

# The role of emotion regulation in the relation between anxiety and life satisfaction among Saudi children and adolescents

## Abstract

**Background:** Anxiety has a negative effect on life satisfaction, but this effect can be moderated and/or mediated by emotion regulation. We assessed these relationships to plan strategies for a good life. The objectives were to: determine the relations among emotion regulation, anxiety, and life satisfaction, estimate the role of emotion regulation (mediation and moderation) in the relation between anxiety and life satisfaction, and evaluate the differences in emotion regulation and its subscale, anxiety and its subscale and life satisfaction across gender and age.

**Method:** A cross-sectional sample of 1379 participants (952 female), with an age range of 9-19 years ( $M=16.2$ ;  $SD=2.15$ ). The administered instruments were the Satisfaction with Life Scale, Screen for Child Anxiety Related Emotional Disorders, and the Emotion Regulation Questionnaire. Reliability analysis, descriptive analysis, correlation analysis, moderation and mediation analyses and two-way multivariate ANOVA were applied.

**Results:** Emotion regulation and life satisfaction were associated positively with each other but negatively with anxiety related emotional disorders. There was an interaction among emotion regulation, anxiety related emotional disorders, and life satisfaction with age and gender. The emotion regulation subscales, cognitive reappraisal and expressive suppression, mediated and moderated (respectively) the relation between anxiety related emotional disorders and life satisfaction.

**Conclusions:** This work contributes to the knowledge of the variables involved in people's life satisfaction. Specifically, knowing the moderator and mediator roles of emotion regulation in the relationship between people's life satisfaction and anxiety could contribute to the design of programs for the promotion of mental health and the prevention of mental health problems in the population.

**Keywords:** emotional regulation, anxiety, life satisfaction, mediation, moderation, children, adolescents

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## Introduction

One of the most characteristic and distinctive issues of humans is their ability to value their quality of life.<sup>1</sup> This evaluation includes both cognitive (referring to satisfaction with life in its entirety or with specific areas like marriage, work, etc.) and affective dimensions (related to the frequency and intensity of positive and negative emotions), whose interaction covers a wide spectrum of experiences.<sup>2,3</sup>

Relations with other persons are a significant foundation of our satisfaction and happiness, as well as terror and anxiety. All people desire social reception and intimacy, but socially anxious persons develop beliefs and approaches to avert their attainment.<sup>4</sup> Some authors call the feeling of high subjective well-being "happiness" because a person experiences high subjective well-being when they are satisfied with their life and live it in a positive way. In contrast, a person with low subjective well-being is dissatisfied with life and experiences negative emotions of anxiety and/or depression.<sup>5</sup> It was found that life satisfaction was reduced in adults with anxiety disorder, supposedly because anxiety symptoms constrained satisfaction in many life areas.<sup>6</sup> In this investigation, we emphasize life satisfaction and ask whether the association between life satisfaction and anxiety is as simple as proposed above. We propose testing whether a person's emotion regulation improves or reduces the influence of anxiety in relation to symptoms of life satisfaction. Primarily, we offer a concise

introduction to the relations between anxiety and life satisfaction previously based on a causal hypothesis.

## Anxiety and life satisfaction

Many investigations have reiterated that lower levels of life satisfaction are associated with high levels of anxiety.<sup>6-9</sup> Research of a sample of 200 University students also found that most students (63.4%) had low "life satisfaction" without any dissimilarity between genders,<sup>10</sup> and other researchers confirmed this.<sup>6,9,11</sup> Anxiety's negative effect on well-being among University students appears to be associated with life satisfaction.<sup>12-14</sup> This may occur because of the person's incapacity to meet the requirements needed or expected for college studies, professional work, family life, social behavior, etc.<sup>15</sup> Adolescence has been established as the stage with the highest risk of anxiety.<sup>16</sup> La Greca and Lopez found diverse adolescent issues, particularly in social functioning, anxiety in peer relationships and negative discernment of self.<sup>17</sup> Persons who suffer from anxiety have low levels of educational attainment and less productivity in workplaces.<sup>18</sup>

## Anxiety, emotion regulation, and life satisfaction

Anxiety is considered a fear state involving evasive behaviors and protective reactions. It can also be a sensation indispensable to instigating escape from an apparently hazardous or terrifying

situation. Anxiety is experienced as tension, apprehension, worry and nervousness associated with stimulation by the automatic nervous system. It can have serious negative effects and can constrain the capacity for attention and daily activities.<sup>19</sup> Individuals use emotion regulation to regulate the nature and timing of their feelings and develop managing techniques.<sup>20</sup> Regulation policies were categorized into antecedent-focused policies, which are planned to attend to the emotion-eliciting incentive and response-focused policies, which deal with the behavioral or physiological reactions recorded by an incentive or condition.<sup>21</sup> One of these, cognitive reappraisal (CR) is a kind of antecedent attentive policy. It can be described as the reinterpretation of a feeling condition so that it changes the meaning and modifies the emotional effect.<sup>22</sup> Another of these is expressive suppression (ES), a kind of response-focused plan designed to conceal, constrain or diminish the ongoing expressive behavior.<sup>23</sup>

