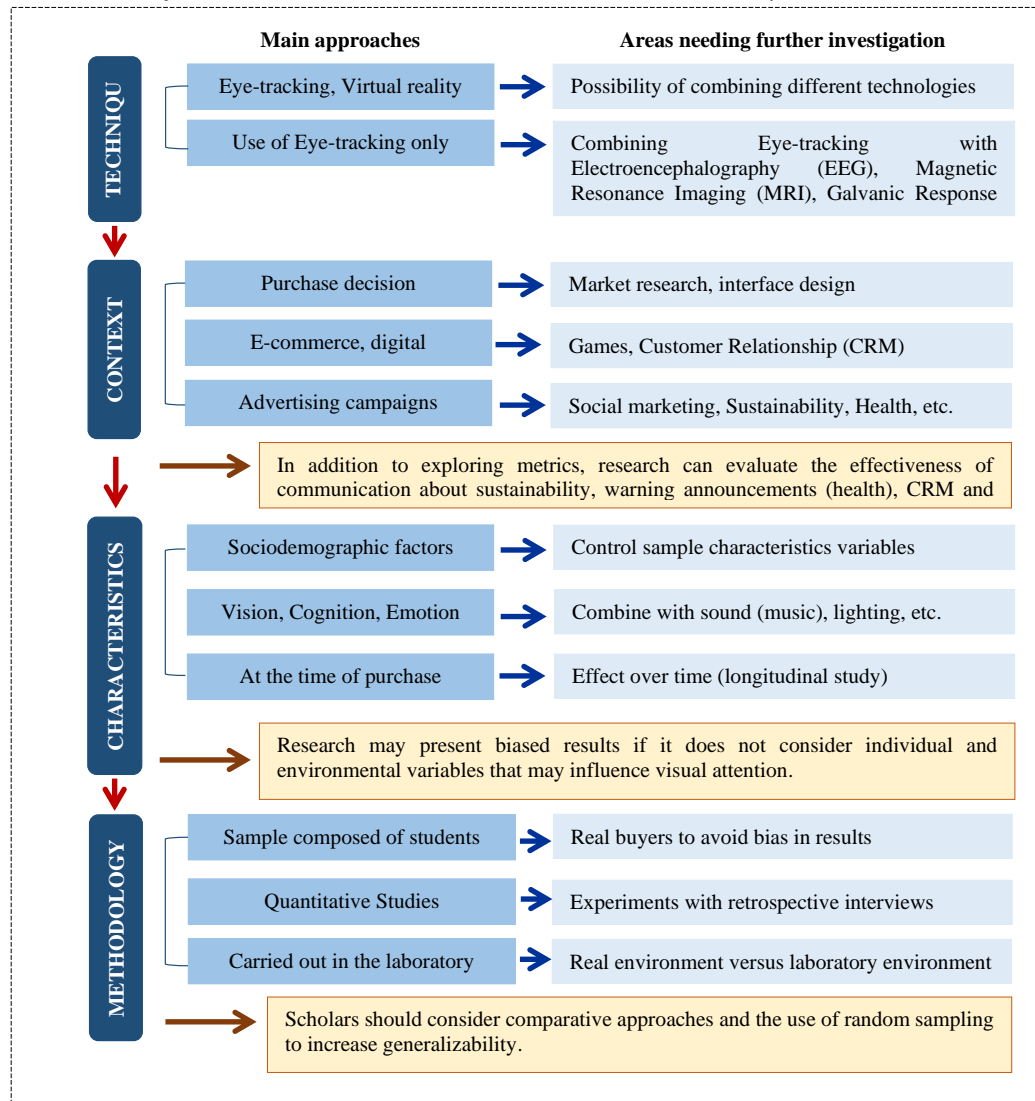
and Phua (2023) highlight that decision making is directly related to information from those who sponsor the event. Therefore, based on the synthesis of these results, The following topic presents suggestions for researchers to explore the potential of eye-tracking in future research on neuromarketing.

3.2.1 Eye-Tracking and Neuromarketing: Future Directions

From the theoretical context presented, we identified areas that need further investigation, as illustrated in Figure 2. Based on this model, directions for future research were arrived at.

Figure 2

Directions for Future Research Based on the Studies Analyzed



Source: Authors' own elaboration (2023).

Some scholars have explored virtual reality for eye-tracking studies in the context of neuromarketing, demonstrating the possibility of combining different technologies. Liu et al. (2023) and Siegrist et al. (2019) highlight that future research can expand this type of analysis, with more rigor, given the differences between virtual reality and the real environment. Thus, we suggest that the relevance of these differences be addressed and what are the potentialities and limitations for the use of virtual reality, Artificial Intelligence and other technologies in research that examines purchasing decisions.

There is less predominance of studies that are carried out using this system and integrating other available techniques (Aslan & Özbeyaz, 2022; Chiang, Yen, & Chen, 2022; Kislov et al., 2022). As future directions, we must consider that eye movements are a consequence of other senses and cognitive processes, which occur in the minds of consumers. Therefore, the combined use of eye-tracking with electroencephalography (EEG) devices, that monitor brain activity, would add information to empirical approaches (Barbierato et al., 2023). Furthermore, magnetic resonance imaging (MRI), galvanic response (GSR), facial biometrics techniques, among others, can also be used. This integration can provide new evidence for understanding consumer behavior during the decision-making process.

Regarding the context/application segment, it is noteworthy that the majority of studies were carried out in the context of electronic commerce. The results point to the tendency to analyze consumer behavior in online interfaces, however, many of these sites are planned and created specifically for research purposes. Therefore, as suggested by Babaç and Yüncü (2022), different results can be achieved using existing websites, which is an avenue for new work. Furthermore, it is important to expand knowledge about emerging themes that are less studied, such as the effect of classifications in evaluation forums (Guan & Lam, 2019), customer relationship (Badenes-Rocha et al., 2022a), ads focused on sustainability (Gómez-Carmona et al., 2021; Luan et al., 2023; Maccioni, Borgianni, & Basso, 2019; Proi et al., 2023) and effects of advertising with health warnings, such as on cigarette, beverage or medication labels (Klein et al., 2020; Liu et al., 2021; Pham et al., 2022).

It is important that researchers who use quantitative models control variables that can influence the results, such as gender, age, nationality, socioeconomic profile, personality traits and the like. Future research could investigate whether there are differences between men and women, or between age groups, in attention and behavior (Boardman & McCormick, 2022; D'Ambrogio et al., 2023; Espigares-Jurado et al., 2020). Other senses could also be combined with vision, this suggests new studies with multisensory stimuli, such as eye-tracking combined

with soundtracks (ambient music) (Kim & Kim, 2020; Peng-Li et al., 2021). Furthermore, it would be important to analyze attention over time and not just at the time of purchase, which could be carried out with longitudinal studies (Wang, Tang, & Tsai, 2022b).

Regarding methodology, some studies highlighted the small sample size as a limitation (D'Ambrogio et al., 2023; González-Mena et al., 2022; Hwang & Lee, 2022; Ibáñez et al., 2021). However, as highlighted in other studies, in an eye-tracking study carried out in the laboratory, analysis with many participants becomes difficult, i.e. laboratory-based experiments, rarely employ a large sample size, given the difficulties and complications associated with the designs, especially when capturing biometric data.

