



Meta-mood knowledge moderates the relationship between neuroticism and depression but not between neuroticism and anxiety in a sample of nonclinical adolescents

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Abstract

Research shows a strong link between neuroticism and internalizing psychopathology, such as depression and anxiety. However, it is unclear to what extent meta-mood knowledge (i.e., attention to emotion and emotional clarity) plays a role as a moderator in this relationship. To investigate this, we collected data on meta-mood knowledge, personality traits, depression, and anxiety in a sample of adolescents ($N = 244$; 53.7% girls) aged 12 to 18 years ($M = 14.6$, $SD = 1.7$) from Catalonia, Spain. Regarding the relationship between neuroticism and depression, results showed that emotional clarity buffered this relationship. Although attention to emotion did not, the joint moderating effect of attention to emotion and emotional clarity was significant. The results on the four different combinations of attention to emotion and emotional clarity showed that the relationship between neuroticism and depression was strongest for high attention and low clarity, less strong for low attention and low clarity, and even lower for high attention and high clarity. And importantly, these similar patterns of association disappeared at low attention and high clarity. In contrast to the relationship between neuroticism and depression, we found no statistically significant moderating effects for the relationship between neuroticism and anxiety. Based on these results, we argue the importance of examining individual differences in emotion-based cognition and understanding when the benefits of emotional clarity are associated with fewer disadvantages of excessive attention. These results provide preliminary evidence that the combination of low attention and high clarity may be an adaptive version of emotional self-awareness in relation to neuroticism and depression.

Keywords Emotional self-awareness · Neuroticism · Depression · Anxiety · Adolescence

Neuroticism and internalizing psychopathology are considered inseparable from a certain point of view, and the difficulty of separating the “person” from his “disorder” is emphasized (Luyten & Fonagy, 2021). Most importantly, moderating variables such as emotional self-awareness are addressed in this context as a protective factor and in

relation to advanced skills such as emotion regulation and social communication. It is more likely that emotional self-awareness is less stable than neuroticism and can be an effective therapeutic component for improvement through psychotherapy (De Gucht, 2003). Simply because it can serve as a tool for developing the necessary psychological resilience mechanisms (Ballesepí et al., 2018). In other words, based on a social-communicative approach, the perception and understanding of emotions as less stable intrapersonal traits may play a role as a moderating factor in the relationship between neuroticism and internalizing psychopathology such as depression and anxiety.

Neuroticism or emotional instability is a higher order personality trait within the Big Five factor model (McCrae & John, 1992). Big Five studies have shown that individuals who score high on the Neuroticism subscale are more prone to guilt, become easily flustered (especially under stress), have low self-esteem, and feel insecure in relationships with

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others (Caspi et al., 2005; Vazsonyi et al., 2015). Therefore, this personality trait has been found to be strongly associated with internalizing psychopathology (e.g., Conway et al., 2019; Griffith et al., 2010) and high mental health costs (Cuijpers et al., 2010). Furthermore, emotional self-awareness has been conceptualized as assessing the processing of emotions in the context of meta-mood experiences (Salovey et al., 1995), intrapersonal intelligence (Gardner, 2006), and certain aspects of mentalizing ability (Luyten et al., 2020).

There is growing evidence that emotional self-awareness is a protective factor for various psychopathologies (Resurrección et al., 2014). Meanwhile, methodological limitations have been raised as an issue that should be considered in future studies. In light of this, in the context of understanding emotions and psychopathological conditions, it seems more useful to use a dimensional approach to emotional self-awareness that includes the dimensions of attention to emotion and emotional clarity, in order to highlight important but less obvious emotional difficulties related to, for example, subclinical anxiety and depression.

There are research studies that focus on cumulative scores (of perceived emotional intelligence) and find significant associations with better health (Martins et al., 2010), well-being (Sánchez-Álvarez et al., 2019), and happiness (Extremera et al., 2011). However, for the subclinical and clinical symptoms of depression and anxiety, the results proved to be informative and attracted attention when the dimensional approach was used. For example, the emotional clarity dimension was found to be negatively associated with depression and anxiety, in contrast to the attention to emotion dimension (e.g., Balluerka et al., 2013). In general, the findings underscore that attention to emotion and emotional clarity play an active role in emotion regulation processes, but in different ways, which in turn should be better distinguished when considering psychopathological conditions.

