



Perceived emotional intelligence and subjective well-being during adolescence: The moderating effect of age and sex

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Abstract

Studies focusing on subjective well-being during adolescence are relatively scarce yet necessary, due to the drop in well-being that occurs during this developmental stage. The aim of the present study is therefore: (1) to analyze the variability of perceived emotional intelligence (PEI) and subjective well-being in accordance with sex and age; and (2) to explore the moderating effect of sex and age on the association between PEI and subjective well-being. The sample comprised 1542 students aged between 11 and 18 years, divided into two age groups: younger (11–14 years) and older (15–18 years). All participants completed the Trait Meta Mood Scale and the Satisfaction with Life Scale. Several ANOVAs and MANOVAs were performed using the SPSSv.28 statistical package. The simple moderation models were analyzed using the PROCESSv.4 macro. Age was the socio-personal variable that most significantly affected emotion repair and life satisfaction, whereas sex had a greater effect on the other variables studied. Sex moderated the predictive effect of emotional clarity on negative affect among girls, the predicted the effect of emotional attention on positive affect among boys, as well as the predictive effect of emotional clarity on life satisfaction in both groups. The theoretical and practical implications of these results are discussed.

Keywords Emotional attention · Emotional clarity · Emotional repair · Age · Sex · Adolescence

Introduction

Within the positive psychology movement, both subjective well-being and emotional intelligence have prompted a growing number of theoretical and empirical studies in relatively little time, probably due to their strong associations with physical, mental and relational health (Kushlev et al., 2020; Sánchez-Álvarez et al., 2016). Nevertheless, although adolescence is considered a crucial stage in the life cycle for fostering the development of emotional abilities that help increase individual happiness (Guerra-Bustamante et al., 2019), few studies have focused on this developmental period from positive psychology, being necessary research

on optimal development and functioning (Gómez-López et al., 2019; Huebner et al., 2009; Zhou et al., 2020), but especially on the mechanisms through which adolescents perceive greater subjective well-being (Llamas-Díaz et al., 2022). It is important to fill this gap in the literature, since life satisfaction and overall subjective well-being have been found to decrease considerably during adolescence (González-Carrasco et al., 2017).

Theoretical background

Perceived emotional intelligence

The understanding of emotional intelligence varies according to the theoretical approach. Thus, the so-called emotional intelligence ability refers to cognitive-emotional skills related to the processing of emotional information, while the mixed approach encompasses both emotional skills and personality traits. But, at the same time, it is also necessary to take into account the measurement instrument used for the assessment of each of them: self-reports and performance tests (Joseph & Newman, 2010). This study,

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in particular, addresses the perception (self-report) of emotional intelligence ability, because it has been shown that this perception contributes significantly to subjective well-being (Sánchez-Álvarez et al., 2016). Therefore, the present study analyzes perceived emotional intelligence (PEI), understood as an individual's set of beliefs about their own ability to process emotionally-charged information. The concept is based on Salovey and Mayer's ability model (1990), which describes people's perceptions of their capacity to pay attention to their feelings (emotional attention), the clarity with which they are experienced (emotional clarity) and their ability to manage them (emotional repair).

In terms of age, many authors hold that emotional intelligence develops and improves over time, arguing that more emotion-related learning experiences lead to the development of improved emotional abilities and a greater perception of these abilities (Mankus et al., 2016). Although empirical evidence of this age-related pattern of improvement has been found in the adult population, it has yet to be determined whether or not it holds true also in adolescence. Mayer et al.'s ability model (1999, 2021) proposes a "development criterion" for emotional intelligence, at least for the period between childhood and adulthood. The model predicts a linear increase in emotional management with age, as a result of the adaptive function that develops alongside cognitive and social skills (Tsaousis & Kazi, 2013). Specifically, the authors propose this criterion as a validation of emotional intelligence ability, as they argue that this construct, being a type of intelligence, improves with experience and age. In fact, their study supports this premise, as they have found that emotional skills are more developed in adulthood than in adolescence. However, some studies have found negative or non-significant associations between age and specific aspects of PEI in adolescence. Specifically, some studies report that emotional attention increases exponentially throughout adolescence, whereas emotional repair decreases significantly (Salguero et al., 2010). In relation to emotional clarity, the results are contradictory, with some authors finding no differences (Salguero et al., 2010) and others reporting greater clarity among younger adolescents (Gómez-Baya et al., 2017; Gorostiaga et al., 2010).

In terms of sex, the emotional dimension has generally been associated with the female sex during both adolescence and adulthood (Fernández-Berrocal et al., 2012). Indeed, previous studies report that adolescent girls demonstrate greater emotional competence, higher levels of interpersonal knowledge and better social skills (Nayak, 2014). Nevertheless, studies have also found that boys score better for the ability to understand emotions clearly and to repair negative and maintain positive ones, whereas girls score higher for attention paid to emotions (Flynn & Rudolph, 2014; Gorostiaga et al., 2011; Haas et al., 2019).

In relation to the variability of PEI in accordance with both sex and age together, previous research has found a significant influence of sex on emotional attention, with age and the interaction between the two socio-personal variables being insignificant or very small (Gómez-Baya et al., 2017; Salguero et al., 2010). As regards emotional clarity, previous studies also found that sex had greater explanatory power than age or the interaction between the two variables, although the importance attributed to age varies, with some authors reporting a small effect (Salguero et al., 2010) and others no effect at all (Gómez-Baya et al., 2017). In contrast, Gorostiaga et al. (2010) identified age as the factor with the strongest effect on this dimension. Finally, in relation to emotional repair, age seems to have the strongest influence (Gorostiaga et al., 2010; Salguero et al., 2010), although sex has also been found to have some effect, whereas the results reported for the interaction between sex and age are contradictory (Gorostiaga et al., 2010; Salguero et al., 2010).

Subjective well-being

Subjective well-being, which is located within the hedonist approach to the broad concept of well-being, encompasses the cognitive and affective hedonist assessments that individuals make about their lives (Maddux, 2018). It is currently accepted that subjective well-being comprises three separate yet associated components (Diener et al., 1985): (1) reflexive cognitive judgments about how satisfied people feel with their own life (life satisfaction); (2) positive or pleasant emotional responses to one's life (positive affect); and (3) negative or unpleasant emotional responses (negative affect).

In terms of age, previous cross-sectional (Casas and González-Carrasco, 2019; Aymerich et al., 2021) and the few longitudinal (González-Carrasco et al., 2017) research report a progressive drop in subjective well-being levels from early to late adolescence, due mainly to the developmental changes that occur during this period in relation to the brain, the endocrine system, emotions, cognition, behavior and interpersonal relations (Goldbeck et al., 2007). This decrease has been found in many different countries, and has been estimated to affect 99% of adolescents (Orben et al., 2022). Specifically, the results reported to date reveal a progressive drop in both the cognitive and affective components of well-being from around 13 to 15–16 years of age (Tomy et al., 2013). The results pertaining to older age groups, however, are contradictory. For example, some authors have found that life satisfaction decrease from age 17 to age 21 (Willroth et al., 2021). However, Steinmayr et al. (2019) observed that all three components of well-being improved after the end of compulsory education, and Aymerich et al., (2021) report similar results, highlighting the relatively sharp increase in life satisfaction among adolescents aged 16–18 years.