We suggest that scholars consider comparative approaches between experiment in the laboratory and in a real purchasing environment, since even though it is rigorously carried out, differences remain between experiment and reality in the context of consumer decision-making (Zhang et al., 2023). The use of random sampling to increase generalizability is also recommended (Giray et al., 2022; Kim & Kim, 2020). In addition to these recommendations, it is highlighted that declarative methodologies, such as retrospective interviews, are complementary and can strengthen eye-tracking results. We therefore suggest this type of combination, due to the importance of having a structure that improves the validity and reliability of neuromarketing studies.

Finally, this study shows that eye tracking and its application as a marketing research tool has helped researchers, advertisers and other professionals in this area to identify consumer behavior and improve the customer experience when viewing products and services, making the image of their campaigns more attractive and closer to the interest of the consumer/observer.

4 Final considerations

This study systematically analyzed the literature on the possibilities of using eye-tracking in neuromarketing interventions. Thus, following the guidelines of the PRISMA protocol, it was possible to select 243 articles, from which data were extracted on the main methodological research designs, market segments and application themes. In summary, the results present a theoretical structure that can be used by scholars in the field and marketing professionals.

This article contributes theoretically by presenting the state of the art of neuromarketing studies with eye-tracking, serving as guidance for the development of related studies. Additionally, it contributes by synthesizing the aforementioned works and assisting in pointing

out gaps or advances in knowledge on this topic, providing guidelines for future research, which can assist managers in defining marketing strategies.

Despite the rigorous process during the systematic literature review, some limitations deserve to be recognized. Thus, it is noteworthy that only articles published in peer-reviewed journals were considered, so that many studies located in conference annals, banks of theses and dissertations can present relevant evidence for the analysis proposed here. As we used specific search terms, language criteria and year of publication, some relevant document may have been left out of the analysis due to this restriction. However, the identified records allowed a comprehensive view of various aspects, known and unknown, of studies that used eye-tracking to analyze consumer behavior.

We highlight as an avenue for future studies the carrying out of new systematic reviews that replicate this protocol and can extract other data that complement the analyses. Additionally, for empirical approaches, we suggest carrying out controlled experiments with eye-tracking for market segments in which behavioral economics and neuromarketing are appropriate for the consumer’s purchasing decision-making process. Furthermore, it may be interesting to carry out studies that combine different neuromarketing techniques, augmented reality that can analyze consumer visual patterns considering explanatory variables of these results, such as cultural, gender, intergenerational aspects, among others, as already highlighted in previous sections.

Authors' contribution

Contribution	Pereira, M. H. N.	Melo, F.L.N.B.	Soares, A. M. J.	Ferreira, P. B. S.	Silva, M. P.	Morya, E.
Conceptualization	X	X	X	X	X	X
Methodology	X	X	X	X	X	---
Software	X	X	X	X	X	X
Validation	X	X	X	X	X	X
Formal analysis	X	X	X	X	X	---
Investigation	X	X	X	---	---	---
Resources	X	X	X	X	X	X
Data Curation	X	X	X	---	---	X
Writing - Original Draft	---	X	X	---	---	---
Writing - Review & Editing	X	X	---	---	---	X
Visualization	X	X	---	---	---	--
Supervision	---	---	---	---	---	---
Project administration						
Funding acquisition						

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***EYE-TRACKING* COMO CORRELATO FISIOLÓGICO DO COMPORTAMENTO DO CONSUMIDOR: UMA REVISÃO SISTEMÁTICA DA LITERATURA**



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Objetivo: Este estudo analisa, por meio de uma revisão sistemática da literatura, quais as principais abordagens utilizadas em pesquisas sobre comportamento do consumidor que usaram o método *eye-tracking* como identificador de reações fisiológicas.

Método: O protocolo *Preferred Reporting Items for Systematic Reviews and Meta-Analyses* (PRISMA) foi utilizado para identificar e selecionar estudos empíricos publicados nos últimos cinco anos, entre 2019 e 2023, em nove bases de pesquisa (*Web of Science, Science Direct, Scopus, Springer, Emerald, Wiley Online, Sage, Taylor & Francis* e Google Acadêmico). Assim, 243 estudos foram incluídos na revisão.

Resultados: Os estudos analisados se enquadram, sobretudo, em quatro diferentes temas de aplicação de *neuromarketing*: decisão de compra, previsão comportamental, efeitos da publicidade e retenção de consumidores. Os principais segmentos analisados foram o comércio eletrônico e o varejo. Destaca-se a predominância de estudos quantitativos e a necessidade de controlar variáveis sociodemográficas nos modelos. Em síntese, sugere-se uma maior aplicação da abordagem multimétodo, que combine o rastreamento ocular com métodos quantitativos e qualitativos (entrevistas retrospectivas), bem como o íntegro com outras técnicas como Eletroencefalografia (EEG), imagem de ressonância magnética (MRI), resposta galvânica (GSR), biometria facial, entre outras.

Contribuições Teóricas/Metodológicas: Esta pesquisa avança na compreensão do estado da arte sobre rastreamento ocular e sua aplicação no *neuromarketing*, apresentando *insights* sobre caminhos metodológicos.

Originalidade/Relevância: Por conseguinte, são discutidas as principais aplicações e temas emergentes que podem ser explorados em estudos futuros. A proposta foi previamente cadastrada no PROSPERO (CRD42022315763) e, até o momento do registro, não havia outro protocolo semelhante.

Palavras-chave: Comportamento do Consumidor; Marketing; Neuromarketing; Eye-Tracking.

Como citar

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1 Introdução

Nos últimos anos houve uma notória integração da neurociência com áreas de gestão e negócios, sobretudo no campo mercadológico (Modi & Singh, 2023; Zhang et al., 2023). Nessa perspectiva, destaca-se o *Neuromarketing*, um campo emergente que combina psicologia comportamental, economia, tecnologia e neurociência para estudar o comportamento do consumidor (Mo, Yang, & Hu, 2023; Wang, Tang, & Tsai, 2022a), buscando compreender o efeito que os fenômenos psicológicos, fisiológicos e emocionais têm sobre decisões de compra (Pawar et al., 2023; Yu, Droulers, & Lacoste-Badie, 2022).

Dada a necessidade de analisar, de modo abrangente, como ocorrem as escolhas do consumidor e seu processo de decisão de compra, o contexto acadêmico e empresarial tem demonstrado interesse crescente pelo uso de técnicas de *neuromarketing* (Mo et al., 2023; Pawar et al., 2023). Um dos métodos mais amplamente utilizados é o rastreamento ocular (*Eye-tracking*) (González-Mena et al., 2022; Pentus et al., 2020), que permite identificar padrões associados à atenção visual, reconhecendo os elementos que mais chamam a atenção do observador (Peschel, Orquin, & Loose, 2019; Zuschke, 2020).

A atenção visual dos indivíduos reflete, por exemplo, a maneira como se dá o processamento das mensagens de conteúdos publicitários (Bigne et al., 2021; Modi & Singh, 2023). Dessa forma, *eye-tracking* é uma técnica que informa diretamente onde o usuário está fixando seu olhar (González-Mena et al., 2022; Liu et al., 2023). Destarte, diversos padrões do produto/serviço podem contribuir para a atração dos consumidores (Oliveira & Giralardi, 2019; Zhang et al., 2023), tais como o logotipo e o *slogan* (Lourenção et al., 2020), *designs* de embalagens e localização dos objetos (Jiang, 2019), cores que mais atraem a atenção do público para despertar seu interesse (González-Mena et al., 2022), marcas, quantidade de informação, bem como diversos aspectos textuais e não textuais (Sielicka-Różyńska et al., 2021).

