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Eye Tracking Technique in the Diagnosis of Depressive Disorder: a systematic review

Técnicas do Rastramento Ocular no Diagnóstico do Transtorno Depressivo: uma revisão sistemática

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Abstract: This systematic review aimed to verify the empirical evidence of the application of the eye tracking technique in depressive disorder. The PubMed, PsyInfo and Web of Science databases were used, using the following descriptors: ((Depression OR "Affective Disorders") AND ("Eye Tracking" OR Eye-Tracking OR "Eye Movements" OR "Eye Tracker" OR "Eye Gaze")). According to the eligibility criteria, sixteen relevant studies were identified and its methods, results and their main limitations were verified. The results suggest an increase in latency and reaction time to detect complex stimuli, e.g. the recognition of emotional facial expressions. In addition, greater numbers of fixations in stimuli of negative emotional content were observed. The findings demonstrate that changes in eye movement measurements in depressive disorder are associated with an attentional bias mechanism. It is concluded that Eye Tracking is a useful tool for psychophysiological assessment of depressive disorder.
Keywords: depressive disorder; eye tracking; facial expressions of emotions.

Resumo: Esta revisão sistemática teve como objetivo verificar as evidências empíricas da aplicação da técnica de rastreamento ocular no transtorno depressivo. Foram utilizadas as bases de dados PubMed, PsyInfo e Web of Science, utilizando os seguintes descritores: ((Depression OR "Affective Disorders") AND ("Eye Tracking" OR Eye-Tracking OR "Eye Movements" OR "Eye Tracker" OR "Eye Gaze")). De acordo com os critérios de elegibilidade, foram identificados cinco estudos relevantes e verificados seus métodos, resultados e suas principais limitações. Os resultados sugerem um aumento na latência e no tempo de reação para detectar estímulos complexos, por ex. o reconhecimento de expressões faciais emocionais. Além disso, observou-se um maior número de fixações em estímulos de conteúdo emocional negativo. Os resultados demonstram que as alterações nas medidas dos movimentos oculares no transtorno depressivo estão associadas a um mecanismo de viés de atenção. Conclui-se que o rastreamento ocular é uma ferramenta útil para avaliação psicofisiológica do transtorno depressivo.

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Palavras-chave: transtorno depressivo; rastreamento ocular; expressões faciais emcionais.

Introduction

Depression is characterized by the loss of mental functioning and an impairement of depressed mood (APA, 2014; DSM-5). Its symptoms are classified into emotional, cognitive, motivational and physical components (Smarr & Keefer, 2020). It is noteworthy that the aggravation of the disorder may lead to suicide (WHO, 2020). Among the types of depression, the Major Depressive Disorder (MDD) is the most recurrent and common. Beck's cognitive model (1967) argues that information processing has negative biases in levels of interpretation and analysis of attentional processes (Park et al., 2019).

The function of inhibition, attention and other cognitive activities can be studied through psychophysiological paradigms (Park et al., 2019). Common simple eye tracking tasks used in the study of mental disorders include the antisaccade task, free vision task, fixation task and so on. The use of eye movement tools in investigating brain responses has become useful methods for describing eye movement patterns of depressive disorder (Suslow, Hublack, Kersting, & Bodenschatz, 2020). The advantage of this device is that it is easy to operate, in addition to being a non-intrusive, reliable and economical measure (Gomes et al., 2019). Tests with this tool are based on features that provide precision of stimulus presentation time, stimulus synchronization and data analysis (Santos, Neto, Sousa, Pessoa, & Nogueira, 2014).

Studies using eye tracking seek to investigate the functioning of mood, processing of attentional information and behavioral changes due to neurobiological disorders (Fang, Sanchez-Lopez & Koster, 2019; Hall, Stamatis, Shaw, & Timpano, 2019; Tao et al., 2020). Duque and Vázquez (2015) point out the use of the Eye Tracking technique associated with stimuli of facial expressions of emotions. They argue that depressive individuals have reduced responses in latency and attentional reaction time to positive stimuli and an increase in their amplitude for negative stimuli (Bodenschatz, Skopinceva, Rub, & Suslow, 2019). In addition, they present an anti-drying task performance that is described as a biomarker for depressive disorder (Li et al., 2020). However, there are still few researches that describes the parameters of eye movements in individuals with depressive disorder. Thus, this study aims to investigate the parameters for using the eye tracking technique in depressive disorder.

