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<https://doi.org/10.1007/s10902-020-00299-5>  
<http://hdl.handle.net/11067/6352>

**Metadados**

<b>Data de Publicação</b>	2020
<b>Resumo</b>	Although there is evidence that parental attachment and personality interact during development and exert mutual influences on one another, studies describing how parental attachment and personality dimensions interact in predicting well-being are scarce. Studies that help clarify the shared and unique variance on well-being explained by these two constructs are required, and as such, the objective of the present study was to describe the relationships between personality, attachment, and well-b...
<b>Editor</b>	Springer
<b>Palavras Chave</b>	Adolescents, Attachment, Personality, Affective well-being, Cognitive well-being
<b>Tipo</b>	article
<b>Revisão de Pares</b>	yes
<b>Coleções</b>	[ILID-CIPD] Artigos

Esta página foi gerada automaticamente em 2024-04-23T19:50:08Z com  
informação proveniente do Repositório

Personality, attachment, and well-being in adolescents:  
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**Note. This document is the authors' version of the final accepted manuscript, published 01.08.2020 by *Journal of Happiness Studies*.  
doi: 10.1007/s10902-020-00299-5**

<https://link.springer.com/article/10.1007/s10902-020-00299-5>

**CRedit Statement:**

**Paulo Moreira:** Conceptualization, Methodology, Supervision, Project administration, Funding acquisition, Writing – Review & Editing. **Susana Pedras:** Formal analysis, Writing – Original draft. Writing – Review & Editing, Visualization. **Márcia Silva:** Data curation; Investigation, Methodology. **Maria Moreira** – Data curation; Investigation, Methodology. **Joana Oliveira** - Supervision, Project administration.

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**Funding:** This work was supported by grants from the Portuguese Foundation for Science and Technology (FCT) (PTDC/MHC-CED/2224/2014; and CIPD-BI-UID/PSI/04375/2016); and by the Minerva Foundation – Ensino, Cultura e Investigação Científica (the founding organization of the Lusíada Universities).

### Abstract

Although there is evidence that parental attachment and personality interact during development and exert mutual influences on one another, studies describing how parental attachment and personality dimensions interact in predicting well-being are scarce. Studies that help clarify the shared and unique variance on well-being explained by these two constructs are required, and as such, the objective of the present study was to describe the relationships between personality, attachment, and well-being. A total of 336 adolescents participated in this study ( $M_{age} = 15$  years;  $SD = 1.73$ ). Participants completed self-report measures of personality, attachment, and well-being. The present study expands current knowledge in three ways. First, attachment dimensions of communication, trust, and involvement were significant predictors of well-being, even after controlling for age, gender, and personality dimensions. Second, age and gender moderate the associations between parental attachment and cognitive (but not emotional) well-being, reflecting the representations systems, which are culturally and socially construed underlying cognitive well-being. Third, adolescents low in self-directedness and low in persistence are more dependent on their parental attachment to have better well-being. In sum, our results support the idea that parental attachment is one of the most crucial mechanisms for the promotion of well-being because it acts both as a promoter of the development of adolescent socio-cognitive processes (such as self-directedness, which development depends strongly on the parental factors) and as a coping mechanism for those with less adaptive personality characteristics.

**Keywords:** Adolescents; Attachment; Personality; Affective Well-being; Cognitive Well-being

## Personality, attachment, and well-being in adolescents: The independent effect of attachment after controlling for personality

Adolescent-parent attachment describes the bonds between parents and adolescents that support healthy development through the life cycle (Moretti and Peled 2004). Attachment bonds, via internal models' representations, will influence adolescents' concepts of themselves and the others (Bowlby, 1969, 1988). In adolescence, the amount of time spent with parents typically drops while time spent with peers increases considerably. Nonetheless, parents continue to play a key role in influencing their adolescent's development, which is itself an important determinant of health and well-being (Mikulincer and Shaver 2007, 2009; van Ijzendoorn et al. 1999). Besides, parental attachment influences adolescents' personality, which in turn is known to be associated with affective (happiness) and cognitive (health) well-being in adolescents (Moreira et al. 2015).