Pesquisas recentes utilizaram o rastreamento ocular para estudar o comportamento do consumidor em diferentes segmentos de mercado, tais como *e-commerce*, digitalização, jogos *on-line* e redes sociais (Mo, Sun, & Yang, 2021; Modi & Singh, 2023; Muñoz-Leiva et al., 2021); varejo (Li et al., 2021; Pentus et al., 2020; Zhang et al., 2023); alimentação saudável (Abell & Biswas, 2023; Yang et al., 2022a, 2022b); bebidas alcoólicas (Barbierato et al., 2023; Gómez-Carmona et al., 2022; Liu et al., 2022); turismo (Liu et al., 2023; Zhu et al., 2023); esportes (Dos Santos et al., 2019a; Oboudi et al., 2023; Toh, Leng, & Phua, 2023); vestuário e acessórios (Boardman & McCormick, 2019; Kim & Lee, 2020); beleza e cuidados pessoais (Cuesta, Paidá, & Buele, 2020; Frierson et al., 2022).

Nesse âmbito, entender o comportamento e atenção visual do consumidor gera evidências que podem auxiliar no planejamento de *marketing* mais efetivo (Bhardwaj et al., 2023), criação de valor de mercado (Huddleston, Coveyou, & Behe, 2023; Mo et al., 2023), estabelecimento de estratégias voltadas para o cliente e customização (Boardman & McCormick, 2022), fidelização e retenção de clientes (Badenes-Rocha et al., 2022a, 2022b), *designs* de interfaces e produtos (Modi & Singh, 2023; Pawar et al., 2023), bem como diversas intervenções de *marketing* com base nos *drivers* que levam os indivíduos à decisão de compra (Bhardwaj et al., 2023; Boerman & Müller, 2022; Hamelin et al., 2022).

Em síntese, embora o rastreamento ocular tenha sido amplamente estudado, ainda existem questões importantes que precisam ser abordadas e torna-se necessário entender quais são essas lacunas (Bhardwaj et al., 2023; González-Mena et al., 2022). A literatura destaca a falta de consenso sobre a melhor maneira de interpretar e aplicar os dados gerados pelo *eye-tracking* (Chen et al., 2022a). Há pouca orientação/discussão sobre como estratégias multimétodos podem ser realizadas para desenvolver pesquisas de *neuromarketing* mais eficazes (Barbierato et al., 2023; Kislov et al., 2022; Michael et al., 2019) e pouco ainda se sabe acerca dos temas que estão se tornando cada vez mais importantes para as empresas e academia (Mo et al., 2023; Modi & Singh, 2023; Muñoz-Leiva et al., 2021). Ademais, é preciso analisar se há padronização em relação aos métodos utilizados (Berčík, Paluchová, & Neomániová, 2021; Boardman & McCormick, 2022; D'Ambrogio et al., 2023).

Essa falta de informações sistematizadas sobre o que se tem produzido academicamente e onde novos estudos podem se encaixar também é vista como barreira significativa para o avanço do conhecimento em torno desse tema (Bhardwaj et al., 2023). Nesse contexto, uma revisão sistemática de estudos sobre o referido tema contribui teoricamente para o fornecimento de novas perspectivas de pesquisa (Bhardwaj et al., 2023; González-Mena et al., 2022).

Frente ao exposto, este estudo de revisão sistemática parte da seguinte questão de pesquisa: Quais as abordagens identificadas em pesquisas que utilizam o método *eye-tracking* como identificador de reações fisiológicas em estudos sobre comportamento do consumidor? Dessa forma, o objetivo desta revisão sistemática é elucidar como o *eye-tracking* tem sido aplicado em estudos de *neuromarketing* sobre o comportamento do consumidor.

Para avançar no conhecimento existente, os resultados desta revisão sistemática apresentam possibilidades de uso do rastreamento ocular em pesquisa de *marketing*, incluindo a identificação dos principais periódicos que cobrem uma variedade de tópicos em *neuromarketing* e *eye-tracking*, os tipos e métodos de pesquisa, segmentos e temas abordados,

bem como *insights* para pesquisas futuras. Por conseguinte, como contribuição, esta revisão apresenta um conjunto amplo de referências sobre a aplicação do *eye-tracking* na previsão do comportamento do consumidor e como tal técnica vem possibilitando a medição de reações fisiológicas para estudar preferências e motivações que influenciam na tomada de decisão.

2 Metodologia

Este estudo foi orientado pelo protocolo *Preferred Reporting Items for Systematic Reviews and Meta-Analyses* (PRISMA), pois as recomendações do referido protocolo (*Checklist* com 27 itens) são amplamente adotadas em revisões sistemáticas, de modo que seu uso está associado a revisões sistemáticas mais completas e robustas (Page et al., 2021). Por este motivo, o PRISMA guiou a seleção e as análises por meio de critérios de inclusão e exclusão, em todas as etapas da revisão (Page et al., 2021). Ademais, esta proposta foi previamente cadastrada no *International prospective register of systematic reviews*, o PROSPERO (CRD42022315763) e, até o momento do registro, não havia outro protocolo semelhante, o que demonstra a originalidade e relevância deste estudo.

2.1 Escopo e critérios de seleção

A busca inicial e exportação dos artigos foi realizada no dia 20 de abril de 2023 em nove bases de pesquisa: *Web of Science*, *Science Direct*, *Scopus*, *Springer*, *Emerald*, *Wiley Online*, *Sage*, *Taylor & Francis* e *Google Acadêmico*. Alguns critérios de elegibilidade foram utilizados como filtros para a seleção dos artigos. Em síntese, os documentos incluídos nesta revisão atenderam aos seguintes requisitos: (a) escrito em inglês, espanhol ou português; (b) publicado nos últimos cinco anos (entre 2019 e 2023); (c) investigou uma intervenção de *neuromarketing* com o método *eye-tracking*; (d) consistiu em estudo empírico (e) apresentou métricas e/ou inferências sobre reações fisiológicas ligadas ao comportamento do consumidor e (f) se enquadra no campo de pesquisas em *marketing* e comportamento do consumidor.

Como consequência dos critérios de inclusão apresentados, foram excluídos os estudos teóricos, revisão sistemática e narrativa, resumos de conferências, livros e capítulos de livros, meta-análises, artigos editoriais e de opinião e afins ou fontes não acadêmicas.

2.2 Estratégia de Busca e Seleção

Para a identificação dos registros, buscou-se entender, com base em pesquisas sobre o tema na literatura, quais são as principais palavras-chave para buscar documentos sobre o tópico em questão. Ademais, validou-se as palavras, que incluiu a realização de uma busca piloto para testar a eficácia dos termos de busca em recuperar estudos relevantes. Assim, os termos de pesquisa definidos para serem combinados foram: “*Eye-Tracking*”, “*Eye-Tracker*”, “*Neuromarketing*”, “*Consumer behavior*”, “*Neuroscience*”, “*Marketing*”, “*Retail*”, “*E-commerce*”, “*Advertising*”.