In terms of the variability of subjective well-being in accordance with sex, the results are again somewhat contradictory (Meisenberg & Woodley, 2015). On the one hand, many studies have reported significantly lower scores among girls than among boys for subjective well-being and life satisfaction (Bedin & Sarriera, 2015; Esteban-Gonzalo et al., 2020; Goldbeck et al., 2007; González-Carrasco et al., 2017). In their study with students aged between 6 and 18, Aymerich et al., (2021) found significant differences in life satisfaction from age 12 onwards, with girls feeling less satisfied than boys, and Soares et al. (2019) found that boys aged 13 to 19 reported significantly higher life satisfaction than girls. Similar trends were observed by Casas and González-Carrasco (2019) in relation to the affective components of well-being, with the decrease in positive affect and increase in negative affect being more pronounced among girls aged 10–18 than among their male counterparts. Nevertheless, other studies have found hardly any differences among secondary school students (Esteban-Gonzalo et al., 2020).

As regards the variability of life satisfaction in accordance with sex and age together, the results are again contradictory, with some authors finding no significant influence of sex on either this variable (Pilkauskaitė & Gabrielaviciute, 2015) or the affective components of subjective well-being (Toplu-Demirtaş et al., 2018), and others reporting a significant effect on both the cognitive (Bedin & Sarriera, 2015; Love & Holder, 2014) and affective dimensions (Love & Holder, 2014). Schütz et al. (2019) reported a significant effect of age on life satisfaction and Ramos dos Santos et al. (2019) also observed variability in this variable associated with age and sex when different life satisfaction indicators were used. Yang et al. (2017) found that sex and age explained life satisfaction and negative affect, whereas only sex explained positive affect. Finally, Wilson and Somhlaba (2018) reported a significant effect of sex, but not age, on life satisfaction.

PEI and subjective well-being

Previous research has shown that as adolescents' ability to understand and regulate their emotions improves, so too does their well-being (Guerra-Bustamante et al., 2019), since intelligent management of emotions helps prevent negative feelings and increase positive ones, thereby fostering greater satisfaction with life (Sánchez-Álvarez et al., 2016). These findings are supported by the results reported by Martínez-Marín and Martínez (2019), who found that emotional clarity and repair were negatively associated with negative affect and positively associated with life satisfaction and positive affect. Moreover, in light of the mediation models analyzed and the effect sizes found, these authors also highlight the important role played by emotional clarity

and repair in fostering subjective well-being. In relation to emotional attention, previous research has either failed to find any association (Guerra-Bustamante et al., 2019) or has only found a negative one between this component of PEI and subjective well-being (Martínez-Marín and Martínez, 2019). Studies that include the specific components of well-being have found that emotional attention is positively associated with negative affect, but is not significantly associated with either positive affect or life satisfaction (Ramos-Díaz et al., 2019), although others have found a negative association with the cognitive component of subjective well-being (Blasco-Belled et al., 2020).

In addition to the direct effects of age and sex outlined above, it is also important to analyze how these socio-personal variables moderate the association between PEI and subjective well-being. In light of the results described in previous sections, it is logical to assume that certain emotional abilities may be important to predicting well-being in certain sex and age groups. The meta-analysis conducted by Xu et al. (2021) found that certain demographic variables, including age, moderated the association between PEI and subjective well-being, although the authors did not find any moderating effect of sex. However, the study took both PEI and subjective well-being into account from a global perspective, and very few studies were found that analyzed the moderating effect of sex and age in terms of the specific components of these two constructs. In this sense, the study by Li et al. (2019) suggests that sex does indeed moderate the association between PEI and subjective well-being, since this socio-personal variable was found to moderate the relationship between regulation strategies and life satisfaction. Other studies also suggest that sex may be a moderating variable similar to other constructs associated with subjective well-being, such as mood (Abbas et al., 2018) and health behaviors (Malinauskas et al., 2018). Moreover, according to the homeostatic theory of subjective well-being, the feeling of well-being tends to remain stable under the normal circumstances of life (Luhmann & Intelisano, 2018), although it is sensitive to modifications triggered by life challenges (Tomyn et al., 2015) and may vary in accordance with life changes and regulatory adjustment processes, which are particularly frequent during adolescence (Cummins, et al., 2014). Together, these findings suggest the likelihood of socio-personal variables such as age and sex significantly affecting the way in which PEI predicts subjective well-being.

The present study

Given that PEI and subjective well-being are variables that contribute to adaptive behavior (Kushlev et al., 2020; Sánchez-Álvarez et al., 2016), it is important to understand

how they develop during adolescence and to identify the factors associated with their evolution (Steinmayr et al., 2019). Relatively few studies to date within this field have focused on adolescents (González-Carrasco et al., 2017; Salguero et al., 2010) and empirical research into the role of sex and age in PEI and subjective well-being has yet to provide clear results (Steinmayr et al., 2019). Moreover, studies tend to use life satisfaction as the sole representative component of well-being (Jebb et al., 2020), and it is important to include the affective components also in order to gain a clearer understanding of how this construct develops and how it is associated with PEI. The study therefore has two aims: (1) to analyze the variability of PEI and subjective well-being in accordance with sex and age; and (2) to explore the moderating effect of these socio-personal variables on the association between PEI and subjective well-being.

Method

Participants

The sample comprised 1542 students (Table 1) from public ($n=948$, 61.5%) and semi-private schools ($n=594$, 38.5%) in the Autonomous Community of the Basque Country, from the 1st year of compulsory secondary education to the 2nd year of the Spanish Baccalaureate. In terms of sex, 727 (47.2%) were boys and 815 (52.8%) were girls. To calculate age differences and avoid the cohort effect (González-Carrasco et al., 2017), two categories were established: (1) younger adolescents, comprising 879 (57%) participants aged 11–14 years ($M=13.99$, $SD=0.86$); and (2) older adolescents, comprising 663 (43%) participants aged 15–18 years ($M=15.76$, $SD=1.07$). Pearson’s χ^2 test was used to confirm the hypothesis of interdependence between sex and age ($\chi^2=1.97$, $p=0.162$). The socioeconomic and cultural level of the sample was medium.

Instruments

PEI was measured using the *Trait Meta-Mood Scale* (TMMS) by Salovey et al. (1995), adapted to Spanish by Fernández-Berrocal et al. (2004). This scale assesses the perception of three emotional intelligence abilities: (1) *emotional attention*,

defined as the ability to recognize emotions and emotional states (“I think about my mood constantly”); (2) *emotional clarity*, referring to the ability to distinguish and understand emotions (“I am usually very clear about my feelings”); and (3) *emotional repair*, referring to the ability to effectively regulate and control positive and negative emotions (“Although I am sometimes sad, I mostly have an optimistic outlook”). The scale comprises 24 items rated on a 5-point Likert-type scale ranging from 1 = *strongly disagree* to 5 = *strongly agree*. The reliability values obtained in this study were: *emotional attention* ($\alpha=0.896$, $H=0.910$), *emotional clarity* ($\alpha=0.865$, $H=0.873$) and *emotion repair* ($\alpha=0.843$, $H=0.192$). The H coefficient is interpreted as the maximum proportion of variance of the theoretical construct that can be explained by its indicators, or in other words, as the reliability of the optimal linear combination between items (Hancock & Mueller, 2001). Among its properties, it stands out that its value is equal to or greater than the reliability of the most reliable item, it does not depend on the sign of the factor loadings, nor does decrease when the number of items increases (Viladrich et al., 2017).

Life satisfaction was measured using the *Satisfaction with Life Scale* (SWLS) by Diener et al. (1985), validated in Spanish by Atienza et al. (2000). This 5-item scale measures respondents’ overall and cognitive appraisals of their life cycle (“In most ways my life is close to my ideal”). Items are rated on a 7-point Likert-type scale ranging from 1 = *strongly disagree* to 7 = *strongly agree*. The reliability values obtained in this study were $\alpha=0.824$ and $H=856$.