### **Attachment and Adolescence**

Attachment represents an emotional bond created through repeated interactions between a child and its parents or principal attachment figures (those who have the main caregiving responsibility for the child) (Bowlby 1969, 1982). A secure attachment indicates that children had, from a very early age, a primary attachment figure who was regularly and consistently attentive and responsive to their physical and emotional needs. These children develop unconditional confidence that the reference figure will be available when they need it and consequently, become more confident, and socially adjusted children with a greater interest in exploring the world around them and engaging in new learning (Ainsworth et al., 1978). Children with insecure-avoidant, or insecure-ambivalent attachments have experienced moments of abandonment and

rejection by the primary attachment figure or instability and unpredictability from caregiver figures who prove to be less responsive to their needs, respectively. Children with an insecure-avoidant attachment style tend to have difficulty forming intimate emotional bonds and can appear indifferent and independent. Children with an insecure-ambivalent attachment style are characterized by difficulties in emotional regulation, negative expression, and an attitude of doubt concerning the responsiveness of the attachment figure. As such, these children frequently switch between approach and rejection of the attachment figure due to the unpredictability of their attitudes (Ainsworth et al. 1978).

Considering these attachment styles, it is unsurprising that research indicates secure parental attachment is linked to fewer psychological difficulties, externalizing and internalizing problems, and to elevated levels of life satisfaction, while insecure parental attachment predicts conduct problems and emotional difficulties (Lucktong et al. 2017; Oldfield et al. 2016). Moreover, a secure attachment has been shown to predict safe relational patterns in adolescence (Allen and Land 1999; Allen et al. 2003; Allen 2008) and is a protective factor against physical, psychological and relational symptoms of stress (Mónaco et al. 2019; Oldfield et al. 2016; Rapoza et al. 2016). Adolescents classified as highly securely attached reported greater satisfaction with themselves, a higher likelihood of seeking social support, and less symptomatic response to stressful life events (Armsden and Greenberg 1987). Thus, the relationships established in early childhood can be considered vital for a healthy (physical, mental, social) adolescence, but also healthy and functional adult life.

### **Personality and Attachment in Adolescence**

Personality is a significant predictor of positive mental health and well-being (Butkovic et al. 2012; Cloninger and Zohar 2011; Josefsson et al. 2011), also in

adolescents (Moreira et al. 2015). Studies using Big Five model (Garcia 2011; Gutiérrez et al. 2005; McCrae and Costa 1991), showed negative associations between neuroticism and happiness/psychological well-being; and positive associations between neuroticism and negative affect, openness and positive affect, and conscientiousness and life satisfaction (DeNeve and Cooper 1998; Garcia 2011). Moreover, studies have indicated that more extraverted people tend to experience more positive affect (Diener et al. 2003; Garcia 2011; Lyubomirsky et al. 2006).

Although the link between the big five personality dimensions and well-being is well established, researchers have advocated and encouraged the use of more genetic-, and neuropsychobiological-informed personality models, as they are more adequate for describing psychobiological processes underlying patterns of behaviors, feelings, and thoughts than lexical models (Cloninger 2008; deMoor et al. 2010; Munafò and Flint 2011; Veselka et al. 2012). One such model, the Psychobiological Model of Personality (Cloninger et al. 1993), conceptualizes personality as *“the way a person learns to adapt to experience, or, more specifically, as the dynamic organization within the individual of the psychobiological systems by which a person both shapes and adapts uniquely to an ever-changing internal and external environment”* (Zwir et al. 2019, p. 1).

According to this model, personality is constituted by temperament and character dimensions. Temperament is described as the disposition of a person to learn how to behave, react emotionally, and form attachments automatically by associative conditioning (Cloninger et al 2019). Temperament refers to dimensions that have been empirically confirmed to quantify individual differences in associative conditioning and related human brain circuitry (Zwir et al. 2018, 2019). They are innate and hereditary traits, and each extreme of temperament can be roughly described as bipolar; that is, both extremes of each of the four temperaments have some practical advantages as well

as some practical disadvantages, depending on the situation (Cervone 2005; Cloninger et al. 1993). In addition, temperament describes a person's emotional style without any prejudice about what is socially desirable or undesirable about an individual. Because temperament refers to the tendency of responding to basic emotional stimuli, it is strongly related to hedonic well-being (Cloninger et al. 1998). In contrast, character is the self-regulatory aspect of personality, that is, the way a person shapes and adapts responses to ever-changing external and internal conditions (Cloninger et al. 1993), including the executive, legislative, and judicial functions necessary for mental self-government and self-actualization of identity. Because character refers to higher-order socio-cognitive self-regulatory processes, it is more associated with eudemonic well-being (Cloninger 2004). Character is less heritable than temperament and matures with age. The temperament dimensions proposed by Cloninger are Novelty Seeking (NS) (i.e., impulsive vs. deliberate); Harm Avoidance (HA) (i.e., anxious vs. risk-taking); Reward Dependence (RD) (i.e., sociable vs. aloof), and Persistence (PS) (i.e., determined vs. easily discouraged). The proposed character dimensions are Self-Directedness (SD) (i.e., purposeful vs. aimless), Cooperativeness (CO) (i.e., helpful vs. hostile), and Self-Transcendence (ST) (i.e., holistic vs. self-centered) (for more details see Cloninger et al. 1993; Zvir et al. 2018, 2019).