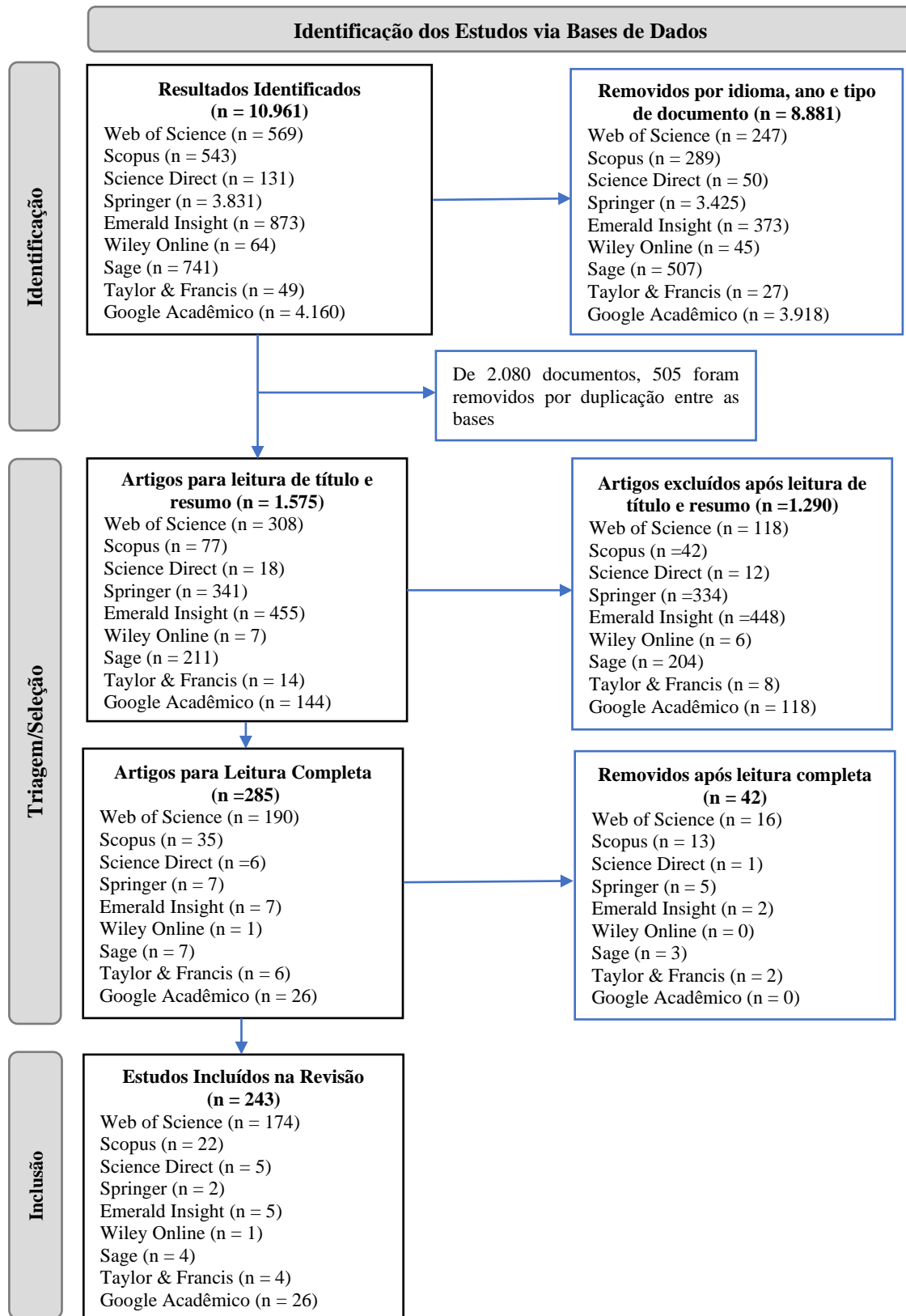
Quanto aos campos de busca nas bases, incluíram-se título, resumo e palavras-chave. Além disso, a *string* de busca com conectores correspondentes foi: ((*Neuromarketing AND Eye-Tracking OR Eye-Tracker*)) OR (*Consumer behavior AND Eye-Tracking OR Eye-Tracker*)) OR (*neuroscience AND marketing AND Eye-Tracking OR Eye-Tracker*)) OR (*retail AND Eye-Tracking OR Eye-Tracker*)) OR (*E-commerce AND Eye-Tracking OR Eye-Tracker*)) OR (*Advertising AND Eye-Tracking OR Eye-Tracker*)).

Um total de 10.961 registros foi identificado, sem eliminar os documentos duplicados e os que não são elegíveis pelos critérios determinados. Os documentos foram exportados no formato *BibTeX*. Todas as demais etapas da revisão sistemática foram conduzidas de forma compartilhada entre os revisores, por meio da ferramenta *Parsifal*, que contém campos para serem preenchidos pelos usuários, incluindo desde os detalhes da fase de planejamento até a extração e análise de dados, fornecendo suporte necessário para a execução do protocolo de revisão sistemática.

Para a seleção dos artigos foram realizadas avaliações independentes pelos revisores. A primeira triagem deste estudo consistiu na exclusão dos documentos que não atendiam aos critérios de elegibilidade (idioma, ano e tipo de documento), na qual foram removidos 8.881 registros e, na sequência, 505 artigos foram removidos por duplicação entre as bases. Assim, 1.575 artigos foram elegíveis para leitura dos títulos e resumos. A Figura 1 apresenta, os resultados das buscas e seleção.

Figura 1

Diagrama de Fluxo PRISMA dos Resultados da Pesquisa



Fonte: Elaborado pelos autores (2023).

Durante a leitura de títulos e resumos, 1.290 artigos foram removidos por não se enquadrarem no tema, ou seja, embora abordassem *eye-tracking*, não eram estudos empíricos que, de fato, aplicaram essa técnica para estudar o comportamento do consumidor. Com isso, 285 artigos foram elegíveis para leitura de texto completo. De forma análoga ao que ocorreu na triagem por título e resumo, com a leitura detalhada de todas as seções dos artigos, foi possível eliminar 42 estudos. Os motivos para a exclusão durante a leitura do texto completo foram majoritariamente em razão da não adequação do assunto ao escopo da pesquisa, ou seja, não analisaram reações fisiológicas com o rastreamento ocular no contexto de *neuromarketing*. Isso resultou em 243 estudos selecionados para compor esta revisão sistemática.

3 Resultados

3.1 Análise descritiva dos resultados

No tocante à tendência de publicações por ano, entre 2019 e 2023, destaca-se: 40 artigos publicados em 2019; 45 publicados em 2020; 67 publicados em 2021; 68 publicados em 2022 e 23 publicados até abril de 2023. Esse resultado demonstra que houve um significativo aumento no número de estudos ao longo do tempo. Cabe destacar que, no ano de 2023, foram considerados os artigos publicados até a data de 20 de abril, o que pode justificar o menor número de publicações no referido ano. Assim, essa elevação no número de publicações a partir de 2020 pode ser consequência da popularidade da técnica de *eye-tracking* em estudos de *neuromarketing* e sua relevância para o entendimento do comportamento do consumidor.

Esses 243 artigos foram divulgados em 172 periódicos diferentes. Entretanto, cerca de 63% do total de revistas registrou menos de 3 publicações. Isso pode indicar que o tema é multidisciplinar, havendo uma tendência ao acolhimento pelos diversos tipos de periódicos. A Tabela 1 apresenta as principais revistas, que cobrem uma variedade de tópicos em *neuromarketing* e *eye-tracking*, e a respectiva quantidade de artigos publicados, bem como os autores.