Positive and negative affect were measured using the *Positive and Negative Affect Scale* (PNA; Bradburn, 1969) translated into Spanish by Godoy-Izquierdo et al. (2008). The questionnaire comprises 18 items and directly measures respondents’ experience of both positive (“Have you felt euphoric?”) and negative affect (“Have you felt like crying?”). Items are rated on a 4-point Likert-type scale ranging from 1 = *never* to 4 = *all the time*. The reliability values obtained in this study were satisfactory: *negative affect* ($\alpha=0.783$, $H=823$) and *positive affect* ($\alpha=0.807$, $H=864$).

Procedure

Once telephone contact had been established and the corresponding procedures had been completed with each school,

Table 1 Distribution of participants

| | Boys | | Girls | | Total | |
|-----------------------------------|------|------|-------|------|-------|-----|
| | n | % | n | % | n | % |
| Younger adolescents (11–14 years) | 428 | 27.8 | 451 | 29.2 | 879 | 57 |
| Older adolescents (15–18 years) | 299 | 19.4 | 364 | 23.6 | 663 | 43 |
| Total | 727 | 47.2 | 815 | 2.8 | 1542 | 100 |

informed consent was obtained from participants’ parents or legal guardians. The sampling technique used was incidental. Data were collected from each group during class time. The battery of questionnaires was administered to participants under the supervision of a researcher who was present to facilitate the process and resolve any doubts that may arise. Sessions lasted around 20 min and respondents were assured that their answers would be anonymous and that their participation was strictly voluntary. The simple single blind criterion was applied to prevent participants from knowing the aim of the research and to reduce the effect of social desirability bias. The study complies with the ethical criteria established by the University of the Basque Country.

Statistical analyses

Missing values (2.1%) were calculated using the expectation maximization (EM) algorithm and Markov chain Monte Carlo (MCMC), both offered by the LISREL 8.8 program. Outliers were also eliminated using the SAS program ($n=273$ participants).

Two MANOVAs and six ANOVAs were performed (2 (sex) × 2 (age)) and *Pillai’s Trace* (V) was used, based on the characteristics of the study’s statistical design (Ateş et al., 2019). Linearity, together with assumptions required in this type of analysis (Field, 2009), was studied by means of scatter plots, P-P and Q-Q plots, and was observed that the data fit the diagonal line with a fair degree of accuracy. The *eta-squared* (η^2_p) value was utilized to estimate the size of the effect of the socio-personal variables on PEI and subjective well-being, using the criteria established by Cohen (1988): small = $\eta^2_p < 0.01$; medium = $0.06 < \eta^2_p < 0.14$; large = $\eta^2_p > 0.14$.

After performing several regression analyses to explore the predictive effect of PEI on subjective well-being, various

simple moderation models were tested using the PROCESS macro (Hayes, 2018) to identify any possible moderating effects of sex and age. The bootstrapping method was used with 10,000 sample to obtain a 95% confidence interval ($p < 0.05$).

Results

PEI and subjective well-being in accordance with sex and age

In relation to the results for PEI, the multivariate contrast revealed significant effects for sex (*Pillai’s Trace* = 0.85, $F = 47.69$, $p < 0.001$, $\eta^2_p = 0.085$) and age (*Pillai’s Trace* = 0.24, $F = 12.40$, $p < 0.001$, $\eta^2_p = 0.024$), as well as for the interaction between these two independent variables (*Pillai’s Trace* = 0.85, $F = 2.88$, $p < 0.05$, $\eta^2_p = 0.006$).

The results shown in Table 2 reveal that older adolescent girls scored highest for *emotional attention* ($M = 26.78$; $SD = 6.75$), and lowest for *emotional clarity* ($M = 23.13$; $SD = 6.48$) and *emotional repair* ($M = 25.86$; $SD = 6.69$); whereas younger adolescent boys scored highest for *emotional clarity* ($M = 26.62$; $SD = 6.35$) and *emotional repair* ($M = 28.55$; $SD = 6.68$) (Fig. 1). According to the results of the ANOVAs, these inter-group differences are mostly due to sex, with the main effect being relatively high in the case of *emotional clarity* ($F = 47.57$, $p < 0.001$, $\eta^2_p = 0.030$) and *emotional attention* ($F = 49.57$, $p < 0.001$, $\eta^2_p = 0.031$), with medium-moderate effect sizes. Age, on the other hand, was the variable that best explained the differences observed in *emotional repair* ($F = 20.15$, $p < 0.01$), with a medium effect size ($\eta^2_p = 0.013$).

Table 2 Main and interaction effects of the independent variables on PEI

| | | Emotional attention | | Emotional clarity | | Emotional repair | |
|--------------|--------|---------------------|--------------|-------------------|--------------|-------------------|--------------|
| | | 11–14 years | 15–18 years | 11–14 years | 15–18 years | 11–14 years | 15–18 years |
| Boys | M (sd) | 23.45 (7.19) | 23.43 (6.86) | 26.62 (6.35) | 25.73 (6.02) | 28.55 (6.68) | 27.34 (6.18) |
| Girls | M (sd) | 25.16 (7.04) | 26.78 (6.75) | 24.60 (6.70) | 23.13 (6.48) | 27.73 (6.89) | 25.86 (6.69) |
| Fixed factor | | | | | | | |
| sex | | $F = 49.57^{***}$ | | $F = 47.57^{***}$ | | $F = 11.29^{***}$ | |
| | | $p < .001$ | | $p < .001$ | | $p < .001$ | |
| | | $\eta^2_p = .031$ | | $\eta^2_p = .030$ | | $\eta^2_p = .007$ | |
| age | | $F = 4.92^*$ | | $F = 12.41^{***}$ | | $F = 20.15^{***}$ | |
| | | $p < .05$ | | $p < .001$ | | $p < .001$ | |
| | | $\eta^2_p = .003$ | | $\eta^2_p = .008$ | | $\eta^2_p = .013$ | |
| sex*age | | $F = 5.20^*$ | | $F = 0.76$ | | $F = 0.90$ | |
| | | $p < .05$ | | $p > .05$ | | $p > .05$ | |
| | | $\eta^2_p = .003$ | | $\eta^2_p = .000$ | | $\eta^2_p = .001$ | |