Method

Study design

It was a systematic review of the literature, which consists of describing the scientific findings of a specific topic or theme, in a theoretical and contextual perspective (Rother, 2007). The review followed the PRISMA protocol.

Data extraction

Data collection was carried out from July 2017 to May 2021 in the electronic databases of PubMed, PsycINFO and Web of Science. Articles related to eye tracking measures of individuals with depressive disorder were evaluated. The combination of the following keywords was used: ((Depression OR "Affective Disorders") AND ("Eye Tracking" OR Eye-Tracking OR "Eye Movements" OR "Eye Tracker" OR "Eye Gaze")). The chosen descriptors were controlled by MeSH. The references of the studies found were also revised to identify additional studies.

Eligibility criteria

The following inclusion criteria were used as eligibility: 1) articles dealing with depressive disorder and eye tracking; 2) clinical condition of major depressive disorder; 3) researches using Eye Tracking in monocular or binocular model; 4) researches carried out with adult and elderly humans; 5) articles that present available empirical data; 6) articles in english); 7) having been published between 2008 and 2021. Articles that presented comorbidity of depressive disorder with the following neuropsychiatric disorders were excluded: schizophrenia, bipolarity and mania.

Procedures

Initially, there was a pre-selection of keywords in article titles and its abstracts that would be used in the systematic review in order to discriminate more relevant words in the research area. The selected descriptors were controlled by MeSH. Using as filters: Population group: humans; Methodology: Empirical Studies; Publication Type: Periodical; Index Term: Eye Movements; Year: 2008 to 2021. The terms should be identified in the title or abstract of the articles.

Subsequently, the titles and abstracts of the articles were read, to exclude those that did not meet the eligibility criteria. After selection, the remaining articles were analyzed in full, and duplicates and those that did not correspond to the subject of interest were removed. After the first selection, the studies were evaluated using the PEDro quality scale by two independent researchers. The selection process was carried out independently by two examiners, and the disagreements were discussed by a third examiner. As a complementary selection strategy, the bibliographic references of the eligible articles were also consulted. The entire selection process resulted in 16 articles to be analyzed (See Figure 1 to access the flowchart for inclusion of articles).

Results

Figure 1 shows the flowchart of the selected articles for the systematic review. Based on the chosen descriptors, 2,261 articles were found, being 364 in PubMed, 1,652 in PsyInfo and 235 in Web of Science. After applying the eligibility criteria, 103 articles remained for full reading. Of these, 34 were duplicates, 29 dealt with another subject and 18 did not specify major depressive disorder. Six articles that presented comorbidity of depressive disorder with the following neuropsychiatric disorders were excluded:

schizophrenia, bipolarity and mania. At the end, 16 articles were selected for data analysis and interpretation.