Tabela 1

Principais Revistas Que Estão Publicando esse Tipo de Abordagem Empírica

Revista	Número de Publicações	Autor(es)
<i>Frontiers in Psychology</i>	12	Ausin-Azofra et al. (2021); Chen et al. (2022b); Juarez et al. (2020); Kim e Kim (2020); Kim e Lee (2021); Mañas-Viniegra et al. (2020b); Mengual-Recuerda et al. (2020); Ouyang e Jia (2022); Pawar et al. (2023); Wang, Tang e Tsai (2022a); Zito et al. (2021); Escandon-Barbosa e Rialp-Criado (2019)
<i>Food Quality and Preference</i>	9	Bialkova et al. (2020); Kleih e Sparke (2021); Kleih, Lehberger e Sparke (2022); Leon, Spers e de Lima (2020); Machín et al. (2019); Melendrez-Ruiz et al. (2022); Peng-Li et al. (2020a); Puerta et al. (2022); Songa et al. (2019)
<i>Journal of Business Research</i>	9	Bigne et al. (2021); Bogomolova et al. (2020); Giray et al. (2022); Krefeld-Schwab e Rosner (2020); Laski et al. (2020); Sheng et al. (2020); Vriens, Vidden e Schomaker (2020); Yang et al. (2022a); Zuschke (2020)
<i>Appetite</i>	8	Castro et al. (2021); Machín et al. (2020); Peng et al. (2021); Peng-Li et al. (2021); Peschel, Orquin e Loose (2019); Robertson e Lunn (2020); Steinhauser, Janssen e Hamm (2019b); Tanner, McCarthy e O'Reilly (2019)
<i>Journal of Retailing and Consumer Services</i>	7	Espigares-Jurado et al. (2020); Gidlöf et al. (2021); Huddleston, Coveyou e Behe (2023); Ladeira et al. (2021); Ladeira et al. (2022); Ladeira et al. (2023); Yu et al. (2022)
<i>Psychology & Marketing</i>	7	Badenes-Rocha et al. (2022a); D'Ambrogio et al. (2023); Londoño e Ruiz de Maya (2022); Meng et al. (2022); Pozharliev, Rossi e De Angelis (2022); Savelli et al. (2022); Ye et al. (2020)
<i>Sustainability</i>	7	Aguiló-Lemoine et al. (2020); Chen et al. (2022a); Chiang et al. (2022); Maccioni, Borgianni e Basso (2019); Mañas-Viniegra et al. (2019); Proi et al. (2023); Pelau et al. (2022)
<i>Behaviour & Information Technology</i>	5	Boardman, McCormick e Henninger (2022); Deng e Gu (2021); Hsieh et al. (2021); Hwang e Lee (2022); Krajina (2022)
<i>Foods</i>	4	Berčík, Paluchová e Neomániová (2021); Mehlhose, Schmitt e Risius (2021); Peng-Li et al. (2020b); Thomas et al. (2022)
<i>Nutrients</i>	4	Bossuyt et al. (2021); Mansfield et al. (2020); Rantala et al. (2022); Steinhauser, Janssen e Hamm (2019a)
<i>Physiology & behavior</i>	4	Dos Santos et al. (2019b); García-Madariaga et al. (2019); Muñoz-Leiva et al. (2019); Sargezeh et al. (2019)
<i>Electronic Commerce Research</i>	3	De Keyzer, Dens e De Pelsmacker (2021); Jin et al. (2021); Zahmati et al. (2023)
<i>Food Research International</i>	3	Ballco, de-Magistris e Caputo (2019); Siegrist et al. (2019); Tórtora, Machín e Ares (2019)
<i>Applied Science</i>	3	David et al. (2021); González-Mena et al. (2022); Schröter et al. (2021)
<i>Behavioral Sciences</i>	3	Levrini e Jeffman dos Santos (2021); Rúa-Hidalgo et al. (2021); Wei, Khachatryan e Rihn (2019)
Outros periódicos	155	*
Total	243	

* Nota: devido a quantidade de referências, optou-se por destacar na tabela apenas os autores dos 15 principais periódicos, que cobrem um grande número de artigos desta revisão sistemática e publicam sobre o tópico com mais frequência. Cada um dos “Outros periódicos” apresentaram menos de três publicações.

Fonte: elaborado pelos autores (2023).

O rastreamento ocular apresenta potencial de aplicação em estudos nos mais diversos segmentos de mercado, de modo que os profissionais de *marketing* podem utilizar essa técnica

para estudar o comportamento do consumidor em diferentes tipos de negócios. A Tabela 2 apresenta a distribuição de frequência dos segmentos de mercado avaliados nos artigos.

Tabela 2

Distribuição de Frequência dos Segmentos de Mercado Pesquisados

Principais Segmentos Abordados	Número de Artigos	%
E-commerce, digitalização, jogos <i>on-line</i> e redes sociais	77	31,69%
Varejo (mercado, brinquedos, embalagens, anúncios físicos)	48	19,75%
Alimentos Saudáveis	21	8,64%
Bebidas alcoólicas	13	5,35%
Turismo	11	4,53%
Esportes	10	4,12%
Vestuário e acessórios	7	2,88%
Beleza e Cuidados pessoais	6	2,47%
Finanças, carreira e empregos	5	2,06%
Outros segmentos	45	18,52%
Total	243	100%

Fonte: Elaborado pelos autores (2023).

Os artigos associados à categoria “Outros segmentos”, incluem como objeto: produtos eletrônicos (Aslan & Özbeyaz, 2022), relacionamento com cliente (Badenes-Rocha et al., 2022b), plantas (Behe et al., 2020, 2022; Huddleston, Coveyou, & Behe, 2023), saúde/anúncios de advertência (Hamelin et al., 2021; Kidanu et al., 2022; Liu et al., 2021; Pham et al., 2022; Wang, Tang, & Tsai, 2022a), produtos ecológicos e Sustentabilidade (Gidlöf et al., 2021; Gómez-Carmona et al., 2021; Lamberz et al., 2020; Londoño & Ruiz de Maya, 2022; Luan et al., 2023; Maccioni, Borgianni, & Basso, 2019; Mansor & Isa, 2022; Proi et al., 2023), mídia televisiva (Segijn, Voorveld, & Vakeel, 2021), produtos automotivos (Luo et al., 2022), bebidas sem álcool (Neuhofer et al., 2020; Salarifar et al., 2020), entre outras abordagens.

O setor digital, envolvendo o comércio eletrônico, reuniu o maior número de pesquisas na literatura consultada, reforçando a potencialidade de técnicas de *eye-tracking* para analisar a atenção dos consumidores em publicidade *online*, páginas *web* e redes sociais (Bigne et al., 2021; Jiang, 2019; Küçün & Güler, 2021; Mañas-Viniegra et al., 2019; Muñoz-Leiva et al., 2019; Monica et al., 2019; Peker et al., 2021; Rúa-Hidalgo et al., 2021), percepção dos usuários em jogos *online* (Cuesta-Cambra et al., 2019), bem como a influência de celebridades como porta-voz da publicidade (D'Ambrogio et al., 2023; Pelau et al., 2022; Wang et al., 2020; Zahmati et al., 2023).