* $p < .05$; ** $p < .01$; *** $p < .001$

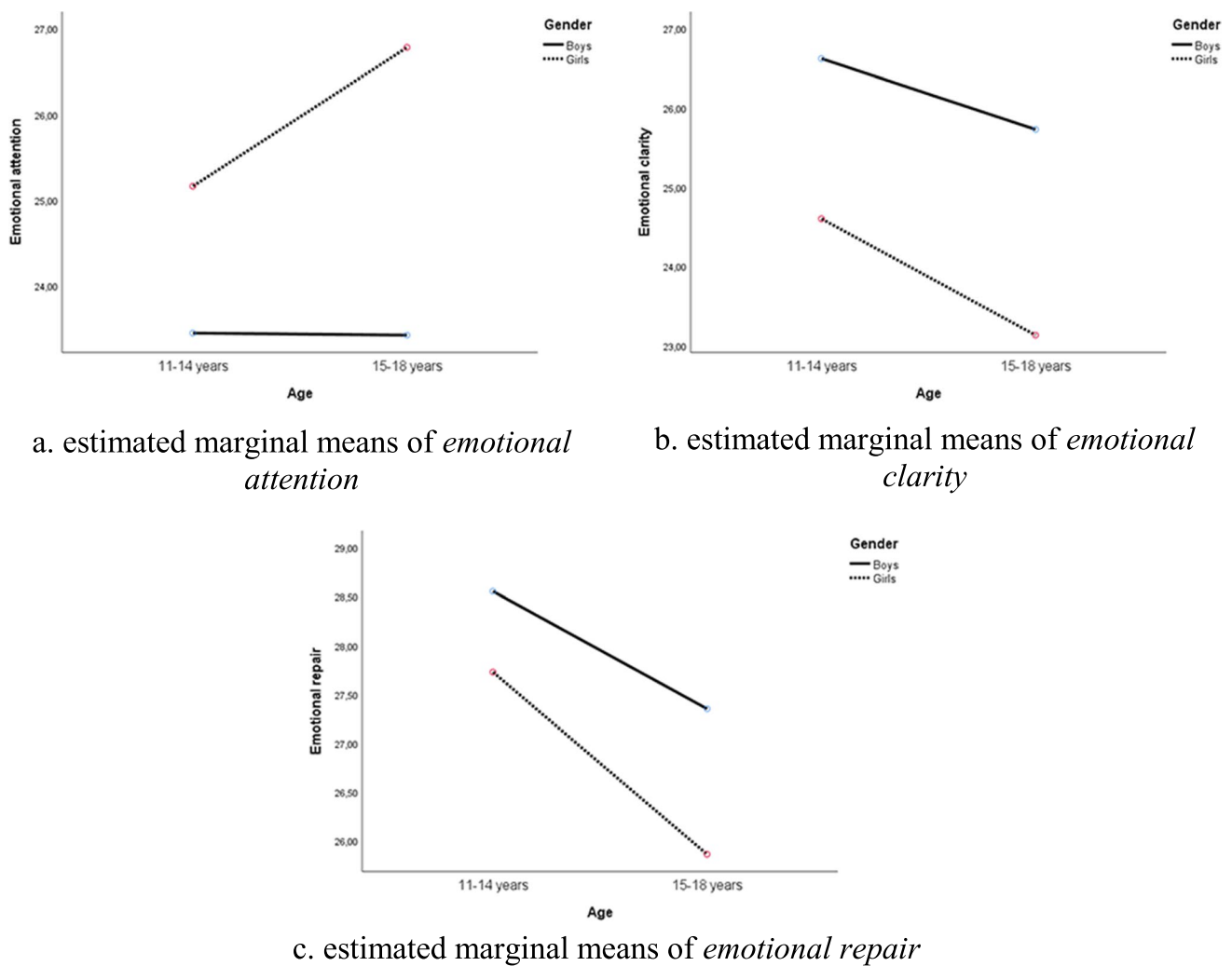


Fig. 1 Estimated marginal means of perceived emotional intelligence for gender*age

In relation to subjective well-being, the multivariate contrast revealed significant effects for sex (*Pillai's Trace* = 0.033, $F = 17.319$, $p < 0.001$, $\eta^2_p = 0.033$) and age (*Pillai's Trace* = 0.019, $F = 10.05$, $p < 0.001$, $\eta^2_p = 0.019$), although not for the interaction between these two independent variables (*Pillai's Trace* = 0.00, $F = 0.632$, $p > 0.05$, $\eta^2_p = 0.001$).

As shown in Table 3, the results revealed that younger adolescent boys scored highest for *life satisfaction* ($M = 27.22$; $SD = 4.99$) and *positive affect* ($M = 27.11$; $SD = 4.70$), and lowest for *negative affect* ($M = 18.09$; $SD = 4.41$). For their part, older adolescent girls scored lowest for *positive affect* ($M = 24.57$; $SD = 4.72$) and *life satisfaction* ($M = 24.82$; $SD = 5.89$), and highest for *negative affect* ($M = 19.77$; $SD = 4.83$) (Fig. 2). According to the inter-subject analysis, the inter-group differences observed were due to both sex and age, although sex had a greater impact on *positive* ($F = 32.717$, $p < 0.001$, $\eta^2_p = 0.021$) and

negative affect ($F = 37.327$, $p < 0.001$, $\eta^2_p = 0.015$), with medium-moderate effect sizes; and age had a greater impact on *life satisfaction* ($F = 18.661$, $p < 0.001$), with a medium effect size ($\eta^2_p = 0.012$).

The effect of sex and age on the association between PEI and subjective well-being

The regression analyses carried out revealed a significant, positive predictive effect of *emotional clarity* and *emotional repair* on *positive affect* ($\beta_{clarity} = 0.277$, $p < 0.001$; $\beta_{repair} = 0.308$, $p < 0.001$) and *life satisfaction* ($\beta_{clarity} = 0.223$, $p < 0.001$; $\beta_{repair} = 0.305$, $p < 0.001$), along with an inverse effect on *negative affect* ($\beta_{clarity} = -0.145$, $p < 0.001$; $\beta_{repair} = -0.155$, $p < 0.001$). For its part, *emotional attention* was found to positively predict *negative affect* ($\beta = 0.363$, $p < 0.001$) and negatively predict *life satisfaction* ($\beta = -0.131$, $p < 0.001$). The data also revealed that together, the

Table 3 Main and interaction effects of the independent variables on well-being

| | | Positive Affect | | Negative affect | | Life satisfaction | |
|--------------|-------|------------------|--------------|------------------|--------------|-------------------|--------------|
| | | 11–14 years | 15–18 years | 11–14 years | 15–18 years | 11–14 years | 15–18 years |
| Boys | M(sd) | 27.11 (4.70) | 26.15 (4.50) | 18.09 (4.41) | 18.38 (4.64) | 27.22 (4.99) | 26.09 (5.30) |
| Girls | M(sd) | 25.96 (4.55) | 24.57 (4.72) | 19.01 (4.66) | 19.77 (4.83) | 26.16 (5.89) | 24.82 (5.89) |
| Fixed factor | | | | | | | |
| sex | | $F=32.717^{***}$ | | $F=23.327^{***}$ | | $F=16.624^{***}$ | |
| | | $p<.001$ | | $p<.001$ | | $p<.001$ | |
| | | $\eta^2_p=.021$ | | $\eta^2_p=.015$ | | $\eta^2_p=.011$ | |
| age | | $F=24.408^{***}$ | | $F=4.811^*$ | | $F=18.661^{***}$ | |
| | | $p<.001$ | | $p<.05$ | | $p<.001$ | |
| | | $\eta^2_p=.016$ | | $\eta^2_p=.003$ | | $\eta^2_p=.012$ | |
| sex*age | | $F=0.828$ | | $F=0.939$ | | $F=0.131$ | |
| | | $p>.05$ | | $p>.05$ | | $p>.05$ | |
| | | $\eta^2_p=.001$ | | $\eta^2_p=.001$ | | $\eta^2_p=.001$ | |