Investigation of emotion regulation increasingly defends the idea that emotion regulation is obligatory for understanding the onset, continuation, and administration of anxiety disorders. Investigation confirms that shortages in emotion regulation forecast the growth and continuation of anxiety disorders.<sup>24</sup> Research on a non-clinical adolescent sample also show that shortages in emotion regulation can evolve into anxiety symptoms.<sup>25</sup> College students with emotion regulation problems described incidents of severe anxiety symptoms.<sup>26</sup> Investigation of the clinical sample showed that persons identified with Generalized Anxiety Disorder (GAD) displayed deficits in emotional lucidity, poor comprehension of emotions, intensified negative reactivity to feelings, a diminished quantity of acceptance and diminished fruitful management of feelings.<sup>27</sup> Persons with panic disorder were found to frequently use avoidant policies when dealing with anxiety-provoking circumstances.<sup>28</sup> Paradoxically, this was found to improve the anxiety symptoms.<sup>29</sup> However though the symptoms of anxiety seem to improve by using avoidance, their use contributes to the development and continuation of anxiety symptoms or disorders.<sup>30</sup> In contrast to healthy controls, persons identified with Social Anxiety Disorder were inclined to have much more trouble in recognizing and describing strong feelings when they had to cope with negative events.

The idea of emotion regulation has been studied increasingly in the current period, and this effort has had an significant influence on developing the deterrent and treatment policies for anxiety disorders. Emotion regulation practices can increase or deteriorate emotional answering, depending upon the use of the procedure. Emotion regulation seems to be a discrete idea that may affect the expression of anxiety and fear. Persons with anxiety disorders are categorized by maladaptive emotion regulation. Difficulties in emotion regulation continue to be expressively related to the anxiety symptom disorder even when emotion regulation constructs such as overall anxiety and depression are determined.<sup>27,28</sup> It was proposed that a person's approach and aptitude to regulating emotion is a major component in the onset and administration of anxiety disorders.<sup>31</sup> A recent study displayed a vigorous positive relationship between anxiety, emotion regulation, and expressive suppression and a notable negative association between anxiety and cognitive reappraisal.<sup>32</sup>

Numerous studies have shown positive association between diverse emotion regulation strategies and the Satisfaction with Life Scale (SWLS).<sup>33-35</sup> Explicitly, indications from long-term longitudinal investigation show that self-efficacy for the regulation of negative emotions forecasts life satisfaction.<sup>36</sup> One of the emotion regulation approaches is CR. It has been suggested that CR could be implemented to reduce negative sentiments and raise positive sentiments and adaptive behaviors;<sup>22,34</sup> however, another emotion regulation strategy (ES) is negatively associated with life satisfaction.<sup>33,37</sup>

When revising emotion regulation and well-being (and life satisfaction as its cognitive constituent), there are many procedural interrogations to respond to.<sup>38</sup> Is this relationship direct or indirect? In the last case, which influencer mediates the relationship? Additionally, should one consider the existence of a reverse causal pathway? Perhaps high life satisfaction aids people in using adaptive cognitive emotion regulation strategies. Lastly, a "third variable" such as an environmental condition or personality probably affects both cognitive emotion regulation strategies and life satisfaction or mental disorders (anxiety, depression).<sup>39</sup> All these questions imply statistical moderation effects.

Life satisfaction has been defined as the positive assessment that a person makes of their life in general or of particular aspects of it such as family, studies, work, health, friends, and free time.<sup>40</sup> Overall, life satisfaction was higher among those who had: higher socioeconomic status; a partner; social resources and support; financial resources; employment; good health; and certain personality features (low neuroticism, high extroversion). However, these effects clarified only moderate to modest quantities of variance in general life satisfaction.<sup>40-42</sup> Mental health problems constitute a significant class of potential forecasters of life satisfaction since, logically, mental health might perform a significant role in determining a person's life satisfaction and well-being. This subject has been much researched; normally, mental health troubles were related to decreased life satisfaction.<sup>43-48</sup> Mental health has been found to be the single biggest forecaster of life satisfaction.<sup>49</sup> Notwithstanding life satisfaction's relation to these mental health consequences, anxiety appears to be predominantly related to its onset and maintenance. Persons with anxiety hold negative views about themselves and the world and use evasive behaviors, which constrain their chances of being involved in meaningful social relations.<sup>4,50-52</sup>

Though anxious persons are risk decreased life satisfaction, not all anxious people have low life satisfaction, and not all people with high life satisfaction are free of anxiety. One probable divergence between anxious persons with more or less life satisfaction may be associated with their incapacity to regulate and state their feelings efficiently. Emotion regulation is supposed to play a significant part in the conservation of anxiety.<sup>53</sup> Two emotion regulation approaches broadly studied within anxiety disorders are CR and ES.<sup>22,53</sup> CR is commonly considered an adaptive emotion regulation approach; persons change their emotional responses to possibly emotion-provoking circumstances or stimuli by looking at them from a new viewpoint.<sup>22,54,55</sup> Persons who more frequently used CR reported more positive feelings and less negative feelings and displayed improved interpersonal operation and well-being.<sup>22</sup> In contrast, ES is commonly considered a maladaptive and frequently unsuccessful method of emotion regulation in which persons constrain the outward expression of their feelings.<sup>22,53-55</sup> Those who more frequently used ES report less positive feelings and more negative feelings and show poorer interpersonal operation.<sup>22</sup> Furthermore, ES has been found in research to have an unfavorable influence on social associations; persons who suppress the expression of their feelings indicate more discomfort in close relations, less satisfaction within relations, poorer social support and linking, and more separation.<sup>56-59</sup>