Adicionalmente, o setor de varejo destaca-se com o segundo maior número de abordagens, utilizando o rastreamento ocular para uma diversidade de análises, tais como: a percepção dos indivíduos acerca de uma nova marca (Aslan & Özbeyaz, 2022; Hamelin et al., 2021), efeitos de diversos tipos de anúncios entre consumidores de diferentes gêneros (Hamelin et al., 2022; Luo et al., 2022; Yarosh, Kalkova, & Reutov, 2021), atenção dada a logotipos, marca, textos, cores dos produtos e embalagens (García-Madariaga et al., 2019; Juarez et al., 2020; Ploom et al., 2020; Russo et al., 2021), elementos visuais de *merchandising* e ambientes físicos de varejo (Kim & Lee, 2021; Mengual-Recuerda et al., 2020), mídia impressa (Şik & Soba, 2021; Zito et al., 2021), entre outras aplicações.

Em síntese, alguns segmentos mostrados na Tabela 2 estão recebendo atenção dos pesquisadores (alimentos saudáveis, bebidas alcoólicas, turismo, esportes, vestuário e acessórios, beleza e cuidados pessoais, finanças, carreira e empregos). Apesar de serem menos explorados, esses segmentos estão se tornando setores emergentes em relação aos predominantemente analisados em pesquisas de rastreamento ocular. Para Abell e Biswas (2023) e Giray et al. (2022), a compilação e sumarização de evidências sobre atenção visual e demais métricas nesses novos segmentos em ascensão torna-se relevante, uma vez que o comportamento tradicional do consumidor está mudando e desafiando os profissionais de *marketing*.

Estudos recentes como os de Barbierato et al. (2023), Damião de Paula et al. (2023), Diouf et al. (2023), Escandon-Barbosa e Rialp-Criado (2019), Gómez-Carmona et al. (2021), Liu et al. (2022), Merdian et al. (2021) e Serrano et al. (2022) destacam evidências científicas sobre a atenção visual de consumidores de bebidas alcólicas. Pesquisas nesse campo são voltadas, sobretudo, para anúncios de bebidas (Ausin-Azofra et al., 2021; Damião de Paula et al., 2023; Diouf et al., 2023; Oliveira & Giraldi, 2019), atenção despendida em rótulos de marcas de vinhos, variedade e ano de safra (Němcová & Berčík, 2019) e *design* de embalagens/garrafas/latas (Barbierato et al., 2023; Escandon-Barbosa & Rialp-Criado, 2019; Merdian et al., 2021).

Ceravolo et al. (2019) e Mañas-Viniegra et al. (2020b) utilizaram o *eye-tracking* para analisar se os consumidores são sensíveis aos estímulos de documentos de divulgação financeira, argumentando que a forma como a informação é distribuída pode torná-la mais atrativa. Mičík e Kunešová (2021) exploram sites de carreira e empregos. Assim, esses autores utilizam o rastreamento ocular com o objetivo de otimizar tais ambientes virtuais para indivíduos da geração Y, demonstrando a diferença intergeracional dos padrões de atenção

visual. Além disso, a tomada de decisão de compra, por parte de profissionais da medicina, foi analisada por Olarte (2021), que destacou o gênero e área de interesse como principais variáveis explicativas. Adicionalmente, Lourenção et al. (2020) utilizaram anúncios turísticos brasileiros e verificaram influência do logotipo e *slogan* do país de destino na atenção visual dos turistas.

Não obstante às diferenças em cada segmento estudado, entender como funciona o comportamento visual do consumidor no momento da decisão de compra pode dar suporte aos neurocientistas e empresários na criação e/ou otimização dos produtos e serviços, de acordo com as variáveis que influenciam no interesse do grupo-alvo.

No tocante aos métodos utilizados nos artigos selecionados, a Tabela 3 apresenta os resultados identificados.

Tabela 3

Categorias de Estudos Identificados

Tipo de Estudo	Número de Artigos	Percentual
Exploratório descritivo (quantitativo)	145	59,67%
Exploratório descritivo (misto)	75	30,86%
Quase Experimental (não randomizado)	11	4,53%
Exploratório descritivo (qualitativo)	9	3,70%
Experimental	3	1,23%
Total	243	100%

Fonte: Elaborado pelos autores (2023).

Esses resultados indicam que há um amplo campo a ser explorado no que diz respeito aos estudos qualitativos, quase Experimental e experimentais. Estes últimos podem realizar análises robustas com grupos de tratamento (expostos à determinada intervenção) e controle (não expostos à intervenção). Desta forma, as evidências poderiam ser ampliadas, comparando grupos específicos, bem como pesquisas de *marketing* com e sem determinadas técnicas de *neuromarketing*, sobretudo com ênfase no rastreamento ocular, objeto desta revisão.

Os principais resultados dos estudos analisados estão sintetizados no tópico a seguir, que é acompanhado pela análise de temas emergentes.

3.2 Aplicações do Eye-Tracking e potenciais resultados dos estudos analisados

Dentre os 243 documentos analisados, identificou-se que as aplicações do rastreamento ocular, em estudos de comportamento do consumidor, incluem predominantemente quatro temas: (I) Decisão de compra, (II) Previsão, (III) Publicidade e (IV) Retenção do consumidor. Bhardwaj et al. (2023) também identificaram alguns desses temas quando analisaram estudos

sobre *neuromarketing*. Dentro dos quatro temas, alguns tópicos são abordados com mais frequência. A Tabela 4 sintetiza tal análise.

Tabela 4

Predominância da Aplicação da Técnica Eye-Tracking em Neuromarketing

Tema/Aplicação	Tópicos Abordados	Quantidade de Artigos
Decisão de Compra	Decisão baseada em dados	88
Previsão	Previsão comportamental	79
Publicidade	Efeito da Publicidade (anúncios, comentários, endossantes e afins)	52
	Técnicas de <i>Neuromarketing</i>	7
Retenção do Consumidor	Experiência e Percepção do consumidor	12
Outros	Relacionamento com o cliente	5
Total		243

Fonte: Elaborado pelos autores (2023).

No geral, as aplicações de *eye-tracking* na literatura se voltam, sobretudo, para a análise da Decisão de Compra, que é um tema que envolve estudos sobre quais dados e informações visuais baseiam as decisões dos consumidores. Na sequência, destaca-se o tema de Previsão, que agrupa documentos sobre previsão comportamental, propondo uma metodologia para prever comportamentos de potenciais clientes.

Outros temas identificados foram: Publicidade, subdividido em dois tópicos: (I) Efeito da Publicidade, analisando variáveis que influenciam nas reações do indivíduo, dado determinado estímulo publicitário; bem como (II) Técnicas de *Neuromarketing*, que abordam a utilização desses estímulos para estudar as técnicas de *neuromarketing* e incorporar melhorias; Retenção de consumidor, considerando a relação entre a experiência/percepção, fidelização e atributos dos produtos. Ademais, estudos já utilizam a técnica para verificar, especificamente, o pós-compra, investigando o efeito de fóruns de avaliação e comentários *online*, bem como relacionamento com o cliente.

Com relação à publicidade, alguns dos estudos que utilizaram rastreamento ocular conseguiram identificar que o efeito é mais significativo quando a marca é forte (Flores et al., 2022; Mandolfo, Di Dalmazi, & Lamberti, 2022; Oliveira & Giraldo, 2019); o logotipo, tamanho, objetos e aspectos gráficos são posicionados de maneira central, evitando segundo plano (García-Madariaga et al., 2019; Jiang, 2019), e o *slogan* deve ser claro, induzindo a comunicação (Lourenção et al., 2020; Şik & Soba, 2021).