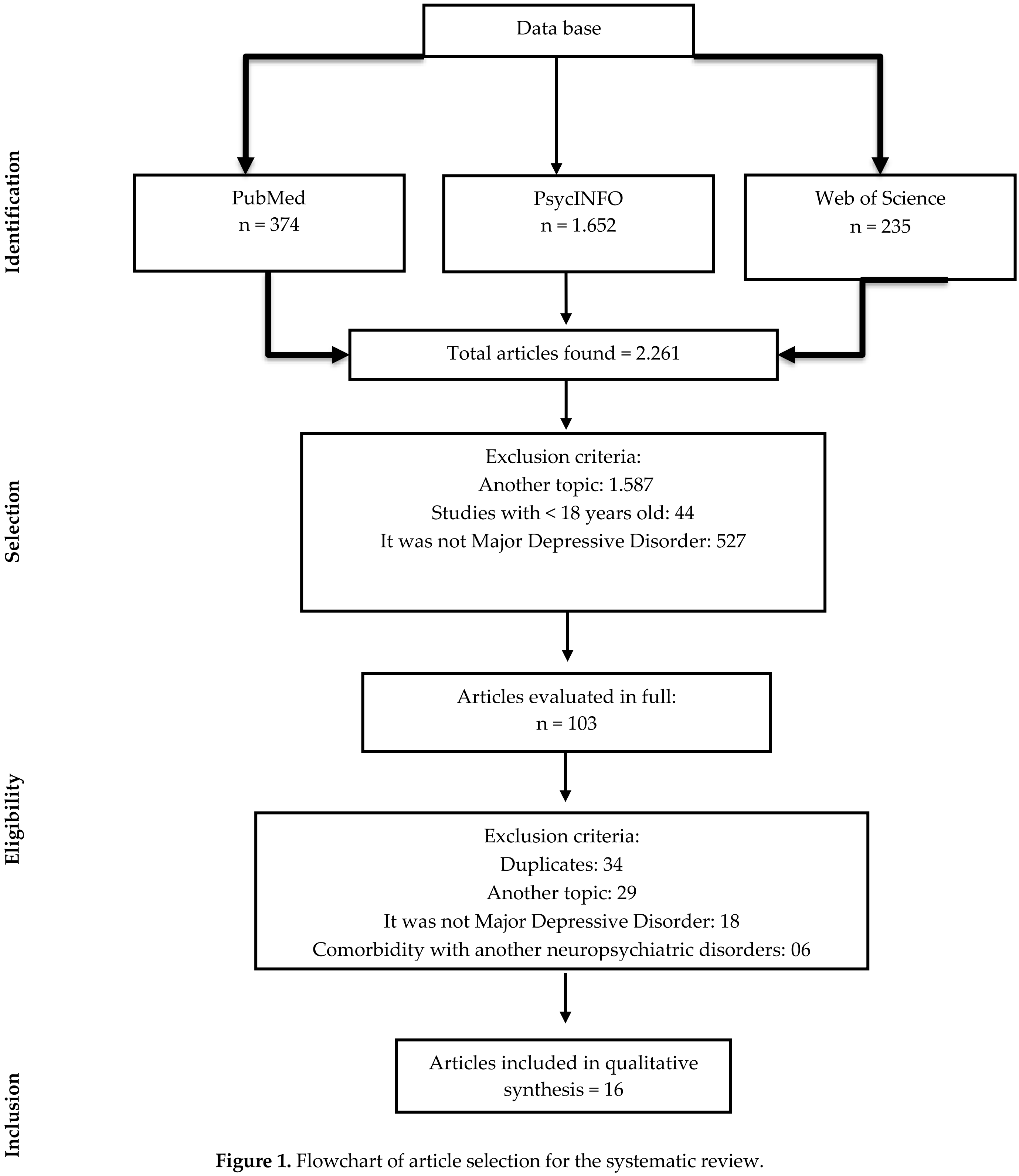

Figure 1. Flowchart of article selection for the systematic review.

The articles were extracted from the following journals: Psychiatry Research, Journal of Behavior Therapy and Experimental Psychiatry, Journal of International Medical Research, BMC Psychiatry, Journal of Abnormal Psychology and Frontiers in Psychology. Therefore, it is noted that there is a centralization of publications in journals foucused on psychiatry, denoting their constant interest in the study of depressive disorder and the damage it causes to affected individuals.

The selected studies were published in the English language, with their authors from the following universities: Complutense of Madrid, Beijing of China, University of Szeged and University of Miami. Another aspect observed was that although the publication time interval stipulated for the inclusion of studies was from 2008 to 2021, the selected articles were concentrated between 2013 and 2021, being two publications from this last year. Undoubtedly, even if the depressive disorder is extensively investigated, there are still few publications relating it to the application of the eye tracking tool.

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Table 1
Shows the articles that were selected for review.