Moreover, excessive attention to emotions in the context of rumination has been interpreted in terms of dysfunctional emotion processing (Gross & John, 2003). In contrast, the dimension of emotional clarity, especially in the face of stressors (e.g., arousal/stress levels), has been described as more stable or homogeneous and associated with adaptive responses to emotion-evoking stimuli (Boden & Thompson, 2017). This also speaks to the need for a multidimensional approach to attention to emotion and emotional clarity. Crucially, dysfunctional emotion processing is likely to be present at the onset of depression and anxiety, which then likely indicates a failure to use self-regulatory strategies or potentially adaptive coping skills (e.g., acceptance or help-seeking) associated with different levels of attention to emotion and emotional clarity. There are other research findings in the literature in which the combination of high attention and low clarity has been described as the emotion type of emotionally

overwhelmed individuals (e.g., Berenbaum et al., 2012). For example, this emotion type has been found to be associated with increased somatic complaints (Ballespí et al., 2019) and higher impairment related to social anxiety (Ballespí et al., 2021). Accordingly, this implies that high attention, if not accompanied by high clarity, may contribute to the duration of stress triggered by microevents (Vives et al., 2021). It is therefore not surprising that the combination of low attention and high clarity, in addition to improved well-being, has been highlighted as a goal of interventions for adolescents to achieve better health (De la Barrera et al., 2021).

Few studies have also examined the role of emotional clarity in relation to neuroticism and internalizing psychopathology. One study found that not only low but also high emotional clarity was associated with increased internalizing symptomatology. Here, this “high” level was then interpreted in terms of (hyper)awareness of negative emotions and those of anxiety or fear (Park & Naragon-Gainey, 2020). In another study, elevated neuroticism and depression were interpreted in terms of low emotional clarity of negative emotions and a knowledge deficit in understanding negative emotions but not positive emotions (Thompson et al., 2015). Thus, there are these fuzzy associations that suggest further studies to examine the role of emotional clarity with the application of a multidimensional view to emotional self-awareness to better understand its protective role in the face of adversity.

In the current study, therefore, we considered a multidimensional approach to attention to emotion and emotional clarity, which also provides the opportunity to capture emotion-based individual differences in the development of internalizing psychopathology. It seems crucial to understand potentially effective resilience mechanisms from a transdiagnostic perspective (Ballespí et al., 2018). Given that neuroticism is a common risk factor and a central feature of internalizing psychopathology (Spiroiu, 2018; Wilkinson, 2009). Specifically, our approach seemed appropriate for examining when and how attention to emotion is less harmful, or when and how emotional clarity can be protective for highly neurotic individuals.

More specifically, in the current study, we aimed to examine attention to emotion and emotional clarity as moderators of the relationship between (1) neuroticism and depression and (2) neuroticism and anxiety. Given the conflicting results on emotional clarity, our approach to testing associations was actually more exploratory. It is also possible that the role of attention to emotion and emotional clarity in the relationship between neuroticism and depression is different from that in neuroticism and anxiety, given the role of the arousal factor in emotion processing (Deckert et al., 2020). Nevertheless, it seems more plausible that a combination with high attention would be associated with increased depression and

anxiety. In contrast, a combination with high clarity would tend to be associated with less depression and anxiety.

Finally, adolescence is an important period for emotional development, characterized by high emotional intensity and associated with a high prevalence of anxiety and depressive symptoms (Bailen et al., 2019). It is also a period for the development of more complex and abstract metacognitive skills (Brizio et al., 2015). Therefore, an advanced understanding of emotional competence in the context of developmental psychopathology could help prevent more severe consequences in adulthood, which could have implications for the overall impact of neuroticism on mental health. For this reason, the current study relied on a sample of adolescents.

Method

Participants

The current study sample included 244 adolescents ($M_{\text{age}} = 14.6$, $SD = 1.7$; 53.7% girls) from the general population who agreed to participate in the study. We recruited participants who were active students at the time of data collection. The inclusion criterion was an age between 12 and 18 years, and the exclusion criterion was a severe mental illness such as psychosis, autism spectrum disorder, or intellectual disability. All this information was collected in a short questionnaire, and then we proceeded only with eligible participants.