* $p<.05$; ** $p<.01$; *** $p<.001$

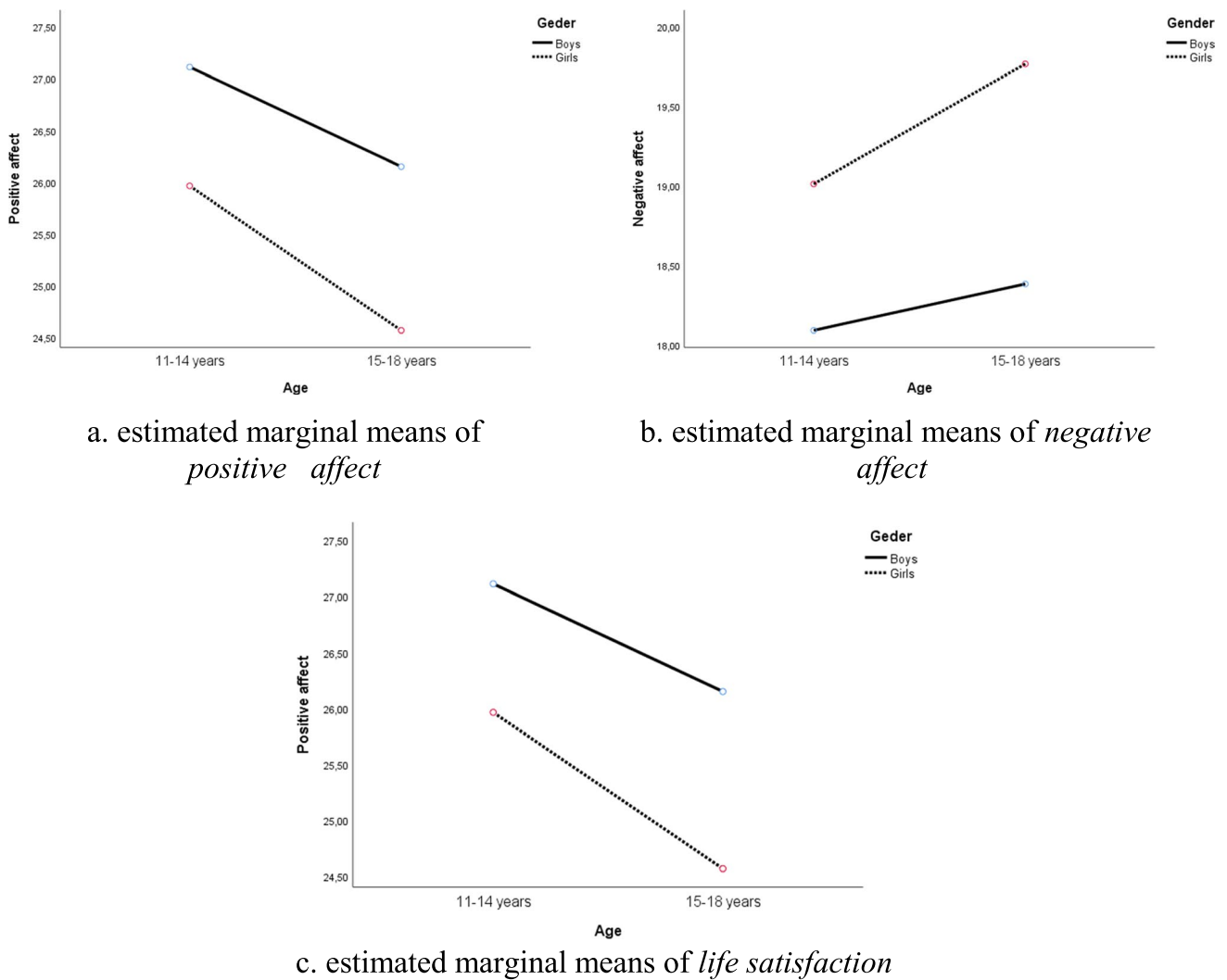


Fig. 2 Estimated marginal means of subjective wellbeing for gender*age

two independent variables explained 15% of the variance observed for *negative affect*, 24% of the variance observed for *positive affect* and 19% of the variance observed for *life satisfaction*.

The second research question concerned the effect of PEI on subjective well-being, moderated by sex (Table 4) and age (Table 5).

The results of the bootstrapping test with 10,000 samples confirmed that, of all the simple moderation models analyzed, sex moderated the association between *emotional clarity* and *negative affect* [$b = -0.162, p < 0.001, 95\% \text{ CI } (-0.235, -0.089)$], *emotional attention* and *positive affect* [$b = -0.087, p < 0.01, 95\% \text{ CI } (-0.160, -0.016)$] and *emotional clarity* and *life satisfaction* [$(b = 0.114, p < 0.01, 95\% \text{ CI } (0.025, 0.201))$]. Specifically, the conditional effects found indicated that low levels of *emotional clarity* were associated with significantly higher levels of *negative affect* among girls [$b = -0.142, p < 0.001, 95\% \text{ CI } (-0.190, -0.095)$], but not among boys [$b = 0.020, p > 0.05, 95\% \text{ CI } (-0.032, 0.072)$] (Fig. 3a). They also indicated that higher levels of

emotional attention were positively associated with higher levels of *positive affect* among boys [$b = 0.119, p < 0.001, 95\% \text{ CI } (0.722, 0.168)$], but not among girls [$b = 0.036, p > 0.05, 95\% \text{ CI } (-0.013, 0.078)$] (Fig. 3b). Finally, a positive association was observed between *emotional clarity* and *life satisfaction* among both boys [$b = 0.202, p < 0.001, 95\% \text{ CI } (0.142, 0.262)$] and girls [$b = 0.316, p < 0.001, 95\% \text{ CI } (0.261, 0.371)$], with boys scoring relatively higher than girls for *life satisfaction* when *emotional clarity* levels were low (Fig. 3c).

Discussion

PEI and subjective well-being are variables that contribute to mental health and adaptive behavior (Kushlev et al., 2020; Sánchez-Álvarez et al., 2016). As such, it is important to understand how they develop during adolescence and to identify the factors associated with their evolution during a developmental period that has generally been

Table 4 The moderating effect of sex

| Negative Affect | $R/\Delta R^2$ | b | SE | t | p | $LLCI$ | $ULCI$ |
|--------------------------|-----------------|---------|------|--------|------|--------|--------|
| Emotional attention | | .119 | .053 | 2.292 | .022 | .016 | .223 |
| Sex | | -.452 | .862 | -.545 | .586 | -2.13 | 1.27 |
| Emotional attention*Sex | .096***/.001 | .046 | .034 | 1.418 | .157 | -.022 | .112 |
| Emotional clarity | | .182 | .060 | 3.113 | .002 | .066 | .299 |
| Sex | | 5.06 | .955 | 5.402 | .000 | 3.21 | 6.91 |
| Emotional clarity*Sex | .037***/.013*** | -.162 | .038 | -4.503 | .000 | -.235 | -.089 |
| Emotional repair | | .003 | .061 | .044 | .965 | -.117 | .122 |
| Sex | | 2.98 | 1.07 | 2.934 | .003 | .821 | 5.03 |
| Emotional repair*Sex | .040***/.002 | -.069 | .037 | -1.967 | .049 | -.143 | .005 |
| Positive affect | $R/\Delta R^2$ | b | SE | t | p | $LLCI$ | $ULCI$ |
| Emotional attention | | .207*** | .051 | 3.844 | .000 | .092 | .323 |
| Sex | | .596 | .934 | .690 | .490 | -1.21 | 2.45 |
| Emotional attention*Sex | .038***/.004** | -.087** | .037 | -2.596 | .010 | -.160 | -.016 |
| Emotional clarity | | .219*** | .058 | 4.000 | .000 | .104 | .336 |
| Sex | | -1.65 | .946 | -1.881 | .060 | -3.49 | .212 |
| Emotional clarity*Sex | .167***/.001 | .036 | .036 | 1.075 | .283 | -.035 | .106 |
| Emotional repair | | .323*** | .057 | 6.082 | .000 | .209 | .436 |
| Sex | | -.451 | 1.02 | -4.90 | .624 | -2.46 | 1.56 |
| Emotional repair*Sex | .191***/.001 | -.021 | .035 | -6.56 | .512 | -.091 | .048 |
| Life satisfaction | $R/\Delta R^2$ | b | SE | t | p | $LLCI$ | $ULCI$ |
| Emotional attention | | .118 | .066 | 1.818 | .069 | -.099 | .2480 |
| Sex | | .778 | 1.13 | .748 | .455 | -1.42 | 2.97 |
| Emotional attention* Sex | .014***/.003 | -.080 | .044 | -1.967 | .050 | -.167 | .006 |
| Emotional clarity | | .118 | .066 | 1.309 | .191 | -.099 | .248 |
| Sex | | .777** | 1.13 | -3.192 | .001 | -1.42 | 2.97 |
| Emotional clarity*Sex | .110***/.004** | .114** | .045 | 2.741 | .006 | .025 | .201 |
| Emotional repair | | .254 | .069 | 3.928 | .000 | .118 | .388 |
| Sex | | -1.88 | 1.27 | -1.672 | .095 | -4.36 | .648 |
| Emotional repair*Sex | .151***/.001 | .038 | .043 | .958 | .338 | -.047 | .123 |