Alguns pesquisadores constataram a eficácia dos anúncios nas redes sociais para aumentar a atenção visual do grupo-alvo (Muñoz-Leiva et al., 2019), sobretudo quando os(as)

modelos (personalidades escolhidas para a publicidade) conseguem gerar engajamento no público e/ou celebridades são utilizadas como porta-voz da marca (Abell & Biswas, 2023; Wang et al., 2020; Zahmati et al., 2023). Ademais, os efeitos da publicidade, em diferentes meios, podem sofrer influência do gênero do indivíduo (Hamelin et al., 2022; Toh, Leng, & Phua, 2023; Zahmati et al., 2023).

Kim e Kim (2020) e Peng-Li et al. (2021) estudaram estímulos multissensoriais e sugerem que os impulsos publicitários são mais expressivos quando a técnica de *eye-tracking* é combinada com trilhas sonoras (música ambiente) que transmitem mensagens sobre o produto/serviço a ser vendido. Tal resultado permite refletir sobre a utilização de técnicas combinadas e deixa espaço para que pesquisadores testem outros sentidos (tato, olfato etc.), associando-os ao visual, de modo a aperfeiçoar as pesquisas.

Com relação aos principais preditores do comportamento do consumidor identificados nos estudos, destacam-se os fatores étnicos, culturais (Ploom et al., 2020), intergeracionais (Mičík & Kunešová, 2021), diferenças de gênero (Hamelin et al., 2022; Luo et al., 2022; Sargezeh, et al., 2019; Yarosh, Kalkova, & Reutov, 2021), fidelidade e familiaridade com a marca (Garczarek-Bąk et al., 2021; Kim & Lee, 2021; Peker et al., 2021) e autoestima (Aguero et al., 2019).

De acordo com Isa e Mansor (2020), a resposta dos consumidores tem relação com os quatro componentes do mix de marketing (preço, praça, promoção, produto), bem como com a territorialidade (origem regional de produtos) (Russo et al., 2021) e integração com mídias digitais (Mañas-Viniegra et al., 2020a). Outro preditor destacado na literatura é a variável número de filhos. Os estudos de Küçün e Güler (2021) e Zito et al. (2021) identificaram que há diferenças nos padrões de comportamento visual entre pais e indivíduos sem filhos.

As decisões de compra podem ser baseadas em dados, ou seja, no ato da escolha os participantes dos estudos prestam mais atenção nas informações verbais (Sielicka-Różyńska et al., 2021), e informações gráficas recebem mais atenção que texto em outros casos (Pawar et al., 2023; Wu & Li, 2021; Zhang et al., 2023). Outros fatores importantes são o *design* do rótulo e ano de safra (no caso de vinhos) (Němcová & Berčík, 2019), *layout* das informações (Ceravolo et al., 2019), aparência e engajamento dos influenciadores representantes do produto (Abell & Biswas, 2023; Mañas-Viniegra et al., 2019; Wang et al., 2020; Zahmati et al., 2023), indicadores de valor e qualidade da marca (Levrini & Jeffman dos Santos, 2021; Mañas-Viniegra et al., 2020b) e usabilidade do produto (Monica et al., 2019).

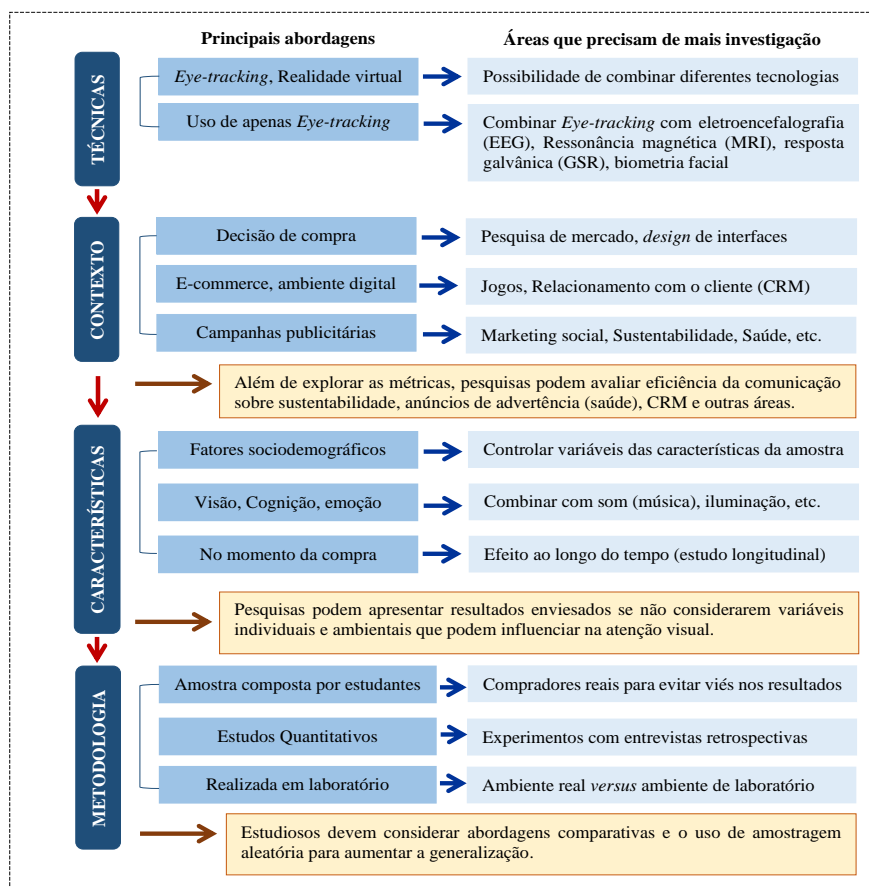
Em casos de eventos esportivos, Aguiló-Lemoine et al. (2020), Boronczyk, Rumpf e Breuer (2022), Dos Santos et al. (2019a), Giakoni et al. (2022), Henderson, Mazodier e Sundar (2019), Herrera, Segado e Manzanares (2021), Oboudi et al. (2023) e Toh, Leng e Phua (2023) destacam que a tomada de decisão está diretamente relacionada com as informações de quem patrocina o evento. Por conseguinte, com base na síntese desses resultados, o tópico a seguir apresenta sugestões para que pesquisadores possam explorar a potencialidade do rastreamento ocular em pesquisas futuras sobre *neuromarketing*.

3.2.1 Eye-Tracking e Neuromarketing: Direções Futuras

A partir do contexto teórico apresentado, identificou-se áreas que precisam de mais investigação, conforme ilustra a Figura 2. Com base nesse modelo, chegou-se às direções para pesquisas futuras.

Figura 2

Direções para Pesquisas Futuras com Base nos Estudos Analisados



Fonte: Elaborado pelos autores (2023).

Alguns pesquisadores exploraram a realidade virtual para estudos com rastreamento ocular no contexto do *neuromarketing*, demonstrando a possibilidade de combinar diferentes tecnologias. Liu et al. (2023) e Siegrist et al. (2019) destacam que pesquisas futuras podem ampliar esse tipo de análise, com mais rigor, dadas as diferenças entre realidade virtual e o ambiente real. Assim, sugere-se que seja abordada a relevância dessas diferenças e quais são as potencialidades e limitações para o uso da realidade virtual, Inteligência Artificial e outras tecnologias em pesquisas que examinam as decisões de compra.