Instruments

Big Five Inventory (BFI) (John & Srivastava, 1999; Spanish adaptation: Benet-Martínez & John, 1998). This instrument included forty-four items. In the present study, only the eight items related to neuroticism were used (e.g., “I see myself as someone who gets nervous easily”; “I see myself as someone who can be moody”). Participants responded on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). The reliability of the original version of the adapted scale was 0.80. In the present study, the Cronbach’s alpha for the neuroticism subscale was 0.77.

Trait Meta-Mood Scale (TMMS) (Salovey et al., 1995; Spanish adaptation: Fernandez-Berrocal et al., 2004). This instrument included twenty-four items. In the current study, we used only the following two subscales: Attention to Emotion (e.g., “I pay a lot of attention to how I feel”) and Emotional Clarity (e.g., “I am usually very aware of my feelings”), with each subscale comprising eight items. Participants responded on a 5-point scale ranging from 1 (“strongly disagree”) to 5 (“strongly agree”). The reliability of the original version of the adapted scale ranged from 0.86

to 0.90. In the current study, Cronbach’s alpha was 0.90 for the Attention to Emotion subscale and 0.92 for the Emotional Clarity subscale.

Beck’s Depression Inventory-II (BDI-II) (Beck et al., 1996; Spanish adaptation: Sanz et al., 2003). The BDI-II consists of twenty-one items related to emotions, behavioral changes, and somatic symptoms, including symptoms such as “feelings of sadness,” “suicidal thoughts,” “sleep patterns,” and “changes in appetite.” Participants indicated the extent to which they agreed with each item on a 4-point scale. The reliability of the original version of the adapted scale was 0.87. In the current study, Cronbach’s alpha was 0.90.

Multidimensional Anxiety Scale for Children (MASC) (March et al., 1999; García-Villamisar et al., 2002). The total score of MASC consists of thirty-nine items and includes four dimensions of anxiety: physical symptoms, social anxiety, harm/avoidance, separation anxiety. We asked participants to rate how well each item described them on a 4-point scale ranging from 0 (never true) to 3 (often true). The reliability of the original version of the adapted scale was 0.90. In the present study, the Cronbach’s alpha was 0.88.

Procedure

The present study was conducted within the framework of the Declaration of Helsinki and approved by the Ethics Committee of the University (CEEAH 2603, Spain). For the project entitled “Personality, Psychopathology, and Coping Strategies in Adolescence,” we obtained written informed consent from the participants. Prior to data collection, we distributed an invitation letter to the selected schools. We invited ten schools with similar characteristics to participate in the current project based on their proximity to the research center to facilitate coordination. Five schools agreed to participate in the current study. Later, the adolescents, parents, and their teachers received sealed envelopes containing the questionnaires and an alphanumeric code that encoded their identities. As soon as the deadline for returning the questionnaires expired or necessary information was missing, we contacted them with the given code. Data collection took place over the course of five weeks. In the present study, we used only the data that included attention to emotion, emotional clarity, neuroticism, depression, and anxiety.

Data Analysis

We examined the two dimensions of meta-mood knowledge, focusing on the relationship between neuroticism and internalizing psychopathology (depression, anxiety). As a first step, we assessed the data using tests of the assumptions of linear regression-based moderation analysis. We proceeded with regression-based moderation analysis after confirming

that the data met the assumptions of normality, linearity, and multicollinearity.

Moderation analysis was conducted separately for the relationship between (1) neuroticism and depression; (2) neuroticism and anxiety using PROCESS Version 3.5 (Model 2) (Hayes, 2013). In the model that tested neuroticism and depression, we used attention to emotion and emotional clarity as moderators, while socioeconomic status (SES), gender, age, and anxiety variables were included as covariates. Later, in the model that tested anxiety, we adjusted the same analysis by replacing depression with anxiety.

As recommended by Hayes (2013), we further evaluated the statistically significant interaction effects by plotting the simple regression lines for low (16th) and high (84th) values of the moderating variables (attention to emotion and emotional clarity). All statistical analyzes were performed using IBM Statistics Package for Social Science (SPSS), version 27. Statistical significance of results was set at the alpha level of 0.05.

We performed a sensitivity analysis using G*Power 3.1 (Faul et al., 2009) for a regression analysis with 244 participants and seven predictors (one exposure, two moderators, four covariates). The smallest sample size needed was 236 for 80% power (alpha = 0.05) to achieve effect sizes of 0.04 (Cohen’s f^2), which is between small ($f^2 \geq 0.02$) and medium ($f^2 \geq 0.15$) effect sizes (Cohen, 1988).