References	Sample	Type of Depression	Study Type	Assignment Type	Eye Tracker	Spatial Vision Model	Stimulus	Stimulus Presentation	Eye Movement	Results
Bodenschatz et al. (2021)	SG = 38 GC = 38	MDD	C/E	Cognitive (Attention)	250Hz SMI iView X-RED	B	24 FE	5000ms	F	= TDF in groups and < F in distractor FE in the SG.
Carvalho et al. (2014)	SG = 47 GC = 20	MDD	C/E	Cognitive-motor	ASL EYE-TRAC 6 system	B	A prosaccade and antisaccade task	2s	S	> Reaction time and error rates in the SG.
Chen G et al. (2013)	SG = 19 GC = 19	MDD	C/E	Cognitive (Attention; MP)	250Hz SMI iView X-RED	B	128 pictures of ordinary non-animated objects.	500ms	F	> TDF and number in the SG.
Ding et al. (2019)	SG = 140 GC = 204	MDD	C/E	Cognitive (Attention)	Tobii Eye Tracker 4C 90Hz	B	20 trails (12 studies and 8 fillers)	10s	F	> Attention to the dysphoric stimulus in the SG.
Duque & Vázquez (2015)	SG = 16 GC = 34	MDD	C/E	Cognitive (Attention)	Tobii tx-120 60Hz	B	28 FE	3500ms	F	> DFF and TDF in sad FEs in the SG.
Foster et al. (2020)	SG1 = 37 SG2 = 30 GC = 48	sMDD/RDD	C/E	Cognitive (Attention)	Tobii T60XL 60Hz	B	16 FE	20s	F	< Sustained attention to happy FE in the RDD
Hoffmann et al. (2019)	SG = 40 GC = 40	MDD	C/E	Cognitive (Attention)	EyeLink 1000 system 1KHz	B	20 antisaccades and 20 prosaccades.	1000ms	S	> Error rate for antisaccades in the SG.
Hsu et al. (2019)	SG = 29 GC = 29	MDD	C/E	Cognitive (Attention; TM)	EyeLink 1000 system 1KHz	B	Boxes white or green (S1 and S2 stimuli).	50ms	S	> Premature saccades in the SG.
Kellough et al. (2008)	SG = 15 GC = 45	MDD	C/E	Cognitive (Attention)	R6 da Applied Science Laboratories 60Hz	B	12 images of the 4 categories	30s	F	> DF dysphoric images and < DF positive images in the SG.
Klawohn et al. (2020)	SG = 50 GC = 31	sMDD/RDD	C/E	Cognitive (Attention)	EyeLink 1000 system 1KHz	B	16 FE	6S	F	> DF in sad FEs in the SG.

Lanza et al. (2017)	SG = 15 GC1 = 17 GC2 = 20	MDD	C/E	Cognitive (Attention)	SMI BeGazeTM 2.2	B	12 slides with 4 emotions	10s	F	> DFF'sad' stimulus,'happy' and 'threat' in the SG.
Li et al. (2016)	SG = 27 GC = 27	RDD	C/E	Cognitive (Attention)	Tobii tx-120 120Hz	B	28 FE	10,000ms	F	*P* > 0.05.
Lu et al. (2017)	SG = 90 GC = 75	MDD	C/E	Cognitive (Attention)	Tobii T-120 120Hz	B	48FE	3s	F	< Positive attentional and > negative attentional in the SG.
Némth et al. (2016)	SG = 28 GC = 30	MDD	C/E	Cognitive (Attention; IM / EM)	iView X™ 500Hz Hi-Speed SMI	B	36 FE	3000ms (Images), 5000ms (FE) and 2000ms (VMR / VML)	F	< DF in happy FE and MR loss in the SG.
Sanchez et al. (2013)	SG = 16 GC = 19	MDD	C/E	Cognitive (Attention)	Tobii tx-120 60Hz	B	36 FE	3000ms	F	> DF and TDA in sad EF in the SG.
Wehebrink et al. (2018)	SG = 42 GC = 40	MDD	C/E	Cognitive (Attention)	EyeLink 1000 system 1KHz	B	54 faces (18 faces for each of the three conditions of pupils)	1500ms	P	SG < trusting with of whether partners' pupils were dilating or constricting.

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The sample size of the articles ranged from 15 (Kellough, Beevers, Ellis, & Wells, 2008) to 204 participants (Ding et al., 2019), being formed by adult individuals, with an average age between 23 and 85 years, with a predominance of females, where only in one study was the majority male (Chen, Zhou, Cui, & Chen, 2013). In addition, four study groups were composed of individuals diagnosed with MDD, according to the DSM-IV criteria, and two studies used the ICD-10 for diagnosis. Only the study by Li et al. (2016), presented depression and used another form of diagnosis, however none of the publications reported how long the participants presented the disorder. The Hamilton Depression Rating Scale was applied in four publications, the Beck Depression Inventory II Scale in ten publications, the Self-Rating Depression Scale in one publication, the Geriatric Depression Scale in one publication and the Montgomery-Asberg Depression Rating Scale in one publication, for the characterization of samples.