* $p < .05$; ** $p < .01$; *** $p < .001$

Table 5 The moderating effect of age

| Negative affect | $R/\Delta R^2$ | b | SE | t | p | $LLCI$ | $ULCI$ |
|-------------------------|----------------|--------|-------|--------|------|--------|--------|
| Emotional attention | | .136 | .052 | 2.789 | .005 | .033 | .239 |
| Age | | -.641 | .865 | -.764 | .445 | -2.330 | 1.070 |
| Emotional attention*Age | .092***/.001 | .042 | .034 | 1.286 | .199 | -.026 | .109 |
| Emotional clarity | | .022 | .059 | .411 | .681 | -.096 | .137 |
| Age | | 2.250 | 1.01 | 2.404 | .016 | .243 | 4.189 |
| Emotional clarity*Age | .018***/.002 | -.071 | .040 | -1.957 | .051 | -.147 | .008 |
| Emotional repair | | -.067 | .059 | -1.263 | .207 | -.183 | .047 |
| Age | | 1.186 | 1.106 | 1.183 | .237 | -.980 | 3.354 |
| Emotional repair*Age | .028***/.000 | -.029 | .039 | -.799 | .424 | -.105 | .048 |
| Positive affect | $R/\Delta R^2$ | b | SE | t | p | $LLCI$ | $ULCI$ |
| Emotional attention | | .128 | .056 | 2.512 | .012 | .019 | .239 |
| Age | | -.135 | .945 | -.154 | .877 | -1.966 | 1.728 |
| Emotional attention*Age | .027***/.001 | -.047 | .037 | -1.381 | .167 | -.119 | .026 |
| Emotional clarity | | .271 | .055 | 5.371 | .000 | .163 | .377 |
| Age | | -1.027 | .943 | -1.182 | .237 | -2.881 | .804 |
| Emotional clarity*Age | .169***/.000 | .006 | .036 | .170 | .865 | -.065 | .078 |
| Emotional repair | | .378 | .053 | 7.670 | .000 | .272 | .482 |
| Age | | .930 | 1.032 | 1.006 | .315 | -1.100 | 2.964 |
| Emotional repair*Age | .187***/.002 | -.063 | .036 | -1.904 | .057 | -.134 | .007 |
| Life satisfaction | $R/\Delta R^2$ | b | SE | t | p | $LLCI$ | $ULCI$ |
| Emotional attention | | .087 | .068 | 1.423 | .155 | -.046 | .222 |
| Age | | .454 | 1.098 | .433 | .665 | -1.708 | 2.644 |
| Emotional attention*Age | .015***/.002 | -.069 | .043 | -1.712 | .087 | -.155 | .015 |
| Emotional clarity | | .250 | .070 | 4.037 | .000 | .114 | .387 |
| Age | | -1.199 | 1.191 | -1.122 | .262 | -3.486 | 1.189 |
| Emotional clarity*Age | .110***/.000 | .010 | .045 | .248 | .804 | -.081 | .098 |
| Emotional repair | | .330 | .068 | 5.515 | .000 | .200 | .465 |
| Age | | -.416 | 1.295 | -.370 | .711 | -2.874 | 2.187 |
| Emotional repair*Age | .150***/.000 | -.014 | .044 | -.339 | .734 | -.102 | .072 |

* $p < .05$; ** $p < .01$; *** $p < .001$

under-researched (González-Carrasco et al., 2017; Salguero et al., 2010) and which requires greater empirical clarification (Steinmayr et al., 2019). The present study is located within the positive psychology movement and aims: (1) to analyze the variability of PEI and subjective well-being in accordance with sex and age; and (2) to explore the moderating effect of these socio-personal variables on the association between PEI and subjective well-being, in order to clarify the psychological trends that exist in this developmental stage, in which adolescents must overcome adaptive hurdles requiring processes of regulatory adjustment (Cummins et al., 2014).

The variability of PEI

The results of the present study reveal differences in PEI to the detriment of older adolescent girls since, as reported in previous studies also (Mankus et al., 2016; Salguero et al., 2010; Gómez-Baya et al., 2017; Gorostiaga et al., 2010),

it is they who scored highest for emotional attention and lowest for emotional clarity and repair, whereas younger adolescent boys had better levels of PEI, scoring higher for emotional clarity and repair and lower for emotional attention. Although the multivariate contrast revealed significant effects for both socio-personal variables, consistently with that reported by previous studies (Gómez-Baya et al., 2017; Salguero et al., 2010), our results indicate that sex is the variable that best explains the differences found, particularly in relation to emotional attention. In contrast, age seems to better explain emotion repair, as indeed reported in previous studies (Gorostiaga et al., 2010; Salguero et al., 2010).

In accordance with age, these findings are consistent with those reported by previous studies that found lower levels of PEI among older adolescents (Mankus et al., 2016; Salguero et al., 2010; Gómez-Baya et al., 2017; Gorostiaga et al., 2010). Pubertal maturity is associated with the development of greater emotional sensitivity, as well as the ability to carry out more realistic self-assessments (Forbes &