Results

The results of descriptive statistics (means, standard deviations) and Pearson correlation coefficients between the variables can be found in Table 1.

Neuroticism and depression

The overall model explained significant variance in depression ($F(9, 234) = 19.74, p < .001, R^2 = 0.432$). Emotional clarity moderated the relationship between neuroticism

Table 1 Pearson correlation coefficients and descriptive statistics

	1	2	3	4	5
1. Neuroticism	-				
2. Attention	0.282**	-			
3. Clarity	-0.307**	0.198**	-		
4. Depression	0.481**	0.298**	-0.355**	-	
5. Anxiety	0.387**	0.332**	-0.198**	0.432**	-
Mean	2.83	22.79	24.88	8.97	42.13
SD	0.68	6.98	7.25	8.39	15.08

$N = 244$. ** Correlation is significant at the 0.01 level (two-tailed)

and depression ($b = -0.22, p = .008, CI [-0.38, -0.06]$), but attention to emotion did not ($b = 0.11, p = .167, CI [-0.05, 0.28]$). There was a statistically significant moderating effect of emotional clarity, so in a further step we assessed the joint effects of two moderators (i.e., attention to emotion and emotional clarity). The joint moderating effect was statistically significant ($F(2, 234) = 4.41, p = .013, \Delta R^2 = 0.021$). Here, the relationship between neuroticism and depression was not statistically significant only for the combination of low attention and high clarity ($b = 0.67, p = .545$). However, it was significant for the combination of high attention and low clarity ($b = 5.90, p < .001$); low attention and low clarity ($b = 4.18, p = .001$); high attention and high clarity ($b = 2.39, p = .031$) (see Table 2; Fig. 1).

Neuroticism and Anxiety

The overall model explained significant variance in anxiety ($F(9, 234) = 12.40, p < .001, R^2 = 0.323$). However, neither emotional attention, $b = -0.06, p = .721, CI [-0.38, 0.26]$ nor emotional clarity, $b = 0.04, p = .792, CI [-0.28, 0.37]$ was

Table 2 Moderating effects of attention to emotion and emotional clarity in neuroticism and depression

	<i>b</i>	<i>p</i>	95% CIs
High EA - low EC	5.90	$p < .001$	[3.51, 8.30]
Low EA - low EC	4.18	$p < .001$	[1.84, 6.52]
High EA - high EC	2.39	$p = .031$	[0.22, 4.57]
Low EA - high EC	0.67	$p = .545$	[-1.51, 2.85]

$N = 244$. EA = Attention to emotion EC = Emotional Clarity
Regression coefficients (*b*), *p* values (*p*), and 95% confidence intervals (95% CIs)

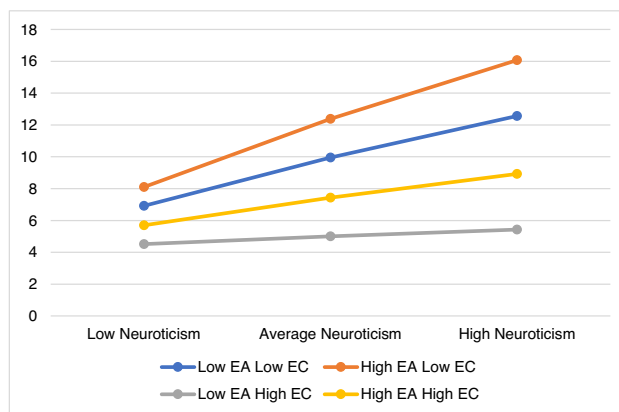


Fig. 1 Interaction plot showing the moderating effects of attention to emotion and emotional clarity in the relationship between neuroticism (x-axis) and depression (y-axis)

a significant moderator of the relationship between neuroticism and anxiety.

Discussion

The results of the current study answer the question about the moderating role of attention to emotion and emotional clarity in the relationship between (1) neuroticism and depression; (2) neuroticism and anxiety. For depression, the results showed that emotional clarity moderated the relationship between neuroticism and depression, but attention to emotion did not. And interestingly, for anxiety, there was no statistically significant moderating effect of these two dimensions. These different results for depression and anxiety are somewhat consistent with previous research studies. For example, when examining different components of rumination, it was found that only rumination related to sadness was associated with neuroticism and, at a subclinical level, with symptoms of depression but not anxiety (Roelofs et al., 2008).