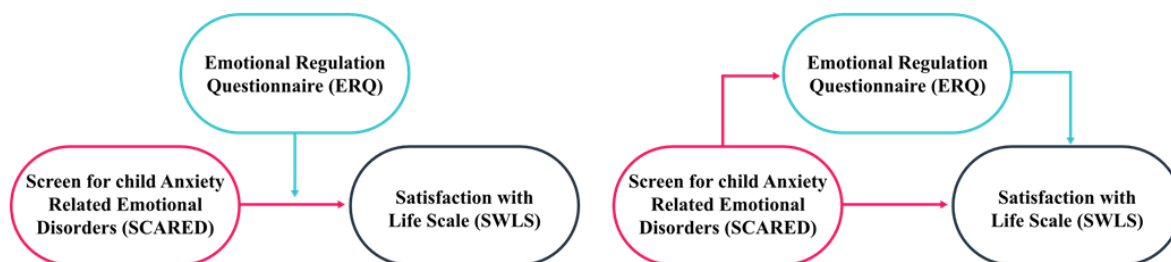
Anxiety is characterized by less frequent, and more unsuccessful use of CR and more frequent use of ES.<sup>55,60</sup> Persons with anxiety less frequently use CR compared to healthy controls.<sup>61-63</sup> In its place, anxious persons are more likely to trust ES to avoid rejection and negative assessment by others.<sup>55,60</sup> In one undergraduate sample, anxious persons used ES more frequently in replying to imagined social refusal than their non-anxious peers.<sup>64</sup> Furthermore, investigations revealed that persons with anxiety are also more likely

to suppress the expression of their feelings due to fear of negative assessment and rejection.<sup>63,65</sup>

There is a scarcity of data concerning the association between life satisfaction and anxiety being mediated/moderated by emotion regulation in international research work. Neither could we find any local paper affirming this association, so we studied the interrelation between these two variables, mediated/moderated by emotion regulation.

The present study builds on the earlier body of work. We evaluated anxiety and life satisfaction within a sample that we assumed would

display emotion regulation relatively powerfully. We also assumed that levels of anxiety affect life satisfaction depending on the degree to which persons use the emotion regulations and the significance they place on regulation. Nevertheless, we proposed the following model for emotion regulation as a mediator/moderator (Figure 1). The emotion regulation research detailed above evaluated what are moderator hypotheses, fundamentally, i.e., the emotion regulation affects the power and/or direction of an association (Figure 1, left). However, our research also uses determinations of anxiety resulting from a behavioral task to evaluate a mediator hypothesis (Figure 1, right).



**Figure 1** Conceptual framework for the study. Emotion regulation moderation for the relation between anxiety and life satisfaction is shown (left). Emotion regulation mediation in the relation between anxiety and life satisfaction is shown (right).

### Current study

Persons with anxiety frequently suppress the expression of their emotions (ES) and are less likely to try to reframe their negative emotional experiences (CR). Hitherto, investigation has not inspected how these emotion regulation approaches influence the association between life satisfaction and anxiety. We evaluated whether the use of these two emotion regulation approaches, maladaptive ES and adaptive CR, mediate and/or moderate the association observed between life satisfaction and anxiety. We hypothesized that higher anxiety would be related with lower life satisfaction, and higher life satisfaction would also be related with lower ES and higher CR. We then inspected whether these two emotion regulation approaches mediated and/or moderated the association between life satisfaction and anxiety. We hypothesized that higher CR would be related with a stronger negative association between anxiety and life satisfaction than lower CR. We furthermore hypothesized that higher ES would be related with a weaker positive relationship between anxiety and life satisfaction than lower ES.

As the previous research shows that there is a relationship between emotion regulation and anxiety, and the latter in turn is related to life satisfaction, it is expected that there will be a modifying and/or moderating effect of emotion regulation on the relationship of anxiety and life satisfaction. As a result, the following hypotheses were planned. H0a – There was no moderator effect of emotion regulation in the relation between anxiety and life satisfaction; H1a – There was a moderator effect of emotion regulation in the relation between anxiety and life satisfaction; H0b – There was no mediator effect of emotion regulation in the relation between anxiety and life satisfaction, and H1b – There was a mediator effect of emotion regulation in the relation between anxiety and life satisfaction.

Accordingly, the main objectives of this study were to: (a) determine the relations among emotion regulation, anxiety and life satisfaction, (b) estimate the role of emotion regulation (mediation and moderator) in the relation between anxiety and life satisfaction and (c) evaluate the differences in the total emotion regulation and its subscale scores, total anxiety and its subscale scores, and life satisfaction across gender and age.

### Material and methods

The sample comprised 1379 participants (952 female and 427 males), aged between 9 and 19 years ( $M=16.16$ ;  $SD=2.15$ ). The sample was divided into three groups based on the participants' ages: 9-to-less-than-12 years, ( $n=420$ ), 12-to-less-than-15 years ( $n=445$ ) and 15-19 ( $n=514$ ). The mothers of 617 (42.1%) and fathers of 591 (40.4%) participants were college graduates. Finally, 558 (38.1%) of the participants had a monthly household income greater than 10000 SR. Participants were recruited by e-mail.

