Research article

Emotion regulation strategies and aggression in youngsters: The mediating role of negative affect

María José Gutiérrez-Cobo, Alberto Megías-Robles, Raquel Gómez-Leal *, Rosario Cabello, Pablo Fernández-Berrocal

Faculty of Psychology, University of Málaga, Málaga, Spain

ARTICLE INFO

ABSTRACT

Aggression in youngsters is a highly prevalent problem worldwide. Given that this problem has negative consequences for society, aggressors, and victims, the present study aims to understand the processes underlying the acts of aggression in this population. Specifically, we analyze the role of two emotional regulation strategies (cognitive reappraisal and expressive suppression) and the positive and negative affect variables in aggressive behavior. For this purpose, 654 primary and high school students aged between 9 and 18 years (47.6% boys) were assessed on emotion regulation, positive and negative affect, and aggression through the Emotion Regulation Questionnaire, the Positive and Negative Affect Schedule, and the Buss-Perry Aggression Questionnaire, respectively. The results revealed that higher use of the cognitive reappraisal strategy was correlated with lower levels of aggression (for total, physical, and anger). In contrast, the opposite was observed with expressive suppression (for total aggression and hostility). More important for the purposes of this study was the finding that the negative affect variable mediated the relationship between expressive suppression and aggressive behavior. Specifically, those individuals who made greater use of the expressive suppression strategy had higher levels of negative affect, which, in turn, was associated with higher levels of aggression. Cognitive reappraisal appeared to be only directly related with a reduction in total aggression. Thus, higher levels of cognitive reappraisal were related to a reduction in aggressive behavior. However, when focusing on the four dimensions of aggression, the relationship between cognitive reappraisal and aggression appears to be mediated by negative affect and, in the case of anger, by positive affect. The limitations and implications of these findings are discussed.

1. Introduction

Childhood — notably adolescence — is a period during which important changes take place both physically and psychologically [1]. An issue that has generated considerable attention during this developmental stage is aggressive behavior. This interest has arisen due to the negative consequences of aggression for society, particularly for aggressors and victims [2–7], in addition to its high prevalence worldwide [8,9].

Aggression refers to any behavior carried out with the intention of causing harm to another individual who is motivated to avoid

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* Corresponding author. University of Málaga Faculty of Psychology, Department of Basic Psychology. Campus Teatinos, s/n. 29071, Málaga, Spain.

E-mail address: raqgomlea@uma.es (R. Gómez-Leal).

this damaging behavior [8]. Among the various theoretical models aimed at explaining the causes of aggression, we will focus on the General Aggression Model (GAM [10]) in which aggressive behavior is assumed to result from the integration of three stages: 1) Inputs: including personal (e.g., personality traits, gender) and situational factors (e.g., provocation); 2) Routes: which refer to the individual internal state composed of arousal (e.g., high arousal), cognition (e.g., hostility) and affects (e.g., anger), which are influenced by Stage 1 of the model; and, finally, 3) Outcomes: the individual evaluation of the situation, which determines the final decision of whether to act aggressively, which is influenced by the internal state previously generated.

This model implies the necessity of considering the integration of different variables acting at different stages to explain aggressive behavior. Considering the previous literature, the present study focuses on evaluating the impact of two variables as protective and risk factors of aggressive behavior in minors: emotion regulation strategies (Stage 1) and positive and negative affect (Stage 2).

Emotion regulation strategies refer to the individual effort to influence emotions [11]. Therefore, this variable can be classified as a personal factor situated in Stage 1 of the GAM. Two commonly studied strategies are cognitive reappraisal and expressive suppression. The former implies the cognitive reinterpretation of the situation to modify its emotional impact, while the latter refers to the restraint of the external display of an internal emotional state [12]. These two strategies have a differential impact on a variety of aggressive behavior, with cognitive reappraisal being an adaptive strategy that reduces the likelihood of being aggressive, while expressive suppression can increase such behavior and is thus considered a risk factor of aggression in adults and youngsters [13–19]. Specifically, previous studies show evidence that youngsters (from kindergarten upwards) with ineffective emotion regulation strategies such as expressive suppression, are more aggressive than their peers [18,20]. Emotional regulation abilities take time to develop. Previous studies have shown that children are poorer at regulating their emotions than adults. However, it seems that these deficits decline with age [21–23]. Specifically, youngsters employ fewer regulation strategies (such as reappraisal) than adults [24,25], underlining the importance of evaluating the specific effect of these strategies on aggression during this developmental stage, in order to improve emotion regulation training in minors [26].