Based on the statistically significant moderating effect of emotional clarity on the relationship between neuroticism and depression, we had found four patterns of association suggestive of composite outcomes. The combination of high attention and low clarity was positively associated with the strongest relationship between neuroticism and depression. The combination of high attention and high clarity was also positively associated, but the detrimental effect was less strong compared to two other combinations (i.e., high attention and low clarity; low attention and low clarity). These results are consistent with other research showing the detrimental effect of the attention dimension on psychopathological conditions (Ballestopí et al., 2019, 2021; Boden & Thompson, 2017).

The significant moderating effect of emotional clarity may indeed suggest that the protective role of this dimension should be maintained in adolescents with high neuroticism, as the detrimental effect of the attention dimension was less pronounced when low attention and high clarity were combined. Remarkably, high emotional clarity is also interpreted as “not beneficial” in high neuroticism (e.g., Park & Naragon-Gainey, 2020). However, after evaluating four types of emotional states, it seems more plausible to consider emotional clarity as less protective but still beneficial to some extent. Moreover, our results may suggest that an emotional state with low attention and high clarity is beneficial, as it seems to be associated with a lower risk of depressive symptoms. Therefore, this emotional state may be considered a positive imbalance that is more related to better functioning of the self (i.e., self-regulation, self-reflection, or self-mentalization).

From this perspective, other combinations do not appear to be beneficial, particularly the combination of high attention and low clarity, which has been associated with the highest scores for depression. This is consistent with previous research in which this negative imbalance (i.e., high attention and low clarity) has been described as that of individuals overwhelmed by excessive attention to (negative) emotions (e.g., Berenbaum et al., 2012). Therefore, we found the results of the current study helpful as they suggest ways to understand psychological resilience mechanisms considering emotion-based individual differences and in relation to the risk of exhibiting exacerbated symptoms.

As mentioned earlier, personality and psychopathology are difficult to separate in some respects. Therefore, the results of the current study also suggest that different approaches should be applicable depending on the context (i.e., a person-centered approach and a disorder-centered approach) (Luyten & Fonagy, 2021). Similarly, in the relationship between neuroticism and depression, it seems crucial to consider common features (e.g., guilt, low self-esteem) and distinguish them from unique features (e.g., high arousal).

Regarding the relationship between neuroticism and anxiety, although there were no statistically significant moderating effects, the results were informative and argued for the need for a dimensional view of the anxiety spectrum. For example, in a study of social anxiety, the moderating role of emotional clarity was found to be statistically significant and thus protective against elevated symptom scores (Ballestopí et al., 2021). Indeed, our findings may also point to the need to identify other temperamental factors (e.g., adaptability, activity level, or sensitivity) and examine how they play a role in this context, one might think.

It is noteworthy that in the present study neuroticism and the dimensions of meta-mood knowledge were measured as dispositional traits, whereas anxiety was measured as a state. It is advisable to use different methodological approaches when considering the stability of personality traits and psychopathological states and in relation to changes in a person's life situation (e.g., Rhee et al., 2020). This is because personality traits are context-dependent and can be reciprocally influenced by psychopathological states.

Also, because neuroticism is a tendency to be emotionally unstable and to experience negative emotions due to a low tolerance for unexpected or unpleasant situations. In the context of anxiety, this may indicate the likelihood of dysfunctional emotion processing in the initial ‘identification phase’ of emotion regulation (Hughes et al., 2020). It may also indicate the intensity of negative emotions or higher levels of arousal blocking emotion processing (Deckert et al., 2020). In the context of depression, this may be more indicative of the adoption of maladaptive coping strategies (e.g., ruminating about sad emotions) that are characteristic

of depressive symptomatology and associated with high neuroticism (Roelofs et al., 2008).

Nevertheless, the results of the current study suggest the possibility of investigating the protective role of emotional self-awareness as an important therapeutic tool in the treatment of anxiety. Although this was not the case in the current study, the literature related to adolescent anxiety supports the positive value of emotional clarity (i.e., noticing, understanding, and naming emotions) as a therapeutic component for alleviating related psychological problems (Davis et al., 2019). In light of this, our findings on anxiety may underscore the importance of emotional skills training after accounting for high emotional arousal. Alternatively, if necessary, focusing on neuroticism rather than anxiety could be a way to better understand the role of emotional self-awareness.