An e-mail was sent to the participants and their parents to obtain authorization to apply a battery of assessment instruments, including the SWLS, the SCARED and the ERQ, to obtain the data. In the process, the purpose of the evaluation and the ethical considerations on confidentiality and non-transgression to people were explained, thus complying with the Declaration of Helsinki for studies with human beings.

### Three instruments were used in this research

The Satisfaction with Life Scale (SWLS),<sup>66</sup> is a 5-item questionnaire that assesses life satisfaction through people's global judgment. Each item has seven response options, whose values range between 7 – strongly agree; 6 – agree; 5 – slightly agree; 4 – neither agree nor disagree; 3 – slightly disagree; 2 – disagree, and 1 – strongly disagree. In total, the scores range from 5 – extremely dissatisfied to 35 – extremely satisfied. This instrument has been used in very many studies and has been shown to obtain very good psychometric properties. Its Cronbach's alpha values ranged from 0.89 to 0.79.<sup>66</sup> In the current study, Cronbach's Alpha was 0.84.

The Screen for Child Anxiety-Related Emotional Disorders (SCARED)<sup>67</sup> is a 41-item questionnaire that assesses the frequency of anxious symptoms using a Likert-type scale with three response options: (0 – never or almost never; 1 – sometimes; 2 – frequently, almost always). The total score ranges from 0 to 82. The authors noted an optimum cutoff of 25 for the clinical population in the United States. SCARED was developed based on clinical experience and the DSM-IV, which means that it is not a replica of an adult questionnaire. The factor study found five factors: panic/somatic, generalized anxiety,

separation anxiety, social phobia, and school phobia.<sup>67</sup> Girls (51%) had more anxiety symptoms than boys (41%). It had good reliability (global Cronbach's alpha of 0.83), with factors of 0.44 to 0.72. In the current study, the Cronbach's Alpha estimates were 0.93, and 0.86, 0.79, 0.71, 0.70 and 0.74, for the SCARED scale and subscales of panic disorder/significant somatic symptoms, generalized anxiety disorder, separation anxiety disorder, social anxiety disorder, and significant school avoidance, respectively. Its Arabic version has been verified.<sup>68</sup>

The Emotion Regulation Questionnaire (ERQ)<sup>22</sup> consists of 10 items divided into two subscales corresponding to the two emotional regulation strategies: CR (6 items) and ES (4 items). The items are answered on a 5-point Likert-type scale, from 1 – completely disagree to 5 — completely agree. The psychometric properties of the ERQ have shown an internal consistency of  $\alpha=0.75-0.82$  on the CR scale and  $\alpha=0.68-0.76$  on the ES scale, as well as good test-retest reliability.<sup>22</sup> In the current study, Cronbach's Alpha estimates were 0.83, and 0.82 and 0.70 for the ERQ scale and its two subscales, respectively.

### Statistical analysis

**Descriptive analysis:** The evaluation of the mean, standard deviation and range were determined for age. Frequency distributions were calculated for gender, mother's education, father's education, monthly household income and age groups. Descriptive statistics for all administered scales and subscales were calculated (mean, standard deviation and range).

**Correlation analysis:** The relations among emotion regulation and its subscales, anxiety and its subscales and life satisfaction were performed using the Pearson correlation coefficient analysis. The levels of probability were  $p < 0.05$  and  $p < 0.01$ .

**Moderation and mediation analyses:** The role of emotion regulation (mediation and moderation) in the relation between anxiety and life satisfaction was assessed using Hayes' Process Macro Version 3.5 in SPSS Statistic Software.<sup>69,70</sup> Model 1 and Model 4 were used to perform the moderation and mediation analysis, respectively. The level of confidence for all confidence intervals in output was 95.00% and the following variables were mean centered prior to analysis: ES\_ ERQ and SCARED in the moderation analysis. The level of confidence for all confidence intervals in output was 95.00% and the number of bootstrap samples for percentile bootstrap confidence intervals was 5000 in the mediation analysis. All the remaining estimation were carried out using SPSS Statistic Software Version 25.

**Multivariate analysis of variance:** The two-way multivariate analysis of variance (two-way MANOVA) was performed to evaluate the differences in the total emotion regulation and its subscale scores, total anxiety and its subscale scores and life satisfaction scores across gender and age. One multivariate test was used to evaluate the significance of the analysis, the Wilks' Lambda. The level was 1.0%. Frequency distribution tables were calculated for the scales and subscales across gender, age, and gender x age interaction.

## Results

### Sample demographics and descriptive statistics

The demographics of the sample are shown in Table 1. As has been noted, the sample was young with a mean of 16.16years, the standard deviation was low (2.15), and the range was 10years (9-19years). There was a high female proportion (69%). The sample was confined mainly to students with college-graduate parents (father and mother) followed by those with less than high school education for both parents. A monthly household income greater than 10000SR

was more common, and the lowest one was less than 5000SR. The various descriptive statistics for the administered scales and subscales are shown in Table 2.