The affect variable is included in the second stage of the GAM. The level of affect refers to the amount of pleasant (positive affect) and unpleasant (negative affect) feelings experienced by an individual [27]. Affect can be considered either as a trait or a state. We included it in Stage 2, given that the positive or negative affectivity of a person is not always activated, but instead depends on the situation (e.g., a situation of provocation will be more likely to evoke a negative affect) and personal (e.g., emotional regulation strategies) characteristics. Positive and negative affect are two independent components that have a differential impact on aggressive behavior. The previous literature has mainly pointed to negative affect as a maladaptive variable that increases the probability of aggression in adults and minors, while positive affect appears to be inconsistent, and not always related to aggression [16,28–33].

In addition to their relationship with aggression, affect and emotional regulation are also linked. Specifically, previous research suggests a lower negative affect and higher positive affect in those individuals who make greater use of adaptive strategies such as cognitive reappraisal, while expressive suppression appears to exacerbate negative affect [18,34–36]. Previous studies in adults have also shown the impact of affect as a mediator between emotional abilities and aggression [32,33,37]. These findings in adults reinforce the importance of studying emotion regulation strategies and affect as variables that impact aggression.

The poor development of regulation strategies and the high prevalence of aggressive behaviors in youngsters — together with the lack of studies in this population — prompted the main objective of the present study. That is, we wanted to analyze the role of these two emotional regulation strategies on the aggressive behavior of minors through the mediating role of negative and positive affect. In addition, we explored this association across different dimensions of aggressive behavior. The findings could then help the research community to develop effective training strategies for reducing aggression. Based on the reviewed literature, we expected to find (1) a negative direct relationship between cognitive reappraisal and aggression; (2) a positive direct relationship between expressive suppression and aggression; (3) a mediating role of affect in the relationship between emotional regulation strategies and aggression; and (4) that these relationships could depend on the dimension of aggression studied.

2. Method

2.1. Participants

This study included 654 primary and high school students from six different schools in Andalucía, Spain. Of the sample, 311 were boys (47.6%). The age of the participants ranged between 9 and 18 years, with a mean of 14.05 years ($SD = 2.63$). Regarding gender, the mean age of the boys was 13.88 years ($SD = 2.66$) and for girls this was 14.20 years ($SD = 2.60$). Participants were informed that confidentiality and anonymity of the collected data would be maintained, and they were treated following the Helsinki Declaration (World Medical Association, 2008). Consent forms were provided to each participant and their parents and/or guardians. The Research Ethics Committee of the University of Málaga approved this research as part of the project "Factores protectores del bienestar personal y escolar en la adolescencia. UMA18-FEDERJA-114" (Approval Number: CEUMA: 38-2020-H).

2.2. Procedure and instruments

Participants completed the questionnaires to assess levels of aggression, positive and negative affect, and emotion regulation strategies through the online platform LimeSurvey (http://limesurvey.org). The battery of questionnaires (supplementary materials) was administered to the participants in a single session at their schools, and they needed 35 min to complete these instruments. After that, participants were instructed to complete the questionnaires on their own. The researchers were always available to answer questions during these sessions, and particularly provided support to those youngsters with reading difficulties. A brief description of

each scale is detailed below:

Buss-Perry Aggression Questionnaire (BPAQ [38]) was used to measure aggression. The BPAQ is a 29-item self-report scale with four dimensions: hostility, anger, verbal, and physical aggression. This scale uses a five-point Likert format (1 "*extremely uncharacteristic of me*" to 5 "*extremely characteristic of me*"). The Spanish version of this instrument was employed in our study [39]. This has previously shown adequate internal consistency for the total score ($\alpha = 0.88$) and for each subscale (ranging between $\alpha = 0.68$ and $\alpha = 0.86$).

Positive and Negative Affect Schedule (PANAS [40]); is a self-report questionnaire designed to assess two dimensions of emotional experience: negative affect (NA), the tendency to feel negative mood states (e.g., distressed, guilty, hostile, irritable); and positive affect (PA), the tendency to feel positive mood states (e.g., focused, determined, enthusiastic). This instrument has 20 items using a 5-point scale (1 "*not at all*" to 5 "*strongly*"). We employed the Spanish version of the questionnaire [41], which has a good Cronbach's reliability coefficient alpha (PA: $\alpha = 0.89$; NA: $\alpha = 0.91$).