Studies testing the relationships between attachment style and personality dimensions from the Psychobiological Model (Cloninger et al. 1993) using versions of its associated personality inventory (the Temperament and Character Inventory, TCI) are scarce. On exception is the study by Chotai et al. (2005), which assessed the association between attachment styles and personality using the adolescent version of the TCI. Results showed that a secure attachment style was linked to increased novelty seeking, reward dependence, cooperativeness, and self-transcendence, as well as lower

harm avoidance. In contrast, the fearful-avoidance attachment style was linked to lower novelty seeking while the anxious/ambivalent style was linked to elevated harm avoidance and novelty seeking, but lower self-directedness. The dimensions of the Psychobiological Model of Personality were also used to predict the risk of substance addiction in adolescents. Cornellà-Font et al. (2018) found that temperament and attachment dimensions were related to a higher risk of addiction. Specifically, novelty seeking, family concern, and age seemed to act as risk factors, whereas security in attachment was a protective factor. The study also found that novelty seeking was positively associated with attachment dimensions, such as self-sufficiency and parental resentment, and negatively associated with persistence and security attachment.

### **Personality, Attachment and Cognitive and Affective Well-being in Adolescence**

Well-being is a multidimensional phenomenon that incorporates biological, psychological, social, and spiritual dimensions (Bartels and Boomsma 2009; Cloninger 2004; Lyubomirsky et al. 2005; McDowell 2010). It refers to the emotional and cognitive dimensions of subjective experience that result from individuals' evaluations of the various dimensions of life and is strongly associated with an individual's attachment style (Davis et al. 2018). Parental attachment relationships are a protective factor against stress and other physical, mental, and relational health symptoms in adolescence (Mónaco et al. 2019) and have strong influences on health and health behavior (Feeney 2000; Pietromonaco et al. 2013; Pietromonaco et al. 2015), as well as on psychological well-being (Lavy and Littman-Ovadia 2011; Wei et al. 2011). Secure and dismissing attachment styles have been shown to be associated with higher well-being, while preoccupied attachment has been linked to adverse outcomes. In contrast, fearful attachment has been shown not to be directly related to well-being (Karreman and Vingerhoets 2012). In a study with Spanish adolescents, attachment to one's mother



and father, along with emotional competencies, were found to be relevant variables in determining adolescent well-being (Gentzler et al. 2013). In this study, parent-reports of adolescent temperament and adolescent-reports of attachment security with mothers and fathers were studied as predictors of the variation in responses to positive events (i.e., the adolescents' positive emotional reactions and their savoring and dampening responses), across a four-day period, and the authors found that temperament had more influence than attachment. Specifically, effortful control predicted more savoring and sustained positive affect about the events, whereas negative emotionality predicted more dampening. Adolescents' reports of more secure attachment to fathers were (although marginally) linked to more savoring of their positive event (Gentzler et al. 2013).

The personality dimensions of the Psychobiological Model are differentially associated with well-being. For example, self-directedness appears to be a particularly important predictor of adolescents' well-being as it mediates the relationship between temperament dimensions such as persistence and well-being (Garcia 2011; Garcia and Moradi 2011; Garcia et al. 2012). Moreira et al. (2015), for example, found that each character dimension accounts for unique variance in well-being, although this was dependent on its interactions with the other character dimensions. Particularly, increased self-directedness was linked to more affective and cognitive well-being regardless of the other two-character traits. Cooperativeness, on the other hand, was associated with more cognitive well-being and with positive affect, but only in combination with high self-directedness and high self-transcendence. Self-directedness and cooperativeness explained 15.5% of the cognitive well-being variance. Self-directedness and self-transcendence explained 1.4% of the variance in affective well-being. In addition, high levels of harm avoidance predicted low levels of positive affect (Garcia 2011). Both temperament and character dimensions are associated with physical and emotional

health, although evidence for the associations between temperament and cognitive well-being is less consistent (Cloninger and Zohar 2011; Josefsson et al. 2011; Ryff et al. 2004; Westerhof and Keyes 2010). It is important to emphasize that personality traits and well-being reciprocally influence each other over time, and not only personality predicts well-being but also well-being levels prospectively predicted personality change (Soto, 2015).