**Table 1** Sample Demographics in the Study

Variable	Frequency	%
Age (years)		
Mean	16.16	
Standard Deviation	2.16	
Range	9-19	
Gender		
Female	952	69
Male	427	31
Mother's education		
Less than High School	554	37.8
High School	293	20
College Graduate	617	42.1
Father's education		
Less than High School	503	34.4
High School	370	25.3
College Graduate	591	40.4
Monthly household income		
Less than 5000 SR	457	31.2
5000-10000 SR	449	30.7
Greater than 10000 SR	558	38.1
Age (qualitative) (years)		
9-to-less-than-12	420	30.46
12 to-less-than-15	445	32.27
15-19	514	37.27

**Table 2** Descriptive Statistics for the Administered Scales and Subscales

Scale and subscales	Mean	Std Dev	Range
SCARED	36.6	15	0-82
Panic Disorder or Significant	11.2	5.8	0-26
<b>Somatic symptoms</b>			
Generalized Anxiety Disorder	9	4	0-18
Separation Anxiety Disorder	7.3	3.4	0-16
Social Anxiety Disorder	6.5	2.9	0-14
Significant School Avoidance	2.7	2	0-8
ERQ	48.7	11	10-70
Cognitive Reappraisal	30.7	7.3	6-42
Expressive Suppression	18	5.4	4-28
SWLS	23.7	7	5-35

† SCARED: Screen for Child Anxiety Related Disorders

### Correlation analysis

Table 3 shows the Pearson Correlation coefficient between the three scales and their subscales. As can be seen, SWLS was associated positively and highly significantly with ERQ and its subscales, and negatively and highly significantly with SCARED and all its

subscales excepting SEANSOC. ERQ was associated negatively and highly significantly with SCARED and its subscales PAN\_DIS and GEANDISO. The majority of subscales follow a trend like their respective scales for the correlation among them. Age was associated positively and significantly with ERQ and PAN\_DIS, but this correlation was very low (0.052 and 0.063), respectively).

**Table 3** Pearson Correlation Coefficient between the Three Scales and Their Subscales in the Study (N = 1464)

	SWLS	CR_ERQ	ES_ERQ	ERQ	PAN_DIS	GEANDISO	SEANSOC	SOCANXD	SIGSHAVO	SCARED
SWLS	1	0.463**	0.298**	0.451**	-0.129**	-0.201**	-0.007	-0.091**	-0.153**	-0.143**
CR_ERQ	0.463**	1	0.506**	0.907**	-0.112**	-0.127**	-0.051	-0.097**	-0.151**	-0.127**
ES_ERQ	0.298**	0.506**	1	0.822**	-0.004	-0.075**	0.073**	0.048	0.100**	0.018
ERQ	0.451**	0.907**	0.822**	1	-0.076**	-0.121**	0.002	-0.041	-0.051	-0.075**
PAN_DIS	-0.129**	-0.112**	-0.004	-0.076**	1	0.773**	0.571**	0.593**	0.636**	0.919**
GEANDISO	-0.201**	-0.127**	-0.075**	-0.121**	0.773**	1	0.510**	0.627**	0.591**	0.879**
SEANSOC	-0.007	-0.051	0.073**	0.002	0.571**	0.510**	1	0.469**	0.487**	0.736**
SOCANXD	-0.091**	-0.097**	0.048	-0.041	0.593**	0.627**	0.469**	1	0.499**	0.762**
SIGSHAVO	-0.153**	-0.151**	0.100**	-0.051	0.636**	0.591**	0.487**	0.499**	1	0.743**
SCARED	-0.143**	-0.127**	0.018	-0.075**	0.919**	0.879**	0.736**	0.762**	0.743**	1

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

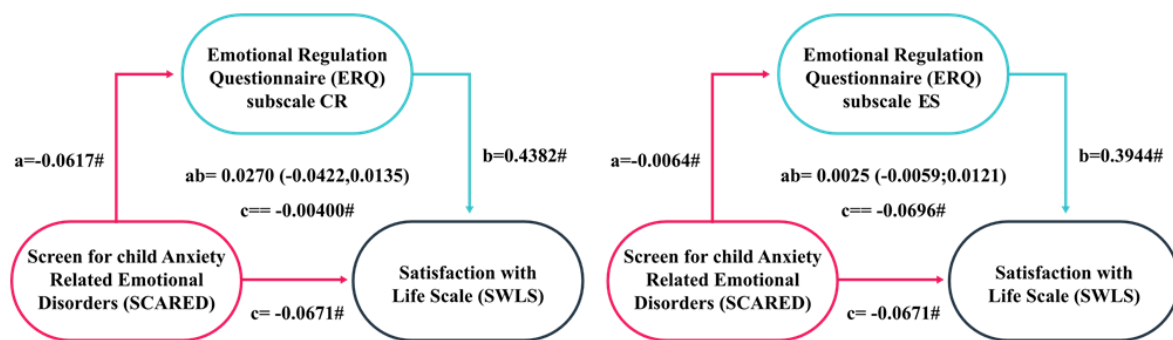
### Mediation hypothesis

All information comes from the PROCESS output.

#### Cognitive reappraisal

Outcomes from a simple mediation analysis show that anxiety was indirectly associated with life satisfaction through its association with CR. First, as can be observed in Figure 2 left, higher levels of anxiety revealed less CR than low levels ( $a=-0.0671$ ;  $p < 0.001$ ), and higher levels indicated CR was subsequently associated with more life

satisfaction ( $b=0.4382$ ,  $p < 0.001$ ). A 95% bias-corrected confidence interval based on 5,000 bootstrap samples shows that the indirect effect ( $ab=-0.027$ ) was completely below zero ( $-0.0422$ ;  $-0.0135$ ). Additionally, high anxiety levels revealed lower satisfaction life ( $c'=-0.0671$ ,  $p < 0.001$ ) even after taking into account anxiety's indirect effect through CR ( $c'=-0.0400$ ;  $p < 0.001$ ). CR's mediating effect can be seen in the indirect effect of anxiety on life satisfaction through CR (mediator) and was statistically significant ( $\beta=-0.0270$ , 95% confidence interval from  $-0.0422$  to  $-0.0135$ ).