The Emotion Regulation Questionnaire (ERQ [17]) measures the emotion regulation strategies of cognitive reappraisal and expressive suppression. This scale has 10 items using a 7-point Likert-type scale (1 "*strongly disagree*," 7 "*strongly agree*"). In our study, we used the Spanish version of the ERQ [42]. This has been demonstrated to have an adequate internal consistency ($\alpha = 0.75$ for suppression, $\alpha = 0.79$ for reappraisal).

2.3. Data analysis

First, a descriptive analysis was conducted to examine the scores obtained for each measure. Gender and age differences were explored using *t*-tests and regression analysis, respectively. Second, Pearson's correlations were calculated to study the relationship between the scores of aggression, PA, NA, and emotional regulation strategies. Third, a path analysis was conducted to test whether reappraisal and suppression were indirectly related to aggression via PA and NA. Cognitive reappraisal and expressive suppression were included as predictors, PA and NA as mediators, and total aggression as the criterion. Gender and age were entered as covariates to control for their effects. Fourth, a model was constructed for each aggression dimension. The model fit was evaluated by the comparative fit index (CFI), root mean square error of approximation (RMSEA), and standardized root mean squared residual (SRMSR) (see Refs. [43,44]). Indirect effects for the path analysis were tested using bias-corrected bootstrapping with 5000 iterations and 95% confidence intervals (CIs). The *t*-tests, correlations, and regression analyses were conducted using SPSS 23 (IBM corp., USA), while path analyses were conducted using AMOS 26.0 software (IBM corp., USA).

3. Results

Descriptive statistics of the study variables are shown in Table 1. *T*-tests examining gender differences revealed that men, compared with women, showed significantly higher scores for PA ($M_{men} = 3.27$; $M_{women} = 3.06$; $p < .001$), total aggression ($M_{men} = 2.85$; $M_{women} = 2.72$; $p = .01$), physical aggression ($M_{men} = 2.73$; $M_{women} = 2.36$; $p < .001$), and verbal aggression ($M_{men} = 2.93$; $M_{women} = 2.78$; $p = .01$), and significantly lower scores for NA ($M_{men} = 2.12$; $M_{women} = 2.25$; $p = .02$). With respect to age, correlation analyses revealed that as age increased, significantly higher scores were observed for expressive suppression ($r = 0.08$, $p = .04$), NA ($r = 0.09$, $p = .02$), BPAQ verbal ($r = 0.14$, $p < .001$), anger ($r = 0.08$, $p = .04$), and hostility ($r = 0.08$, $p = .03$), and significantly lower scores for PA ($r = -0.08$, $p = .04$), and physical aggression ($r = -0.08$, $p = .04$).

Results of the correlation analyses are shown in Table 1. Expressive suppression was positively correlated with cognitive reappraisal, NA, total aggression, and hostility (all $p < .01$). Cognitive reappraisal was positively correlated with PA (and the already mentioned expressive suppression) and negatively with NA, total aggression, physical aggression, and anger (all $p < .05$). PA showed no significant relationship other than that described with cognitive reappraisal. In addition to the correlations previously described, NA was also positively correlated with total aggression, verbal aggression, hostility, and anger (all $p < .01$). Finally, the aggression scores correlated with each other ($p < .001$).

Regarding our hypotheses about the indirect effect of emotion regulation strategies on total aggression, the path analysis of the proposed model (see Fig. 1) revealed that total aggression was predicted by a positive total indirect effect of expressive suppression via NA and PA ($b = 0.02$, $\beta = 0.04$, 95% CI [0.009, 0.033]). This total indirect effect was mainly driven by the specific indirect effect via NA ($b = 0.02$, $\beta = 0.04$, 95% CI [0.012, 0.035]); while the indirect effect via PA was non-significant. Moreover, a negative direct effect of

Table 1
Means and standard deviations (*SD*) and Pearson's correlations between the study variables.