There is evidence that personality changes over time (Josefsson et al. 2013; Zohar et al. 2018) and, therefore, testing the moderating role of personality makes sense because the character matures with age. Nevertheless, the stability of a given variable is not a contraindication for its use as a moderating variable; for example, gender is a stable variable and is widely used as a moderating variable. A body of research has considered personality dimensions as a moderator variable regarding well-being, although most studies have used the Five-Factor Model (Costa and McCrae 1992; Furnham and Christoforou 2007; Senf and Liao 2013; Syrén et al., 2020; Weiss et al. 2008). We are not aware of any study that has used the Psychobiological Model of Personality as the theoretical framework. In a study focused on the moderating role of personality in response to the intervention, participants with higher levels of extraversion and openness experienced greater gains in happiness and greater reductions in depression in a group performing acts of kindness for others (Senf and Liao 2013). In addition, individuals with high scores in sensation seeking (the degree to which an individual enjoys and seeks new experiences) showed a stronger relationship between physical pleasure and satisfaction with daily life (Oishi et al. 2001). These studies emphasize the importance of understanding individual differences in intervention response and provide some indications of the mechanisms behind the intervention effectiveness (Wang et al. 2017). Emotional stability is a moderator of the group's

influence of classmates on academic achievement (Hendriks et al. 2011). Neuroticism, extraversion, openness, agreeableness, and conscientiousness are moderators of the relation between sensation seeking and indicators of adolescent marijuana use (lifetime use, current use, and attraction to marijuana use; Roth and Liebe 2011). Further, Mabbe et al. (2016) found that big five personality dimensions, excluding agreeableness, were moderators of the relationship between psychologically controlling parenting and problem behavior.

Although there is evidence that personality and attachment significantly correlate with well-being, studies describing how these two phenomena interact in predicting well-being are scarce. The objectives of this study are twofold: first, to assess the unique effect of parental attachment on affective and cognitive well-being after controlling for psychobiological personality dimensions in a sample of adolescents. Second, to analyze whether gender and age and specific personality dimensions moderate the relationship between parental attachment and affective and cognitive well-being.

Given current research evidence and theory, we formulated the following hypotheses: 1) personality dimensions from the Psychobiological model and secure parental attachment will be associated with affective and cognitive well-being, with parental attachment accounting for unique variance above and beyond that explained by personality; and 2) age and gender, and personality dimensions from the Psychobiological model will moderate the relationship between parental attachment and affective and cognitive well-being.

## **Material and Methods**

### **Participants and procedure**

Three hundred and fifty adolescents from five schools in the North of Portugal were invited to participate in the study using the snowball technique for the selection of non-randomized samples. All participants required a written informed consent from their parents to take part in the study. Adolescents were also asked if they wanted to participate in the study. In total, 336 adolescents ( $M$  age = 14.88,  $SD=1.73$ ) who met these inclusion criteria (voluntary participation and parents' consent) and agreed to participate were gathered and completed the study measures independently, while in class, in a session that took 1 h. This session, which occurred in June 2018, was supervised by a school staff member and member of the research team. This study was approved by the Psychology for Positive Development Research Center, Porto, Portugal and by the University Behavioral Research Ethics Board. Table 1 present participant's characteristics.

Insert table 1

## Measures

A *Socio-demographics questionnaire* recorded data including age, gender, school grade, number of siblings, and parental education level, marital status, and age.

The *Inventory of Parent and Peer Attachment* (IPPA; Armsden and Greenberg 1987; Neves et al. 1999) has 25 self-report items assessing the quality of adolescents' attachment to parents and peers. In this study only the parent version was used. Three broad dimensions are assessed by three subscales: the degree of mutual trust (e.g. “*My mother/father respect my feelings*”), quality of communication (e.g. “*I like to get my mother/father's view on things I'm worried about*”), and extent of anger and alienation (e.g. “*I don't get much attention from mother/father*”). These scales are assessed using a 5-point Likert format from 1 (*never*) to 5 (*always*). The alienation scale is reverse scored. Higher scores on the subscales indicate more trust, communication, and

involvement (less alienation) in the relationship with parents. Higher scores overall indicate a more secure attachment to the mother and father. The original version of IPPA showed good psychometric properties. The three dimensions of the IPPA showed good levels of reliability ranging from .72 to .92 and the test-retest reliability was .93 for parents' scales. Besides, the dimensions showed high intercorrelations, with the  $r$ -value ranging from .70 to .76. Cronbach's alpha for the mother and father scales was .87 and .89, respectively. Also, IPPA scores were shown to be correlated with well-being scores, such as self-esteem and life satisfaction, and are predictive of depression/anxiety and resentment/alienation in adolescents and personality variables such as positivity (Armsden and Greenberg 1987). The relationship between attachment and affective status remains even after controlling for the degree of negative life-change (Armsden and Greenberg 1987). In the present study, alphas ranged between .82 and .92.

