VISUAL PROCESSING OF FACIAL EMOTIONAL EXPRESSIONS IN PEOPLE WITH ANXIETY. A NARRATIVE REVIEW.

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RESUMEN

Las personas con ansiedad manifiestan sesgos atencionales, que consisten en dirigir la atención visual, de forma preferente, hacia estímulos que pueden representar un peligro o amenaza potencial, en comparación con información neutra o no amenazante en el mismo contexto (Castillo Villar, 2003). Por tanto, las expresiones faciales emocionales negativas como la ira, el miedo o el asco pueden formar parte de esos estímulos que representan un peligro o amenaza potencial para las personas con ansiedad, permitiendo que el sesgo atencional se dirija o focalice en la expresión facial de esas emociones. El objetivo es conocer el estado actual de la investigación sobre el procesamiento de la expresión facial emocional en la ansiedad, a partir de la revisión de la literatura científica publicada recientemente. Se consultaron las bases de datos Web of Science (WOS), PsycNet y PsycInfo, en el periodo (2018-2022). Se siguieron los criterios de PRISMA para la selección de los artículos científicos (N=5). Algunos autores han propuesto que el sistema atencional de los individuos ansiosos es anormalmente sensible a los estímulos relacionados con amenazas y que estos individuos tienden a dirigir su atención hacia la información amenazante (Bar-Haim et al., 2007). Concluimos que la ansiedad modula el procesamiento visual de las expresiones faciales emocionales. En particular, las personas con ansiedad elevada (AE) presentan fijaciones en la región de la boca para las emociones de tristeza y alegría mientras que las personas que realizan estrategias de fijación para emociones de ira y neutras presentan puntuaciones bajas en ansiedad (AB). Las personas con ansiedad social elevada (ASE) muestran patrones de fijación en la región de los ojos para las emociones de ira y neutrales, y estas fijaciones se reducen para las emociones de alegría, miedo y tristeza. Por último, concluimos que AE, AB y ASE muestran una atención selectiva rápida a los estímulos relacionados con amenazas, siendo el sesgo más fuerte en AE.

Palabras clave: Ansiedad, expresión facial emocional, tarea atencional, procesamiento visual.

ABSTRACT

People with anxiety manifest attentional biases, which consist of directing visual attention preferentially towards stimuli that may represent a potential danger or threat, compared to neutral or non-threatening information in the same context (Castillo Villar, 2003). Therefore, negative emotional facial expressions such as anger, fear or disgust may be part of those stimuli that represent a potential danger or threat for people with anxiety, allowing the attentional bias to be directed or focused on the facial expression of those emotions. The aim is to learn about the current state of research on the processing of emotional facial expression in anxiety, based on a review of recently published scientific literature. Web of Science (WOS), PsycNet and PsycInfo databases were consulted, in the period (2018-2022). PRISMA criteria were followed for the selection of scientific articles (N=5). Some authors have proposed that the attentional system of anxious individuals is abnormally sensitive to threat-related stimuli and that these individuals tend to direct their attention to threatening information (Bar-Haim et al., 2007). We conclude that anxiety modulates the visual processing of emotional facial expressions. In particular, people with elevated anxiety (AE) present fixations in the mouth region for sad and happy emotions while people who perform fixation strategies for angry and neutral emotions present low anxiety scores (AB). People with elevated social anxiety (ASE) show fixation patterns in the eye region for anger and neutral emotions, and these fixations are reduced for joy, fear and sadness emotions. Finally, we conclude that AE, AB and ASE show rapid selective attention to threat-related stimuli, with the bias being stronger in AE.
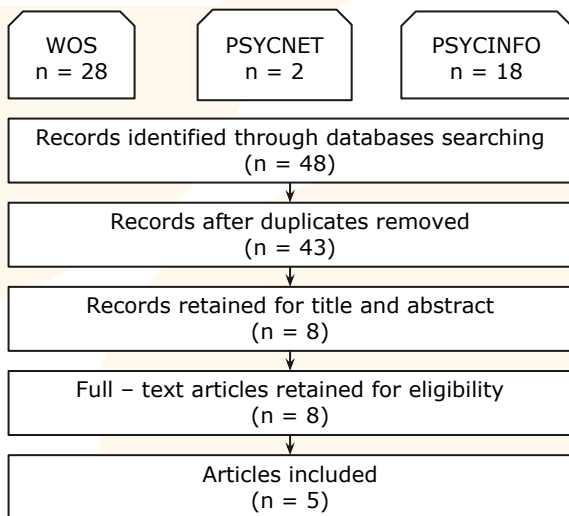
Keywords: Anxiety, emotional face expression, attention task, visual processing.