	M (SD)	2	3	4	5	6	7	8	9
1. Cognitive reappraisal (ERQ)	4.25 (1.12)	.12**	−.10*	.28**	−.11*	−.10*	−.03	−.07	−.16**
2. Expressive suppression (ERQ)	3.60 (1.25)	–	.20**	−.03	.11*	.07	.06	.22*	.00
3. Negative affect (PANAS)	2.20 (0.70)		–	−.07	.21**	.07	.11**	.29**	.23**
4. Positive affect (PANAS)	3.16 (0.65)			–	.04	.05	.04	−.03	.06
5. Total aggression (BPAQ)	2.80 (0.67)				–	.82**	.85**	.80**	.86**
6. Physical aggression (BPAQ)	2.54 (0.90)					–	.60**	.46**	.58**
7. Verbal aggression (BPAQ)	2.85 (0.79)						–	.61**	.68**
8. Hostility (BPAQ)	2.86 (0.77)							–	.64**
9. Anger (BPAQ)	2.90 (0.77)								–

*p < .05, **p < .01.
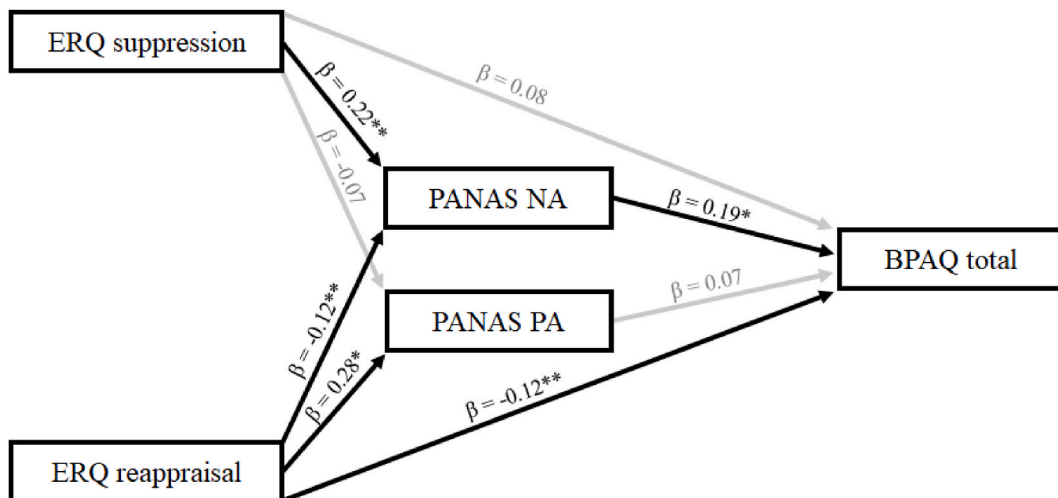
Fig. 1. Graphical representation of the path model including total aggression as the criterion variable. *$p < .05$, **$p < .01$. Non-significant paths are displayed in grey.

cognitive reappraisal was observed (b $= -0.07$, $\beta = -0.12$, 95% CI [$-0.134, -0.033$]). The model showed an adequate fit to the data (CFI $= 0.99$, RMSEA $= 0.03$, SRMR $= 0.01$) and explained 7.5% of the variance in total aggression.

Next, we describe the results for the path models associated with each of the dimensions of aggression. Physical aggression was predicted by a specific positive indirect effect of expressive suppression via NA (b $= 0.01$, $\beta = 0.02$, 95% CI [$0.001, 0.026$]), a specific negative indirect effect of cognitive reappraisal via NA (b $= -0.01$, $\beta = -0.01$, 95% CI [$-0.018, -0.001$]), and a negative direct effect of cognitive reappraisal (b $= -0.09$, $\beta = -0.12$, 95% CI [$-0.149, -0.030$]). Verbal aggression was predicted by a specific positive indirect effect of expressive suppression via NA (b $= 0.01$, $\beta = 0.02$, 95% CI [$0.003, 0.025$]) and a specific negative indirect effect of cognitive reappraisal via NA (b $= -0.01$, $\beta = -0.01$, 95% CI [$-0.019, -0.002$]). Hostility was predicted by a positive total indirect effect of expressive suppression via NA and PA (b $= 0.03$, $\beta = 0.05$, 95% CI [$0.019, 0.053$]) and by a negative total indirect effect of cognitive reappraisal via NA and PA (b $= -0.02$, $\beta = -0.03$, 95% CI [$-0.036, -0.001$]). These two total indirect effects are mainly attributed to specific indirect effects via NA (for expressive suppression: b $= 0.03$, $\beta = 0.06$, 95% CI [$0.020, 0.055$]; for cognitive reappraisal: b $= -0.02$, $\beta = -0.03$, 95% CI [$-0.041, -0.010$]; specific indirect effects via PA were non-significant). Moreover, a positive direct effect of expressive suppression was observed (b $= 0.11$, $\beta = 0.18$, 95% CI [$0.045, 0.148$]). Finally, anger was predicted by a positive total indirect effect of expressive suppression via NA and PA (b $= 0.03$, $\beta = 0.04$, 95% CI [$0.017, 0.071$]). Concerning the specific indirect effects, the analyses revealed a positive specific indirect effect of expressive suppression via NA (b $= 0.03$, $\beta = 0.05$, 95% CI [$0.018, 0.050$]) and specific indirect effects of cognitive reappraisal via NA (b $= -0.02$, $\beta = -0.03$, 95% CI [$-0.037, -0.008$]) and via PA (b $= 0.02$, $\beta = 0.04$, 95% CI [$0.008, 0.047$]). Moreover, a negative total direct effect of cognitive reappraisal was observed (b $= -0.11$, $\beta = -0.16$, 95% CI [$-0.164, -0.061$]). The fit of these four models was always acceptable (CFI >0.98; RMSEA <0.03, SRMR <0.02) and the explained variance was 7.2% for physical aggression, 4.4% for verbal aggression, 11.8% for hostility, and 9.1% for anger.