**Figure 2** The mediating effect of emotion regulation (CR on the left, and ES on the right) in the relationship between anxiety and life satisfaction. Notes: \* $p < 0.05$ , \*\* $p < 0.01$ , #  $p < 0.001$ , ns  $> 0.05$ ; All presented effects are unstandardized; a is effect of anxiety on emotion regulation; b is effect of emotion regulation on satisfaction life; c' is direct effect of anxiety on life satisfaction; c is total effect of anxiety on life satisfaction; ab is indirect effect of anxiety through ER.

#### Expressive suppression

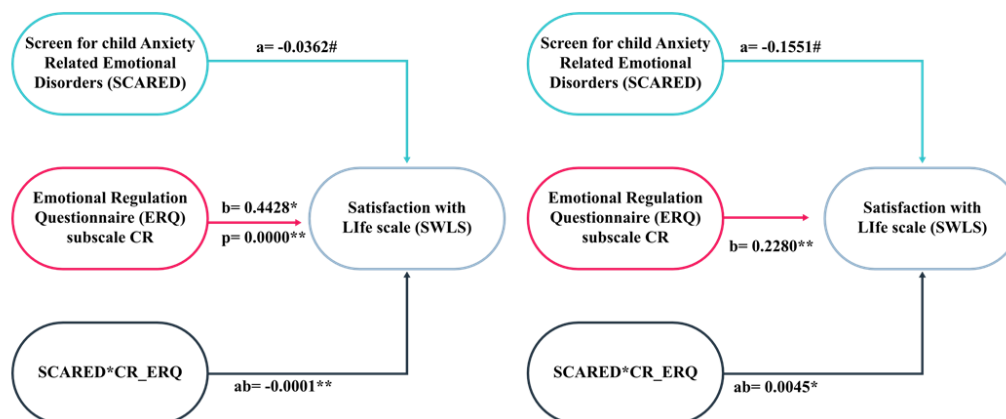
Outcomes from a simple mediation analysis showed that anxiety was indirectly associated with life satisfaction through its association with ES. First, as can be observed in Figure 2, a higher or lower level of anxiety do not equate to less or more or *vice versa* ES ( $a=0.0064$ ;

$p > 0.050.001$ ), and a higher level of ES was subsequently associated with more life satisfaction ( $b=0.3944$ ,  $p < 0.001$ ). A 95% bias-corrected confidence interval based on 5,000 bootstrap samples shown that the indirect effect ( $ab=0.0025$ ) was completely between zero ( $-0.0059$  and  $0.0121$ ). Additionally, high anxiety levels equate to lower life satisfaction ( $c'=-0.0671$ ,  $p < 0.001$ ) even after taking into account

anxiety's indirect effect through ES ( $c' = -0.0696$ ;  $p < 0.001$ ). ES did not have a mediating effect in which the indirect effect of anxiety on life satisfaction through ES (mediator) was statistically significant ( $\beta = 0.0025$ , 95% confidence interval from  $-0.0059$  to  $0.0121$ ).

### Moderation analysis

All this information comes from the PROCESS output.



**Figure 3** The moderating effect of emotion regulation on the relation between anxiety and satisfaction life. Notes: \* $p < 0.05$ , \*\* $p < 0.01$ , #  $p < 0.001$ ,  $p > 0.05$ ns; All presented effects are unstandardized; a is effect of anxiety on life satisfaction; b is effect of emotion regulation on life satisfaction; ab is the interaction between anxiety and emotion regulation (moderation effect).

### Expressive suppression

A sequence of analyses was carried out to evaluate the hypothesis about the moderating effect of ES. ES did establish a moderating effect as there was a significant relationship between anxiety and life satisfaction ( $\beta = -0.01651\#$ , and an interaction effect of anxiety and cognitive reappraisal on life satisfaction ( $\beta = 0.0045^*$ ). Figure 3, on the right, shows the resultant model for the moderation effect of ES.

### Multivariate analysis of variance

The multivariate test, Wilks' Lambda, can be used to test the statistical significance of the diverse effects of the independent variables. This test for the relationship of ERQ, gender and age had a value=0.981 with a  $F = 14.090$ ,  $df = 2$ . Error  $df = 1458$  and probability=0.000, indicating that the ERQ and its subscales scores will vary according to gender and age. The simple effect of age and gender were also highly significant. The interaction was manifested only in the age group 15-19years, when females have more cognitive reappraisals scores ( $M = 30.63$ ,  $SD = 7.39$ ) than males ( $M = 21.00$ ,  $SD = 0.01$ ), but in the same age group men have more expressive suppression values ( $M = 28.00$ ,  $SD = 0.01$ ) than women ( $M = 17.71$ ,  $SD = 5.53$ ). There is no variation between males and females in the age groups 9-to-less-than-12 and 12-to-less-than-15.