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UNIVERSITAT JAUME I

INTRODUCTION

People with anxiety manifest attentional biases, which consists of directing attention preferentially towards stimuli that may represent a potential danger or threat, compared to neutral or non-threatening information in the same context (Castillo Villar, 2003). Therefore, negative emotional facial expressions such as anger, fear or disgust may be part of those stimuli that may represent a potential danger or threat for people with anxiety, allowing the attentional bias to focus on faces presenting those emotions. We can say that there are at least six universal emotions (anger, fear, disgust, happiness, sadness, surprise) that are primarily expressed in the face (Ekman, 1993; Matsumoto, 2021). Face is the primary channel through which emotions are expressed (Kim & Son, 2015). Most of the information coming from the study of emotion recognition comes from the investigation of facial expressions (Rueda Extremera, 2017). The **aim** of this study is to know the current state of research on the processing of emotional facial expression in anxiety from the review of recently published scientific literature.

METHOD

Databases: WOS, PsycNet and PsycInfo.

Search Terms: Anxiety AND emotional face expression AND attention task AND visual processing.

Period: 2018-2022

Population: Adulthood.

RESULTS

AUTHOR	OBJECTIVE	PARTICIPANTS	INSTRUMENTS	STIMULI AND VISUAL ATTENTION TASKS	THEORETICAL APPROACHES	CONCLUSIONS
Rutter et al. (2021)	To investigate eye movement patterns in the processing of emotional stimuli in anxiety disorders.	N = 47 (22 depression and 25 anxiety, M= 7.21; SD = 9.73).	- ADIS-V (Brown, 2014). - BDI-II (Beck et al., 1996). - BAI (Beck et al., 1988). - SIAS (Mattick & Clarke, 1998). - MATLAB Software. - Eye-Trac 6 Applied Science Laboratories. - RStudio.	- Emotion recognition task ("facial morphing"). - Faces: Ekman database (Ekman & Friesen, 1976). The faces showed angry, happy, fear, and sad expressions.	Negativity bias.	- HA increased fixations in the mouth region of sad and happy faces. - For fearful and angry faces there were no significant eye movement fixations. - HSA reduced fixations in the eye region of happy and sad faces.
Chan et al. (2020)	Analyzing eye movement patterns in visual processing of emotions in social anxiety.	N = 60 (HA & LA) (32♀, 28♂ M = 19.42; SD = 1.58).	- LSAS (Liebowitz, 1987). - DASS-21 (Lovibond & Lovibond, 1995). - Hidden Markov Models (EMHMM). - EyeLink 1000 (SR Research). - MATLAB Software.	Free-viewing task (32 images of front view Asian faces, 16 anger and 16 neutral faces) (Zhang et al., 2017).	Cognitive-behavioral model of social anxiety disorder (Heimberg et al. 2014).	- HSA eye-centered pattern (angry and neutral faces). - No significant differences were found in the scores of people who focused on the nose. - Switched strategies for each type of emotion had significantly lower anxiety scores but had no differences in the focus on the eyes for the angry emotion and on the nose for the neutral emotion and vice versa.
Wanyue et al. (2019)	Study of the effects of scenes on the processing of emotional facial expressions in people with anxiety.	N = 57 (29 HA (9♂, 20♀, M = 19.76; SD = 1.3), (28 LA (11 ♂, 17♀, M = 19.71; SD = 1.2)).	- STAI-T (Spielberger et al., 1983). - Morph Technology.	- Facial emotions detection task. - 4 face images: NimStim database (Tottenham et al., 2009), 4 images each for each facial expression. The faces were happy and fear. - IAPS (Lang et al., 2008).	Influence of context on perceptual analysis of faces (Righart & de Gelder, 2006).	- HA do not present significant scene effects. - LA present significant scene effects. For fearful and happy faces, in the incongruent condition they have higher detection accuracy.