Finally, given the wide age range in our sample (from 9 to 18 years), we decided to check, as a supplementary analysis, whether the previous theoretical model was applicable to our sample by dividing it into pre-adolescents (9–12 years; 194 participants) and adolescents (13–18 years; 460 participants). The same model was applied except that age was excluded as a control variable. The analysis including total aggression as criterion did not reveal significant differences between the two groups (χ^2 (11) $= 19.37$, $p > .05$) and the constrained model (equal structural weights) showed a good fit (CFI $= 0.98$; RMSEA $= 0.02$, SRMR $= 0.06$). For the models including the aggression dimensions as criterion, differences between groups were also non-significant (χ^2: ps > 0.05). Therefore, the model provided an adequate fit to the data for both the pre-adolescent and adolescent samples.

4. Discussion

Aggression during childhood (particularly adolescence) is an issue of significant concern given its prevalence, consequences, and the lack of knowledge about the mechanisms underlying its causes in this population. Therefore, the present study aimed to analyze some of the protective and risk factors involved in aggression in youngsters. Specifically, we analyzed the role of the emotional regulation strategies of cognitive reappraisal and expressive suppression on aggressive behavior through the mediating role of affective state in children and adolescents.

Consistent with our Hypotheses 1 and 2, a higher use of the cognitive reappraisal strategy was correlated with lower levels of aggression (for total, physical, and anger). In contrast, the opposite was observed with expressive suppression (for total aggression and hostility). These results are congruent with previous literature pointing to cognitive reappraisal as an adaptive strategy and expressive suppression as a maladaptive strategy for aggression and other variables such as well-being [13,14,16–19]. While

regulating our emotions appears to be more problematic for younger individuals, this ability appears to improve with age [21–23]. Despite the differences across ages, our results are consistent with those reported in previous studies with both adults and adolescents.

Following our main aim, and partially consistent with Hypothesis 3, our results showed that affect mediated the relationship between expressive suppression (but not cognitive reappraisal) and total aggression scores. Specifically, focusing on the expressive suppression strategy, those individuals engaging more in this strategy had higher levels of NA, which, in turn, was associated with higher levels of aggression. Although previous results have pointed out the positive relationship between this strategy and aggression [13,16–18], rather less is known about the processes underlying this relationship, particularly in minors. Following the GAM, our results suggest that those children and adolescents employing the strategy to suppress their emotions in the first stage of the model will be more aggressive due to an increasing in their NA in the second stage. Previous studies have already shown the mediating role of NA in the relationship between emotional variables and aggression in adults [32,33].

In contrast, cognitive reappraisal appeared to be only directly related to total aggression (diminishing this behavior); while this was not mediated by NA. That is, higher levels of reappraisal were related to a reduction in aggressive behavior with no mediating effect of NA between these two variables. These results highlight the possible protective role of the cognitive reappraisal strategy, acting directly by diminishing the participants' aggression. Opposite to the suppression strategy, employment of the cognitive reappraisal strategy to regulate emotions in Stage 1 of the GAM serves as a direct protective factor for aggression. These results are partially consistent with those observed in adults, where a mediating effect has also been found [37]. In spite of the important role of cognitive reappraisal in youngsters, previous studies have shown that they tend to use this strategy less often [24,25], thus reinforcing the importance of encouraging the use of this strategy throughout development.