It should be noted that all articles made use of the Eye Tracker, all of which were binocular models, being 01 iView XTM Hi-Speed SMI 500Hz, 02 SMI iView X-RED 250Hz, and 05 Tobii tx-120 60Hz, 04 EyeLink 1000 system 1KHz, 01 SMI BeGazeTM 2.2, 01 R6 da Applied Science Laboratories 60Hz, 01 ASL EYE-TRAC 6 system. Nine articles used facial expressions of emotions as stimuli such as joy, sadness, anger and neutral facial expression, being that in the study by Chen et al. (2013), images of common inanimate objects and fruits were used. The types of studies applied to all selected articles were behavioral and electropsychophysiological.

Regarding the main results found in the selected articles and which were mentioned in Table 1, firstly, the studies that used facial expressions as a stimulus had a presentation variation of 10.000ms up to 20s. Regarding the amount of stimuli, there was a variation from 16 to 48 faces presented in the studies. Overall, the results of the studies showed that participants in the control groups had a greater tendency to look at happy faces than sad ones like anger and sadness. Regarding the fixation time, the study groups spent more time fixating on negative faces, and they also had more difficulty in diverting attention from them. Consequently, it is clear that depressed individuals have difficulty in detaching attention from sad faces, which is a predictor for the increase of sad mood in anticipation of stress (Bodenschatz et al., 2021; Duque & Vázquez, 2015; Foster et al., 2020; Li et al., 2016; Lu et al., 2017; Némth et al., 2016; Sanchez, Vazquez, LeMoult, & Joormann, 2013).

The study by Chen et al. (2013), a word was presented for 500ms, then four images of objects were shown where the participant had to relate to the name shown on the previous slide by pressing key 1 for objects or key 2 for fruits. Therefore, the type of cognitive task that was being investigated was of attentional level and prospective memory. The study group obtained a greater number of fixations. Likewise, the total duration of fixation was longer in this group in all conditions.

Carvalho et al. (2014) and Hoffmann, Ettinger, Montoro, Paso, and Duschek (2018), used prosaccade and antisaccade stimuli with a presentation time of 2s and 1000ms, respectively. The results generally showed that performance was impaired in depressed patients, who exhibited higher reaction time and error rates when compared to controls. Patients exhibited a higher error rate than controls for antisaccades (Hoffmann et al., 2019). The study by Hsu, Lee, Lane, and Missal (2019) demonstrated that patients have a greater number of anticipated saccades.

The investigation of attention bias in patients with major depressive disorder compared to healthy individuals was carried out through three studies using emotionally salient stimuli. Depressed individuals spent significantly more time seeing negative images and less time seeing positive images than their never-depressed counterparts (Ding et al., 2019; Kellough et al., 2008; Lanza, Muller, & Riepe, 2017).

Discussion

Depressive Disorder causes damage at the neurological level, in view of that, several changes in body functions occur in affected individuals (Kennedy & Ceniti, 2018). In view of the articles found, it is possible to note that there are still few studies related to this theme. This systematic review aimed to verify the empirical evidence of the use of the eye tracking technique in depressive disorder.

With regard to the objectives of the studies, it should be emphasized that all experiments sought to compare groups of depressed individuals with healthy controls. In addition, it was noticed that the articles investigated the relationship between depression and deficits related to attention, recognition of facial expressions of emotions, cognition and memory, behavioral characteristics, control of cerebral blood flow during screening tasks, new systems to aid diagnosis, once these losses are frequently associated and are present in this disorder.

Consequently, seven studies aimed to investigate the biases caused in attention due to depression: Bodenschatz et al. (2021), Foster et al. (2020), Klawohn et al. (2020), o de Lu et al. (2017), Li et al. (2016), Sanchez et al. (2013) and Kellough et al. (2009). Three experiments addressed the possible damage to the memory of depressed individuals, being those by Hsu et al. (2019), Chen et al. (2013) and Németh et al. (2016). While the study by Carvalho et al. (2014), they investigated the possible cognitive-motor impairments. The study by Duque and Vázquez (2015) investigated the processing of emotional information.

Lanza et al. (2017), also verified the regulation of mood in depressed elderly. The study by Hoffmann et al. (2018), sought to verify through brain recordings the proactive control in depressed individuals in antisaccade previously anticipated. The one by Ding et al. (2019), sought to create a new system to aid in the diagnosis of depressive symptoms. Finally, the one by Wehebrink, Koelkeck, Piest, Dreu, and Kret (2018), tried to verify if the pupil diameter in depressed people had slower movements.