Mardo et al. (2019)	Study of the effect of the arousal of a signal stimulus, modulated by the level of AT on the subsequent visual processing.	N = 151 (HA & LA) Exper. 1a -> N = 42 (M = 22.7; SD = 3.7). Exper. 1b -> N = 51 (M = 24.5; SD = 2.8). Exper. 2 -> N =58 (M = 24.5; SD = 3.8).	- STAI-T (Spielberg et al., 1983). - Morph Technology.	- Recognition task. - Stimulus discrimination task (car or faces preceded by negative or neutral images (Experiment 1a) and positive or neutral images (Experiment 1b)). - IAPS (Lang et al., 2008). - Face images: KDEF database (Lundqvist et al., 1998).	Arousal-Biased Competition (ABC) theory (Mather & Sutherland, 2011).	- LA discriminates faces worse than cars when preceded by negative images. HA discriminates them equally. - LA discriminates faces worse than cars when preceded by positive images. HA discriminates better faces than cars.
Berggren et al. (2020)	To investigate the influence of trait anxiety on attentional selection biases and on the representation of threatening information in visual working memory.	N = 39 ((20 HA, 1♂, 19 ♀ M = 27, SD = 6), (19 LA, 12♂, 7 ♀ M = 28, SD = 6)).	- STAI-T (Spielberg et al., 1983). - E-Prime 2.0 software.	- Face in the Crowd Task (Hansen & Hansen, 1988) adding a memory component. - 6 faces. NimStim database (Tottenham et al., 2009). - 2 faces. Ekman and Friesen's Series of Facial Affect (1976). The faces were neutral, happy or angry.	Anger superiority effect (Hansen & Hansen, 1988).	- LA and high HA show rapid attentional selection biases toward threat-related objects, this bias tended to be stronger in HA. - An analogous threat bias is also present during visual working memory retention, but only for HA.

Flow chart:

WOS n = 28 → PSYCNET n = 2 → PSYCINFO n = 18

Records identified through databases searching (n = 48)
↓
Records after duplicates removed (n = 43)
↓
Records retained for title and abstract (n = 8) → Records excluded (n = 35)
↓
Full – text articles retained for eligibility (n = 8) → Records excluded (n = 3) Not assessing the subject matter
↓
Articles included (n = 5)

Figure 1. Flow chart of study screening and selection process (PRISMA, 2009. 2021)

DISCUSSION AND CONCLUSION

The studies addressed aspects of visual processing, anxiety (both social and trait anxiety) and emotional facial expressions, demonstrating the existence of a relationship between them. We can conclude that anxiety modulates the visual processing of emotional facial expressions:
- HA presents greater fixations in the mouth region for both sad and happy emotions.
- LA presents switched strategies for the fixation for angry and neutral faces.
- HSA shows a fixation pattern in the eyes for angry emotions and neutral faces, while its fixations are reduced for happy, fearful and sad faces.
Several authors have suggested that the attentional system of anxious individuals may be distinctively sensitive to and biased in favor of threat-related stimuli (Bar-Haim et al., 2007). With these studies we can see that LA, HA and HSA show rapid selective attention to threat-related stimuli, this bias tends to be stronger in HA.

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