Given the findings of the previous (e.g., Roelofs et al., 2008) and current study, mental health providers, clinicians, and teachers might consider providing the necessary training on metacognitive beliefs to promote positive emotions and meet the needs of severely neurotic individuals. Thus, it seems essential to tailor interventions to emotion-based individual differences in the relationship between neuroticism and depression or neuroticism and anxiety. Moreover, the use of comprehensive assessment tools could certainly contribute to a better understanding of dysfunctional emotion processing. In other words, the tendency to pay excessive attention to negative emotions might indicate other underlying problems associated with low emotional clarity (e.g., lack of self-confidence) and high emotional clarity (e.g., avoidance).

The current study also has limitations. First, because of the cross-sectional design, we could not test whether there was a cause-and-effect relationship. That is, our data suggest that neuroticism, attention to emotion, emotional clarity, depression, and anxiety are systematically related. Indeed, these preliminary findings could be of greater use if future research is replicated using a longitudinal study design. This could also help confirm whether there are mediating effects, for example. Second, we selected a sample of adolescents for the reasons stated in the introduction, so our results are limited to the adolescent population. The results could have further implications for research and the clinical setting if future research replicates this study considering other age groups, study designs (e.g., longitudinal studies, experimental studies), countries from multiple continents, and considering other life-limiting conditions.

Despite the above limitations, this study contributes to the knowledge of the relationship between neuroticism and internalizing psychopathology. Specifically, we have shown that emotional clarity plays a leading role in the relationship between neuroticism and depression, but not between neuroticism and anxiety. We have illustrated

here (Fig. 1) that the relationship between neuroticism and depression changes as a function of different levels of attention to emotion and emotional clarity. Our results therefore allow us to contribute to the existing body of knowledge by showing when and how emotional self-awareness can buffer the relationship between neuroticism and depression. Indeed, the way emotional clarity works proves that attention to emotions is beneficial through emotional clarity. Thus, the combination of low attention and high clarity may be an adaptive form of emotional self-awareness.

Moreover, our approach to emotional self-awareness might be a good antidote to understanding the role of emotional self-awareness when the focus is on neuroticism and internalizing psychopathology. In general, there are difficulties regarding methodological limitations in assessing emotional competencies (Resurrección et al., 2014). Therefore, the current findings may contribute to existing knowledge and open new avenues to consider the interplay between the two key dimensions, with the possibility of incorporating them into research on neuroticism and internalizing psychopathology, as was attempted in the current study. Although high neuroticism scores may indicate difficulties in emotion regulation, the role of emotional self-awareness may help clarify pathways leading to internalizing psychopathology by accounting for emotion-based individual differences.

In summary, it is important to understand how personality manifests itself in psychopathology, and we have attempted to do this by examining the general question of under what circumstances and for whom what level of attention to emotion and emotional clarity is beneficial or detrimental. It should be noted that the processing of emotions in high neuroticism is admittedly complex and multidetermined, requiring a person-centered approach and adaptations (Luyten & Fonagy, 2021). Thus, we recognize that by examining emotion-based individual differences in emotional self-awareness, we can only highlight the specific needs of severely neurotic individuals in terms of poor regulation of negative emotions. However, there is now this evidence of emotion-based individual differences in the relationship between neuroticism and depression that highlights unique patterns of associations. The next challenge may be to apply this multidimensional approach in practice, given the need to develop adaptive emotion regulation strategies that would contribute to better social interactions, better health, and lower risk for clinical depression and anxiety disorders.

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Author Contributions Damla Yildirim: conceptualization and study design; statistical analysis and visualization, interpretation of data, writing - writing the original draft, critical revision of the manuscript and editing.

Jaume Vives: conceptualization and study design; data validation and accuracy of data analysis. Reviewed and approved the final manuscript and the decision to submit it for publication.

Sergi Ballespí: conceptualization and study design, this author had full access to the data used in the current study. Reviewed and approved the final manuscript and the decision to submit it for publication.

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Data Availability The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethical approval Institutional Review Conducted By The Ethics Committee of the Universitat Autònoma de Barcelona, Spain. The study complies with the ethical standards according to the Declaration of Helsinki and was approved by the Ethics Committee of the Universitat Autònoma de Barcelona, Spain.

Protocol Number CEEAH 2603 (Spain).

Competing Interest None.

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