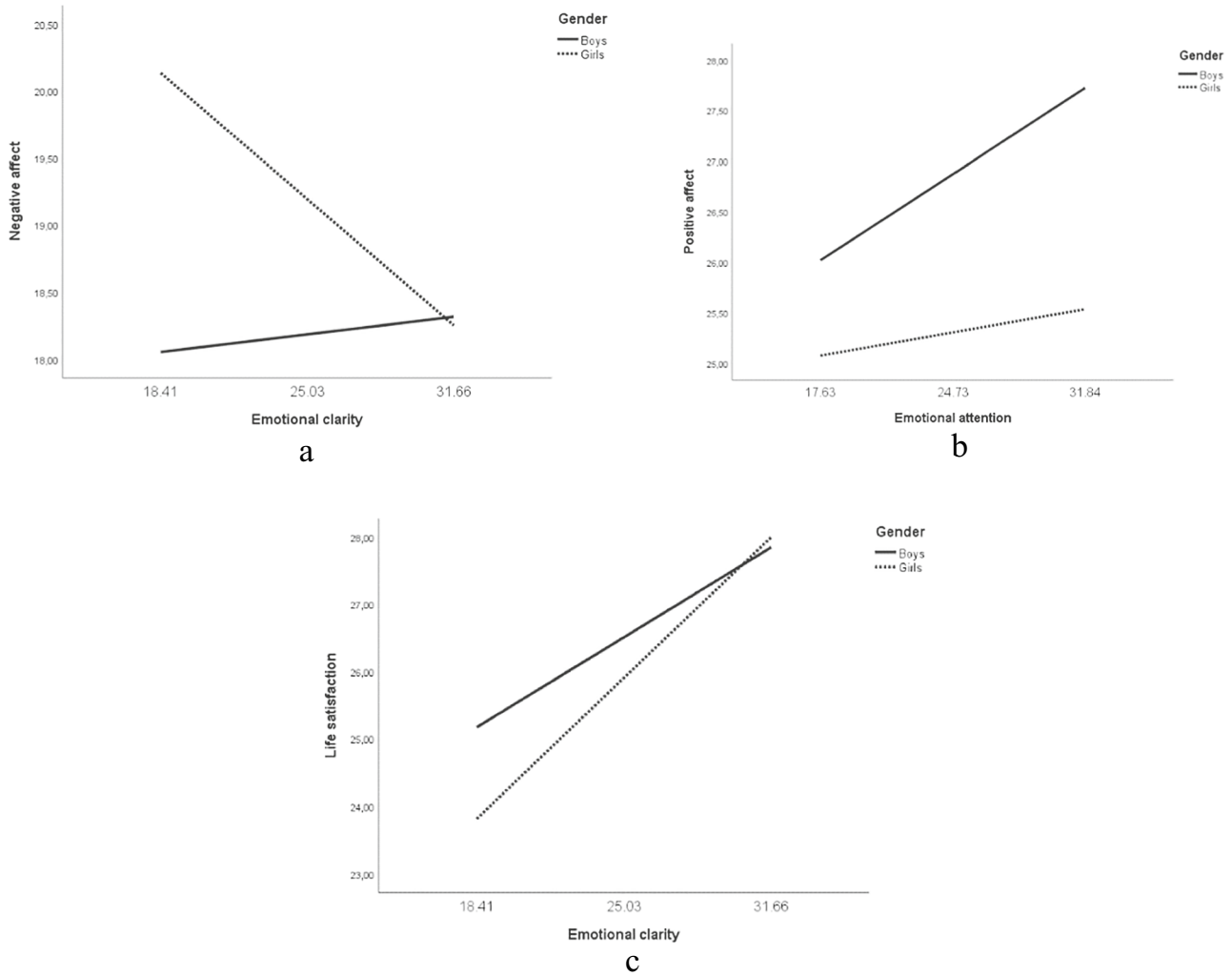


Fig. 3 Conditional effects

Dahl, 2010), which may explain why younger adolescents have lower levels of emotional attention, while older ones score lower for emotional clarity and repair (Gómez-Baya et al., 2017; Gorostiaga et al., 2010; Salguero et al., 2010). Moreover, this finding may be compatible with the assumption that emotional abilities improve with age (Mankus et al., 2016), since more realistic emotional self-assessments enable adolescents to recognize the development potential of certain abilities, such as the capacity to think about difficult problems before deciding on a course of action, and the capability to control impulses and consider of the potential costs associated with certain behaviors (Bonnie et al., 2014). Individuals finish acquiring these skills in early adulthood and their daily practice fosters the development of real and perceived emotional intelligence (Dave et al., 2021). It is therefore likely that PEI develops in the form of an inverted U, with late adolescence being the moment at which the lowest levels of PEI are recorded, but also being an essential

turning point for its development. However, this question has been explored very little to date and further scientific research is required.

Regarding sex, consistently with the findings reported in other studies, our results also indicate that girls have higher levels of emotional attention than boys, whereas boys score higher for emotional clarity and emotion repair (Gorostiaga et al., 2011; Salguero et al., 2010). Although the female sex is generally associated with greater emotional receptivity and sensitivity (Gómez-Baya et al., 2017), some authors argue that girls and women also experience greater emotional intensity and more chronic stress and ruminative thoughts (Brody & Hall, 2008), probably due to their lower levels of emotional clarity and repair (Salguero et al., 2010). Other authors argue that girls tend to underestimate their emotional intelligence and emotion-related competences, whereas boys tend to overestimate them (Meshkat & Nejati, 2017).

The variability of subjective well-being

Consistently with that reported in previous studies (González-Carrasco et al., 2017), we found that older adolescent girls scored lowest for life satisfaction and positive affect, and highest for negative affect, whereas younger adolescent boys scored highest for positive affect and life satisfaction and lowest for negative affect. Also consistently with previous research (Bedin & Sarriera, 2015; Love & Holder, 2014; Ramos dos Santos et al., 2019; Schütz et al., 2019), the multivariate contrast revealed significant effects for sex and age, with the effect of sex being particularly strong, with a medium effect size in all components except life satisfaction, for which age had the strongest influence.

The results regarding the variability of subjective well-being in accordance with age are consistent with those reported by previous studies which found that this variable decreased with age (Aymerich et al., 2021; Casas and González-Carrasco, 2019; González-Carrasco et al., 2017). Adolescence is generally considered a complex stage, characterized by substantial cognitive-emotional changes and behaviors based on cerebral and psychosocial development (Bonnie et al., 2014), including individuation from parents, increased receptivity towards peers and the immediate environment, a still developing capacity for self-control and a weak tendency towards accepting long-term consequences. These changes interfere with the ability to make decisions in different emotional situations and give rise to an increase in risk behaviors (Rapee et al., 2019), which in turn has a negative effect on life satisfaction (Goldbeck et al., 2007; Orben et al., 2022). Nevertheless, research carried out to date has observed a gradual increase in self-regulation and psychological abilities as adolescents approach age 20 (Bonnie et al., 2014), a developmental moment in which they begin to assume adult responsibilities (Bonnie et al., 2014). This trend may explain why the older adolescents in our study reported lower levels of well-being, levels which may be expected to stabilize (Orben et al., 2022) or even improve from age 20 onwards (Steinmayr et al., 2019). This in turn suggests that well-being is not associated with educational transition periods (from primary to secondary school, and from secondary school to further education), but rather seems to be a normal development phenomenon (Goldbeck et al., 2007).

The results of our study are consistent with those of previous research that identifies girls and women as having lower levels of life satisfaction and positive affect, as well as higher levels of negative affect (Bedin & Sarriera, 2015; Esteban-Gonzalo et al., 2020; Goldbeck et al., 2007; González-Carrasco et al., 2017). One possible explanation for these results is that being exposed to greater social inequality has a negative effect on women's life satisfaction and

subjective well-being (Tesch-Römer et al., 2008). Also, the female role has generally been characterized by a greater degree of concern about interpersonal relationships, with girls being more focused on emotions and reflexive coping, tendencies that have been found to correlate positively with depressive states (Mayor, 2015), which in turn lead to lower life satisfaction (Li et al., 2021). Boys, on the other hand, see themselves as being more effective when it comes to regulating negative affect and have a better self-concept (Esteban-Gonzalo et al., 2020).

However, in contrast to the results presented here, some other authors failed to find differences in subjective well-being associated with sex (Esteban-Gonzalo et al., 2020). The results of international projects (such as ISCWeB or WVS) reveal that scores for the three components of subjective well-being vary across countries/regions (Meisenberg & Woodley, 2015), making it impossible to detect any clear trends linked to sex and highlighting the importance of analyzing results at an individual or national/regional level. Other authors, however, claim that these results may indicate a new change in social functioning, in which the social role of women is changing due to the existence of more equal opportunities for men and women (Inglehart et al., 2017). This in turn may contribute to the achievement of a more balanced perception of life satisfaction between the two sexes (Tesch-Römer et al., 2008), and would explain the heterogeneous results reported by previous research and international projects.

The association between PEI and subjective well-being

The present study demonstrates that all three dimensions of PEI are associated with subjective well-being, with emotional clarity and emotion repair positively influencing positive affect and life satisfaction and negatively influencing negative affect, as indeed observed in previous studies (Guerra-Bustamante et al., 2019; Martínez-Marín and Martínez, 2019); whereas, as Blasco-Belled et al. (2020) also found, emotional attention only influences negative affect and life satisfaction. The extant literature, although emotional attention is necessary for adaptation (since it implies being aware of feelings that produce pleasure or discomfort), paying too much attention to emotions without having high levels of emotional clarity is often associated with behaviors that are incompatible with subjective well-being, such as anxiety, depression, rumination and catastrophic thinking (Guerra-Bustamante et al., 2019). Therefore, those who pay too much attention to their emotions and have low levels of emotional clarity and repair, not only perceive more negative affective states, but may also carry out more pessimistic assessments of their lives (Blasco-Belled et al., 2020). However, emotional attention does not seem to have

a direct effect on this cognitive component of well-being (Guerra-Bustamante et al., 2019), but rather is associated with it through third variables (Ramos-Díaz et al., 2019), which may explain the discrepancy observed among previously reported findings. Furthermore, in both this study and in previous ones (Xu et al., 2021), the variance explained by PEI and socio-personal variables is relatively small, a finding which further supports the idea that other variables mediate the association between PEI and subjective well-being (Ramos-Díaz et al., 2019).