The results of the path model could reflect the fact that depending on the type of emotion regulation strategy employed, this could differentially impact the level of NA and, therefore, alter the probability of behaving aggressively via a distinct mechanism. Regarding PA, while the suppression strategy appears to be included in the total indirect effect, when analyzing the specific indirect effects, it is no longer significant, leaving NA as the mechanism underlying this relationship. Previous studies have also shown inconsistent results regarding the relationship between PA and aggression [16,28,29].

Finally, we tested the path models between the emotion regulation strategies and the four dimensions of aggression. Consistent with the results found with the total aggression score and with our Hypothesis 4, a higher use of the expressive suppression strategy was related to a higher level of NA, which, in turn, was related to higher scores on the four dimensions of aggression (physical, verbal, hostility, and anger). In addition, a direct relationship was found between this strategy and hostility. Previous studies in youngsters have pointed out the negative consequences of employing maladaptive strategies such as suppressing emotions in specific types of violence such as relational aggression [18]. In contrast, and unlike the results with total aggression, higher levels of cognitive reappraisal were related to lower NA and consequently to lower levels of the four dimensions of aggression. This mediation effect is consistent with previous studies in adults [37], suggesting that NA is a mechanism that acts upon the relationship between reappraisal and the aggressive dimensions (physical, verbal, hostility, and anger). Finally, our results revealed that the cognitive reappraisal strategy directly affected physical aggression and anger.

While this study contributes towards an understanding of the mechanisms underlying aggressive behavior by using an extensive sample of children and adolescents, it is not exempt from limitations. First, the correlational and cross-sectional nature of the study prevents us from establishing causal relationships. Future studies should aim at causally analyzing the role of our target variables in the aggressive behavior of minors by employing longitudinal and experimental methodologies. Second, the instruments employed to evaluate the variables of interest are based on self-report measures, which provide information on the subjective perceptions of the participants. Future research should replicate these results by using more objective measures. This could be achieved by employing performance tasks that more closely resemble real-life contexts. Moreover, obtaining data from parents and teachers — as opposed to self-reported data from adolescents only — would have increased the quality of the data and the robustness of the models employed. In addition, having data from parents and teachers could increase the objectivity of the data and would allow comparison of the self-report data from children and adolescents. Finally, our results suggest the importance of encouraging the use of the cognitive reappraisal strategy while reducing the use of cognitive suppression. To extend our findings to a more applied context, future longitudinal and experimental investigations should evaluate the impact of emotion regulation training on the aggressive behavior of youngsters in order to improve existing interventions [26].

5. Conclusion

In conclusion, our results indicate that, like adults, the strategies used by youngsters to regulate emotions are linked to the decision of whether to act aggressively, in some cases, via the negative affect variable. These results have been observed even though the previous literature shows that the strategies used by youngsters to regulate emotions appear to be less well developed than those used by adults. These findings could have important theoretical and translational value for addressing the problem of aggression in children and adolescents, opening up future lines of investigation. Specifically, the results could inform the design of strategies used by healthcare providers to improve treatments and also help the education system to incorporate emotional regulation skills training into the school curriculum. Specifically, our results suggest that the development of interventions for improving the use of cognitive reappraisal and reducing expressive suppression as an emotional regulation strategy could be effective in indirectly (by lowering negative affect) and directly diminishing the prevalence of aggression among youngsters.

Author contribution statement

Alberto Megías-Robles; Raquel Gómez-Leal; Rosario Cabello; María José Gutiérrez-Cobo; Pablo Fernández-Berrocal: Conceived and designed the experiments; Performed the experiments. Alberto Megías-Robles; Raquel Gómez-Leal; Rosario Cabello; Pablo Fernández-Berrocal: Contributed reagents, materials, analysis tools or data. Alberto Megías-Robles; Pablo Fernández-Berrocal; Raquel Gómez-Leal: Analyzed and interpreted the data. Alberto Megías-Robles; María José Gutiérrez-Cobo: Wrote the paper.

Funding statement

Data availability statement

Data will be made available on request.

Declaration of competing interest

The authors declare no conflict of interest.

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