However, eight of the sixteen studies analyzed used facial expressions of emotions as stimuli in the Eye Tracker, being only that of Chen et al. (2013) who used figures of common inanimate objects and fruits. The Ding et al. (2019), Hsu et al. (2019), Hoffmann et al. (2018) used neutral, positive, fearful and dysphoric images, as well as

Lanza et al. (2017), Carvalho et al. (2014) and Kellough et al. (2009). In Wehebrink et al. (2018), images of their spouses' eyes were presented.

In the study by Chen et al. (2013), the study group presented lower performance in the tasks of prospective memory, showing even less precision and demanding longer reaction time than the control group. However, this suggests that depressed subjects present impairment in prospective memory, when it refers to working memory, retrospective memory and executive functions, in line with previous research. In addition, eye tracking data showed that individuals with depression presented a higher number and duration of fixations compared to the control group in tasks of prospective memory. It therefore indicates that depressed participants demanded more cognitive effort and focused their attention on processing of screens (Chen et al., 2013).

In the experiment by Duque and Vázquez (2015), it was also confirmed the hypothesis that depressed individuals would pay more attention and keep their gaze more fixed on sad faces, with no differences between the groups regarding the initial direction of the look and the first latency of fixation. These results are supported by previous research that shows that people affected by depression present difficulty in withdrawing their attention from negative information when they are in focus (Duque & Vázquez, 2015; Vázquez et al., 2016).

The second hypothesis of positive information processing was partially confirmed, because although the MDD group spent less time visualizing happy faces. This effect presented only a secondary significance. And it can be explained due to the greater amount of negative stimuli, which may have made the happy faces more noticeable for both groups. Therefore, this is consistent with other eye tracking studies that found a robust bias for happy faces in healthy participants using similar attention rates (Sanchez et al., 2013).

The third hypothesis about the relationship between severe depressive symptoms and attentional bias, these were positively related only to the total fixation time and not to the duration of the first fixation in sad facial expressions. Although previous researches had considered the duration of the first fixation as an index of maintenance of attention, in this study the total fixation time was observed as being a more relevant index for sustained attention because of the insertion of processing between the experiments (Caseras, Garner, Bradley, & Mogg, 2007). However, in line with the findings of Oehlberg, Revelle and Mineka (2012), only the bias for stimuli linked to depression was related to the scores for depressive symptoms. This shows that this pathology has a specific relationship with the processing of information that is equivalent to its emotions, and not just with the processing of negative information in general. That is, the study by Duque and Vázquez (2015), pointed out that depressive individuals have a preference for interpersonal signals and stimuli, which are congruent with its mood.

From the hypotheses presented in the study by Li et al. (2016), the first was not confirmed. It discussed that individuals with depression, when compared to healthy controls, would not initially demonstrate a directional bias for facial expressions of emotions. The second hypothesis was partially confirmed, that individuals with depression remitted they would demonstrate their attentional bias at a later stage of maintaining attention, so this was in line with the results that pointed out that there was no significant effect regarding the gaze count.

Then, the third hypothesis was also partially confirmed. It discussed that in the late stage of sustained attention, the group with depression, even without having a bias for positive attention, would have a significant improvement. On the other hand, there would also be a facilitation of the negative attention bias. Previous eye-tracking studies have shown that depressed individuals are not more inclined to divert their attention to negative stimuli than the control group, but since their attention is focused on negative stimuli, they spend more time keeping an eye on those (Biard, Douglass, Robillard, & Koninck, 2015). Similar to the results of Duque and Vázquez (2015), the study by Li et al. (2016), suggests that the depressive disorder would be characterized by a lack of positive bias, so that the negative bias is congruent with what the depressive is feeling.

In the experiment by Némth et al. (2016), in which they sought to identify the effect of emotional facial expression and monetary reward or loss on associative memory, it was considered that a difference in the interaction of these effects in the group with depression and in the control group would indicate the alternative probability of neuronal processing of facial emotion and reward in the relational memory. The results showed that the duration of fixation in sad faces when it was related to the monetary reward, and there was still a significant decrease during the playing conditions in the group with depression. However, it was not expected that there would be priority in visualizing stimuli that were rewarded in advance and the decline in the fixation time in sad facial expressions.