The two-way analysis of variance for SWLS for the interaction age\*gender, indicated that the Type III Sum of Squares=586.152 with  $df = 1$ . Mean square=586.152,  $F = 12.033$ , and a probability=0.001 was significant, suggesting that the SWLS scores will vary according to gender and age. The simple effect of age and gender were highly significant. The interaction was manifested only in the age group 15-19years, where female have more life satisfaction scores ( $M = 23.60$ ,  $SD = 7.03$ ) than men ( $M = 7.00$ ,  $SD = -0.001$ ). There is no variation between males and females in the age groups 9-to-less-than-12 and 12-to-less-than-15.

### Cognitive reappraisal

A sequence of analyses was carried out to evaluate the hypothesis about the moderating effect of CR. CR did not establish a moderating effect as there was no significant relationship between anxiety and life satisfaction ( $\beta = -0.0362^{ns}$ ), and no interaction of the effect of anxiety and CR on life satisfaction ( $\beta = -0.0001^{ns}$ ). Figure 3 shows the result of the model for the moderation effect of CR.

### Discussion

In general terms, the results show that emotion regulation has a mediating and moderating effect on the relationship between satisfaction with life and anxiety. More specifically, CR mediated its relationships, and ES moderated the relation between anxiety and satisfaction with life. It can thus be seen that emotion regulation is related to indicators and satisfaction with life through emotion regulation. Thus, there are various strategies to regulate emotions, but not all lead to the same psychological results; the strategy used in a specific event will have a more or less adaptive effect. For example, Gross and John pointed out that people who used CR more frequently showed more positive affect, higher self-esteem, better interpersonal functioning, and satisfaction with life than those who did not use it; people who tended to use ES experienced the opposite.<sup>22</sup>

Therefore, it is not surprising that difficulties in emotion regulation are related to the development of psychopathology.<sup>71</sup> In fact, poor regulation of emotion is implicated in more than half of Axis I disorders and in all Axis II disorders included in the Diagnostic and Statistical Manual of Mental Disorders.<sup>23</sup> However, extensive research suggests that emotion regulation problems may be more closely related to some psychological disorders than others. Thus, a recent meta-analysis observed that although there was a relationship between deficiencies in emotion regulation and multiple psychopathologies, the most significant relationship was found with mood disorders and anxiety.<sup>72</sup> Numerous investigations have confirmed that emotion regulation problems are at the core of depression and anxiety, which shows the importance of adequate emotion regulation in the intervention of these disorders, and in addition, a high comorbidity between emotional disorders.<sup>73,74</sup> Salovey and Mayer indicated that the emotion regulation contemplates the control of negative feelings such as anxiety and demands that the individual identifies the factors they must modify, maintain, or even discard to achieve their objectives, taking into account their long and short-term goals and the reward they can obtain

from this whole process.<sup>75</sup> Based on these references, the results obtained in this study in which the emotion regulation (CR and ES) has a mediating and moderating effect, respectively, on anxiety, in its relation to satisfaction with life are to be expected.

On the other hand, examination of the interaction between age, gender, and emotion regulation revealed an interaction among them, similar to those obtained in this current study.<sup>76</sup> Gross and John<sup>22</sup> indicated that male participants in the current research would have higher levels of ES. These discoveries are congruent with earlier inspection of gender dissimilarities in the ERQ answers. They are consistent with other research examining ES in men and women, suggesting that men are inclined to suppress their emotions more than women.<sup>77-79</sup> As for gender divergencies, most researchers propose that males are inclined to show superior ES, while no differences have been found between females and males concerning the usage of CR.<sup>22,80-82</sup> Those results are not congruent with the current study. However, but they are consistent with other research reporting that women seem to use CR to a greater level than men.<sup>83-84</sup>

Regarding age differences in the usage of CR and ES, the outcomes show that younger adolescents used more CR and ES than their older counterparts.<sup>85</sup> This has been previously demonstrated.<sup>86</sup> In relation to life satisfaction, gender, and age, Sirgy<sup>87</sup> indicated in his review of demographic influences on subjective life quality that around 10-15% of the variance in satisfaction with life can be explained by demographic features comprising gender and age. The present investigation shows that age has less influence on life satisfaction than gender. Even in research with the most solid associations between subjective well-being and age, age explained only 3% of the variance in satisfaction with life values.<sup>88</sup> Most research indicates that the influence of age is U-shaped, with the smallest influence occurring in middle adulthood.<sup>84,87,89</sup> But that influence depends on diverse domain satisfaction, life quality measures, and differences among nations. For instance, international research of subjective well-being by the Personal Wellbeing Index (PWI) displayed that satisfaction with life rises with age in Australia, Algeria<sup>90</sup>, China<sup>91</sup>, Thailand<sup>92</sup>, Croatia.<sup>93</sup> and Russia.<sup>94</sup>