Há menor predominância de estudos que realizam a integração do rastreamento ocular com outras técnicas disponíveis (Aslan & Özbeyaz, 2022; Chiang et al., 2022; Kislov et al., 2022). Como direções futuras, deve-se considerar que movimentos oculares são uma consequência de outros sentidos e processos cognitivos, que ocorrem nas mentes dos consumidores. Então, o uso combinado de *eye-tracking* com dispositivos de eletroencefalografia (EEG), que monitoram a atividade cerebral, acrescentaria informações às abordagens empíricas (Barbierato et al., 2023). Ademais, técnicas de ressonância magnética (MRI), resposta galvânica (GSR), biometria facial, entre outras, também podem ser utilizadas. Essa integração pode fornecer novas evidências para a compreensão do comportamento do consumidor durante o processo de tomada de decisão.

No tocante ao contexto/segmento de aplicação, destaca-se que a maioria dos estudos foi realizada no contexto do comércio eletrônico. Os resultados apontam para a tendência de analisar o comportamento do consumidor em interfaces *online*, porém, muitos desses *sites* são planejados e criados especificamente para fins da pesquisa. Assim, conforme sugere Babaç e Yüncü (2022), diferentes resultados podem ser alcançados usando *sites* existentes, sendo essa uma avenida para novos trabalhos. Além disso, torna-se relevante ampliar o conhecimento acerca de temas emergentes menos estudados, tais como, o efeito de classificações em fóruns de avaliação (Guan & Lam, 2019), relacionamento com o cliente (Badenes-Rocha et al., 2022a), anúncios voltados para sustentabilidade (Gómez-Carmona et al., 2021; Luan et al., 2023; Maccioni, Borgianni, & Basso, 2019; Proi et al., 2023) e efeitos de publicidade com advertência em saúde, como em rótulos de cigarro, bebidas ou medicamentos (Liu et al., 2021; Pham et al., 2022).

É importante que os pesquisadores que utilizam modelos quantitativos controlem variáveis que podem influenciar nos resultados, tais como gênero, idade, nacionalidade, perfil socioeconômico, traços de personalidade e afins. Pesquisas futuras poderiam investigar se existem diferenças entre homens e mulheres, ou entre faixas etárias, em atenção e

comportamento (Boardman & McCormick, 2022; D'Ambrogio et al., 2023; Espigares-Jurado et al., 2020). Outros sentidos também poderiam ser combinados com a visão, isso sugere novos estudos com estímulos multissensoriais, como por exemplo, o *eye-tracking* combinado com trilhas sonoras (música ambiente) (Kim & Kim, 2020; Peng-Li et al., 2021). Ademais, seria importante analisar a atenção ao longo do tempo e não apenas no momento da compra, o que poderia ser realizado com estudos longitudinais (Wang, Tang, & Tsai, 2022b).

No tocante à metodologia, alguns estudos destacaram como limitação o pequeno tamanho da amostra (D'Ambrogio et al., 2023; González-Mena et al., 2022; Hwang & Lee, 2022; Ibáñez et al., 2021). No entanto, conforme destacado em outros trabalhos, em um estudo de rastreamento ocular realizado em laboratório, torna-se difícil a análise com muitos participantes, ou seja, experimentos baseados em laboratório, raramente empregam um tamanho de amostra grande, dadas as dificuldades e complicações associadas aos projetos, especialmente ao capturar dados biométricos.

Sugere-se que estudiosos considerem abordagens comparativas entre experimento em laboratório e em ambiente de compra real, visto que mesmo sendo rigorosamente realizado, permanecem diferenças entre o experimento e a realidade no contexto da tomada de decisões de consumo (Zhang et al., 2023). O uso de amostragem aleatória para aumentar a generalização também é recomendado (Giray et al., 2022; Kim & Kim, 2020). Além dessas recomendações, destaca-se que metodologias declarativas, como entrevistas retrospectivas, são complementares, podendo fortalecer os resultados do rastreamento ocular. Sugere-se, portanto, esse tipo de combinação, devido a importância de ter uma estrutura que melhore a validade e confiabilidade dos estudos de *neuromarketing*.

Em síntese, este estudo evidencia que o rastreamento ocular e sua aplicação como ferramenta de pesquisa de *marketing* tem auxiliado pesquisadores, anunciantes e demais profissionais dessa área a identificarem o comportamento do consumidor e melhorarem a experiência dos clientes na visualização dos produtos e serviços, tornando a imagem de suas campanhas mais atrativa e próxima do interesse do consumidor/observador.

4 Considerações finais

Esta pesquisa analisou sistematicamente a literatura sobre as possibilidades de utilização do *eye-tracking* em estudos de *neuromarketing*. Assim, seguindo as diretrizes do protocolo PRISMA, foi possível selecionar 243 artigos, dos quais foram extraídos dados sobre os principais *designs* metodológicos de pesquisa, segmentos de mercado e temas de aplicação.

Este artigo oferece uma contribuição teórica ao apresentar um panorama atualizado dos estudos de *neuromarketing* com o uso do *eye-tracking*, fornecendo orientação para o desenvolvimento de pesquisas relacionadas. Além disso, realiza uma síntese dos trabalhos mencionados, identificando lacunas e avanços no conhecimento desse campo, e oferece diretrizes para futuras pesquisas que podem auxiliar os gestores na formulação de estratégias de *marketing*.

Não obstante ao processo rigoroso durante a revisão sistemática da literatura, é importante reconhecer algumas limitações. Foi dada atenção somente a artigos publicados em periódicos revisados por pares, o que significa que muitos estudos presentes em anais de conferências e repositórios de teses e dissertações não foram analisados, mas podem conter evidências relevantes para a discussão acadêmica proposta. Devido ao uso de termos de busca específicos, critérios de idioma e restrições quanto ao ano de publicação, é possível que alguns documentos pertinentes tenham sido excluídos da análise.

Destaca-se como avenida para estudos futuros a realização de novas revisões sistemáticas que repliquem este protocolo e possa extrair outros dados que complementem as análises. Adicionalmente, para abordagens empíricas, sugere-se a realização de experimentos controlados com *eye-tracking* para segmentos de mercado nos quais a economia comportamental e *neuromarketing* sejam oportunos para o processo de tomada de decisão do consumidor. Ademais, seria interessante realizar estudos que combinem diferentes técnicas de *neuromarketing*, a fim de analisar os padrões visuais dos consumidores considerando variáveis explicativas desses resultados, como fatores culturais, de gênero e intergeracionais, conforme já discutido em seções anteriores.

Contribuições de autoria

Contribuição	Pereira, M. H. N.	Melo, F.L.N.B.	Soares, A. M. J.	Ferreira, P. B. S.	Silva, M. P.	Morya, E.
Contextualização	X	X	X	X	X	X
Metodologia	X	X	X	X	X	---
Validação	X	X	X	X	X	X
Análise Formal	X	X	X	X	X	X
Investigação	X	X	X	X	X	---
Curadoria de Dados	X	X	X	---	---	---
Original	X	X	X	X	X	X
Revisão e Edição	X	X	X	---	---	X
Visualização	---	X	X	---	---	---
Supervisão	X	X	---	---	---	X
Administração do Projeto	X	X	---	---	---	--
Aquisição de Financiamento	---	---	---	---	---	---

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