The moderating effect of sex and age

The results of the present study indicate that sex moderates the associations between emotional clarity and negative affect, between emotional attention and positive affect and between emotional clarity and life satisfaction. These findings are partially consistent with those reported in previous research, since some studies conclude that sex may moderate between specific components of PEI and subjective well-being (Li et al., 2019), whereas others, particularly those which analyze PEI from a global perspective, dismiss this possibility (Xu et al., 2021). Our results indicate no moderating effect of age, a finding which contradicts that reported by Xu et al. (2021).

The results of our study revealed that girls with low levels of emotional clarity scored lower for life satisfaction, whereas both boys and girls with high levels of this PEI component scored similarly for the same aspect of perceived well-being. A poorer understanding of one's own emotional experiences therefore seems to impact negative emotional states (fear, hostility and sadness), which in turn leads to lower satisfaction (Flynn & Rudolph, 2014), although curiously, this association seems to be stronger among girls than among boys. Richardson and Gradisar (2020) found that girls tend to be more perfectionist with themselves and, furthermore, being a group characterized by good interpersonal and emotional knowledge (Nayak, 2014), they are also likely to assess their own emotional abilities more harshly, thereby leading to diminished life satisfaction.

The results also reveal that low levels of emotional clarity are associated with relatively high levels of negative affect among girls, and that, as emotional clarity increases, negative affect decreases. According to Haas et al. (2019), during adolescence, girls start to experience a greater variety of emotions and specific stimuli due to their high emotional attention and sensitivity to stressful factors (Acharya et al., 2018), which in turn prompts them to question their understanding of their emotional states. Consequently, girls are more likely to view emotional clarity as an instrumental ability to be used when negative affective states require precise understanding in order to be coped with effectively (Flynn & Rudolph, 2014). Boys, on the other hand, pay less attention

to emotions and are therefore less vulnerable to stressful factors (Acharya et al., 2018). They therefore tend to view emotional experiences in a less complex manner (Haas et al., 2019), which may generate fewer behaviors/thoughts that are incompatible with well-being. This is probably why, in the present study, emotional attention was only found to predict positive affect among boys.

Finally, further research is needed to verify the moderating role of sex and age in order to create a scientific corpus to explain in greater detail the type of associations established between these variables, since the research have found differentiated results depending on the different elements analyzed. For example, Casas et al. (2020) have shown that the degree to which socio-personal variables explain subjective well-being varies across countries, suggesting that said variables should be analyzed in different samples as part of cross-cultural studies. Other studies have suggested that interactions between sex and other socio-personal variables, such as nationality and economic status (Bedin & Sarriera, 2015), may be significant, which is why such variables should be included in this type of study. In sum, this avenue of research is still being developed and requires much more empirical clarification.

Limitations

This study has a number of limitations which should be taken into consideration. The first is linked to the sample. Future studies should expand the sample to include a broader age range, encompassing young adults aged 18 to 24 years also. The second limitation is connected to the variables included in the study. Incorporating other variables such as socioeconomic status or nationality (Bedin & Sarriera, 2015) would enable a more comprehensive explanation of the differences found. Including other variables would also help gain a more precise understanding of the association between PEI and subjective well-being (Ramos-Díaz et al., 2019). The third limitation is that in this study only self-report measures were used. Therefore, the limitations associated with this type of measures should be taken into account (Demetriou et al., 2015), especially considering that the conceptualization of Emotional Intelligence (ability and mixed models) have been associated with the measurement method employed (performance test and self-report) (Joseph & Newman, 2010; Petrides & Furnham, 2000, 2001). Finally, the study is cross-sectional in nature, which makes it impossible to draw conclusions regarding real dependency between variables. Consequently, when we talk about effects, we are always referring to statistical influence or effects that must be empirically confirmed in the future using experimental designs that take into account the variables analyzed here. Future qualitative research would also provide valuable information on this topic.

Theoretical implications

This study shows how the stage of adolescent development influences the perception of emotional intelligence and subjective well-being. Although the results found may seem to be detrimental to older adolescents, especially the female group, in the discussion it is exposed that these results could be a consequence of cognitive-emotional and behavioral changes based on brain and psychosocial development (Bonnie et al., 2014), as well as sex-associated characteristics, although the reasons concerning sex differences are open to debate, finding much controversy in this regard. This wide variety of results (described in the theoretical background and discussion), leads to consider the need for further research on this topic. Furthermore, a novel contribution of this study is the moderating effect of sex found in certain dynamics of relationships between PEI and subjective well-being (emotional clarity-negative affect, emotional attention-positive affect and emotional clarity-life satisfaction), relationships that have been fairly well proven in a univariate way in previous research, but whose possible moderating variables sex and age had yet to be studied in depth and for which there were hardly any studies or the few existing ones analyzed global measures (Xu et al., 2021) or approximate constructs (Abbas et al., 2018; Malinauskas et al., 2018).

In this study we discuss the possible reasons that could justify the results found, being noteworthy for their theoretical contribution those presented below:

- (1) On the one hand, adolescent pubertal changes seem to compromise decision-making skills in different emotional situations, although from these they are learning and integrating different emotional strategies and skills. Thus, together with the development of a more realistic emotional awareness, the gradual progress of self-regulation and psychological abilities, adolescents improve their emotional skills even though their perception is lower and has a negative cost on well-being. These results seem to be supported by previous research, as presented throughout the theoretical review and discussion, which could presuppose a normal developmental characteristic of this evolutionary stage.
- (2) On the other hand, throughout the discussion, several reasons have been offered that could justify the sexual differences found, such as greater female emotional sensitivity, the tendency of girls to perceive themselves more negatively, the influence of sexual stereotypes, the type of measures used, etc. However, the wide variety of results found in previous research does not allow conclusive statements to be made. However, it is theoretically interesting to consider that: (a) an impaired understanding of women's own

emotional experiences interferes with negative emotional states (fear, hostility and sadness) leading to lower satisfaction; (b) it is likely that girls, being more perfectionistic (Richardson & Gradisar, 2020) and characterized by interpersonal and emotional knowledge (Mathiesen et al., 2013; Nayak, 2014), tend to evaluate more critically their own emotional abilities to the detriment of higher life satisfaction, leading them to question their understanding of their emotional states which impact on greater negative affect; (c) boys by presenting less emotional attention and being less vulnerable to stressors (Acharya et al., 2018), tend to differentiate emotional experiences with less complexity (Haas et al., 2019), which could generate a lower number of behaviors/thoughts incompatible with well-being.

Practical implications

This study adds to the body of research that explores the mechanisms underlying PEI and subjective well-being during adolescence, with the aim of formulating valid, sound premises to support and inform the effective implementation of psychoeducational programs. As argued throughout the discussion, the results reported here have important practical implementations, since they identify the most vulnerable groups in relation to each of the variables studied and offer explanations that may help design targeted strategies.

Given that both variables under study here are constructed as part of the cognitive processes inherent to adolescence, including experience-based practice and the transmission of social values and gender roles, a certain degree of variability was found in accordance with sex and age, and sex was also found to moderate the set of associations analysed. Although this study does not allow conclusions to be drawn about the reasons that influence adolescent behavior and the changes that occur at this stage of development, it does serve to highlight the need to take into account the beliefs and values that shape gender roles and the biological changes when implementing strategies designed to improve PEI and well-being. Although, as noted above, specialised research is needed to draw conclusions.

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Data availability The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Declarations

Conflict of interest The authors declare that they have no conflict of interest.

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