As for gender influences on subjective life quality, in most nations, females are more satisfied with their life than males.<sup>90, 92,95-97</sup> Similar results were found in this current study for the 20-34years age group. Simultaneously, research across cultures has shown that these discoveries are not imitated across all nations.<sup>88,93,98,99</sup> Gender differences in subjective well-being are accounted for by universal sex differences on the one hand and by different living circumstances on the other. Universal sex differences include the fact that women experience higher frequency and intensity of both enjoyable and disagreeable feelings and have greater vulnerability to anxiety and depression, which has been connected to progesterone and estrogen production. Some investigators consider significant living circumstances, which are dissimilar for women and men, such as the opportunity to have higher status, violence, prescribed gender roles, access to individual resources, weakness and national freedom, chance structures, etc.<sup>100</sup> Inglehart<sup>101</sup> suggested that important gender-related dissimilarities in subjective well-being can be explained by an interaction effect between gender, age, and well-being. He showed that women under 45 are inclined to be happier than men, but older women are less happy. Regarding the family environment, the results agree with Sánchez and Quiroga, who reported that the relationship between family and satisfaction is mediated by age and sex.<sup>102</sup>

In relation to anxiety, similar results were reported after study of the interaction among anxiety, age, and gender.<sup>103</sup> Women of reproductive age are approximately 2-3 times more vulnerable to developing anxiety disorders than men. In fact, 17.5% of women

compared to 9.5% of men suffered an anxiety disorder throughout their lives, while 8.7% of women compared to 3.8% of men had suffered an anxiety disorder in the last year.<sup>103</sup> Being a man or a woman can influence the prevalence of mental disorders, but also their manifestation and expression of symptoms, willingness to request medical or psychological assistance, and the course of the disease, including the response to treatment.<sup>104,105</sup> Similar results were found in this study when SCARED and its subscales PAN\_DIS, SEANSOC, and SOCANXDI presented higher scores for women than men in the 15-19years age group, and SOCANXDI presented higher scores for women than men.

A set of factors has been identified that explains the female predominance in anxiety disorders, and the differences between the sexes in other psychiatric disorders. They include psychosocial and sociocultural factors such as differences in coping styles, sexual role, poverty, educational level, marital status, income level, social support, social isolation, childhood adversity, social changes, cultural norms, vulnerability to exposure, and reactivity to stressful life events. Other factors that suggest sex differences include prior comorbidity, genetic predisposition, personality traits, sex hormones, endocrine reactivity to stress, neurotransmission systems, and neuropsychological determinants.<sup>106</sup> There is consensus that psychosocial and sociocultural factors cannot explain all the differences observed between the sexes, and given the consistency of the findings in the different cultural groups, the conclusion is that gender differences in the rates of psychiatric disorders are largely psychobiological. Evaluating which of the explanatory differentiating factors are biological or social in nature will allow us to know which are immutable and which are not.<sup>107</sup>

In relation to age, anxiety disorders are among the earliest-onset disorders and mostly begin between second childhood and middle adolescence.<sup>108</sup> It is common for anxiety disorders to appear within a context of inhibition, temperamentality, and shyness. Therefore, it is often difficult to determine exactly when the anxiety disorder starts, and it can be said to some extent that anxious children are often anxious from birth. However, the average age estimates of initiation for the different disorders are as follows (though for an individual, the disorder can start earlier): Animal phobias – early childhood (about 6-7years); Separation Anxiety Disorder – first to second childhood (around 7-8years); Generalized Anxiety Disorder – toward the end of childhood (around 10-12years); Social Anxiety Disorder – early adolescence (around 11-13years); Obsessive-Compulsive Disorder – mid-teens (around 11-15years) and Panic Disorder – early adulthood (about 22-24years).

In the region of the Americas, as many as 7.7% of the female population are estimated to suffer from anxiety disorder (males, 3.6%). WHO estimated that 264 million people live with anxiety disorders globally, which represents an increase of 14.9% since 2005; and that in 2015 the global prevalence of anxiety disorders was 3.6%. These are more prevalent in women (4.6%) than in men (2.6%).<sup>109</sup> According to WHO the prevalence does not vary substantially between the different age groups, though there is a noticeable tendency toward a lower occurrence among elder age groups.<sup>109</sup>

## Conclusion

Despite the limitations below, this work contributes to the knowledge of the variables involved in people's satisfaction with life. Specifically, knowing the moderator and mediator roles of emotion regulation in the relationship between satisfaction with life and anxiety can contribute to the design of productive programs for the promotion of mental health and prevention of mental health problems in the population. Emotion regulation is usually used without

knowledge about the possibility of exercising control over the course of emotions, or the effects that different forms of regulation have on daily life and interpersonal relationships. In this sense, designing intervention programs that promote the use of CR and ES, two of the main strategies of emotion regulation could have a direct impact on levels of well-being and, indirectly, better prepare individuals to face different situations in life. The results of this study would help the policymakers especially the Ministry of Education, to devise plans and policies aiming to improve students' psychological wellbeing and improve their contribution to the progression and development of the country. The psychological problems if are not addressed adequately can lead to various mental illnesses and disorders. Students are highly vulnerable to stress and anxiety due to their study routines and events of life. If required counseling is not offered to such students in a timely manner, it can severely affect their academic performance and health. The Kingdom is concentrating highly to impart youth with skills and knowledge that allow them to contribute effectively to realize the dream of a sustainable and diversified economy in line with Saudi vision of 2030.

## Limitations

One of the main limitations of this study is the gender ratio. Women were 69% of the sample and men, 31%. This is considered as a limitation because it is well known that gender influences the three scales used in this study, that is, the SWLS, SCARED and EQR, which can produce unexpected results.

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## Conflicts of interest

The authors declare no conflict of interest exists.

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