Lastly, the study hypothesis Sanchez et al. (2013) was confirmed, so their results showed that when comparing the group with depression to the healthy group, the first kept their attention on the negative content. Considering that healthy participants showed a preference for positive stimuli, where they had more fixations and they lasted longer. It is noticed that in depressed people the bias for positive stimuli is absent, which has been already shown in previous studies that used eye tracking, highlighting both positive and negative that attentional processing are impaired by the depressive disorder (Biard et al., 2015).

On the other hand, in the study by Hsu et al. (2019), in which they sought to verify whether short-term memory suffered alterations in MDD, then the results showed that there was a reduction in it in depressed individuals, corroborating the hypothesis. In the studies by Foster et al. (2020), Kelloug et al. (2008), Klawohn et al. (2020), Lu et al. (2017) and Bodenshatz et al. (2021), in which all sought to verify, in general, the attentional biases in TDM. Highlighting the conclusions of Foster et al. (2020), in which depressed women paid more attention to negative emotions than those in the control group.

However, the study by Ding et al. (2019), they sought to develop new systems capable of assisting and supporting the diagnosis of individuals with MDD. In the study mentioned above, it was possible to corroborate the initial hypotheses, as it was found that high scores were reached to discriminate between individuals with MDD and healthy individuals, where it was possible to detect impairments during cognitive tasks in depressed individuals.

Finally, in Carvalho et al. (2014), which sought to assess cognitive and motor damage in elderly depressives, considering that there were losses in performance in terms of reaction time and higher error rates in depressive individuals. Therefore, the slower reaction time would be associated with general motor changes, which can be seen in more severe cases of depression, thus confirming the main hypothesis of the study. And finally, in the study by Hoffmann et al. (2018), in which cerebral blood circulation was observed during the responses emitted by depressed individuals, when performing tasks. In summary, the data pointed out that blood flow was lower, hence this may signal an early trigger of the prefrontal and dorsolateral inferior parietal cortices in MDD.

As observed, most of the hypotheses of the studies analyzed were confirmed. As for the difficulty that depressed individuals have in disconnecting attention from stimuli that are negative and related to depression, this was corroborated in the selected articles, once in the eye tracking tasks that were performed, it was noticed that depressed people fixed their attention for a longer period of time in the negative material, if compared to participants without this disorder. Therefore, this is in agreement with the literature, where it points to a deficit on the positive bias. Screening studies have shown that the gaze of depressed individuals takes longer to focus on negative stimuli (Sanchez et al., 2013).

In all selected articles, the authors verified only the fixation eye movements. This could be justified by the fact that abnormal fixation eye movements are a genetic marker for depressive disorder, whereas dysfunctional gaze movements would be a phenotypic characteristic of other disorders, such as schizophrenia (Smyrnis et al., 2007). In studies with groups of schizophrenic participants and another with mood disorders, eye gaze movements were analyzed. However, in the group of participants with affective disorders, no significant differences were found in terms of gaze in relation to the control group. In the group with schizophrenia, they demonstrated eye movements of abnormal deviant gaze (Borkowska & Rybakowska, 1997; Gottesmann & Gottesmann, 2007).

Therefore, through eye tracking it is possible to perceive when eye movements occur irregularly, and this may be an indicator that there is a pathology that may have caused some change in the brain. Also, it is important to observe that certain pathologies cause difficulties in maintaining fixation and can even interfere in the planning of the next eye movement, making it almost random (Saitoh et al., 2016).

Another issue to be raised is that in all studies the time in seconds of how much the depressed group participant would need to be considered as having an abnormal fixation eye movement in a given stimulus is not presented. Consequently, only time estimates were made, which in the articles ranged from 3 to 10 seconds, and this could be a question to be considered for possible future studies.

Considerations

Eye Tracking has proved to be an excellent and useful tool in the most varied types of studies, considering that it can be used in a range of research on marketing, linguistics, neurological disorders such as Alzheimer's disease, Parkinson's disease, multiple sclerosis, epilepsy, autism, schizophrenia, anxiety, among others (Caruana, Seymour, Brock, & Langdon, 2019; Mastergeorge, Kahathuduwa & Blume, 2020; Tao et al., 2020). This systematic review aimed to verify the empirical evidence of using the eye tracking technique for depressive disorder. Even with the small number of studies found, it does not mean that this topic is not relevant, it is therefore a suggestion for further studies to be carried out, as this is a vast area in possibilities due to the great relevance both at a cognitive and social level, especially when it refers to obtaining a better understanding of this disorder, and helping individuals who are affected.

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