*The Junior Temperament and Character Inventory* (JTCI; Luby et al. 1999; Moreira et al. 2012), contains 127 items, measuring the 7 major dimensions of Cloninger's Psychobiological Model of Temperament and Character. In this study, the alphas were the following for the four JTCI temperament dimensions: Novelty Seeking (NS) = .73; Harm Avoidance (HA) = .69; Reward Dependence (RD) = .57; and Persistence (PS) = .76; the alphas for the three character dimensions were: Self-directedness (SD) = .75; Cooperativeness (CO) = .83; and Self-transcendence (ST) = .71.

The *KIDSCREEN-10* (Erhart et al. 2009; Matos et al. 2012) has 10 self-report items that assess the quality of life and well-being in children/adolescents aged between 8 and 18 years. Items (e.g. "*Thinking about the last week: Have you felt fit and well? Have your parents treated you fairly?*") are scored using a 5-point Likert format from 1 (*never*) to 5 (*always*). Low scores indicate a person feels unhappy, unfit, and dissatisfied

regarding family life, peers, and school life. High scores indicate the opposite (feeling happy, fit, and satisfied with family, school, and peers' group). The original version of KIDSCREEN10 had good psychometric properties, with an alpha of .82 and good test-retest reliability/stability ( $r = .73$ ;  $ICC = .72$ ) (Ravens-Sieberer et al. 2001). This instrument can differentiate groups: children and adolescents with a low score on the family affluence scale (effect size  $d = .47$ ), with behavioral problems (effect size  $d = 1.30$ ) and with a high number of psychosomatic complaints ( $d = 1.69$ ) display a significantly lower health-related quality of life in comparison to the respective comparison group. The Portuguese version has been shown to have good psychometric properties, with an alpha of .78, and the factorial structure was shown to be invariant across age groups, nationality, and socio-economic level. In this study, Cronbach alpha was .81.

The *Positive and Negative Affect Scale* (PANAS, Watson et al. 1988; Galinha and Pais-Ribeiro 2005), includes 20 self-report items assessing moods and emotions. Ten items measure positive affect (PA) and 10 items measuring negative affect (NA). Participants were asked to indicate the extent to which they currently felt each emotion using a 5-point Likert format from 1 (*very slightly or not at all*) to 5 (*extremely*). The positive emotions were interested, excited, strong, enthusiastic, proud, alert, inspired, determined, attentive, and active. The negative emotions were distressed, upset, guilty, scared, hostile, irritable, ashamed, nervous, jittery, and afraid. Higher scores indicate more PA and NA. Across samples (e.g, Jovanović and Gavrilov-Jerković 2015) factorial analyses have supported a two-factor structure for the PANAS, as proposed by Watson et al. (1988). The Portuguese version had alpha values of .86 for PA and .89 for NA, similar to the original scale. In this study, Cronbach's alphas were .85 for PA and .88 for NA.

The *Brief Multidimensional Students' Life Satisfaction Scale* (BMSLSS, Huebner et al. 2011) includes 6 self-report items assessing life satisfaction. Five items focus on specific domains (family, friends, school, self, and living environment), and one item pertains to global well-being. All items (e.g. "I would describe my satisfaction with my family life as...") are scored using a 7-point Likert format from 1 (*terrible*) to 7 (*fantastic*). Higher scores indicate higher levels of global satisfaction with life. The original version of this scale has an alpha of .75, with all items correlated significantly with the corrected total (range = .37 (Friends) - .68 (Self). BMSLSS inter-item correlations ranged from .20 to .67, with a mean of .37. Principal axis factor analyses have indicated one higher-order general factor among students across ages 8–18 in the USA (Funk et al. 2006; Seligson et al. 2005). This scale has already been used in a study with a similar sample (Moreira et al. 2015) and, in this study, Cronbach's alpha was .84.

The *Brief Version of the Satisfaction with Social Support Scale for Children and Adolescents* (Gaspar et al. 2009) includes 11 self-report items, six assessing satisfaction with social support (e.g., "*I am satisfied with the amount of friends I have*") and five items that assess the need for activities related to social support (e.g., "*I miss social activities that satisfy me*"). All items are rated using a 5-point Likert format from 1 (*totally agree*) to 5 (*totally disagree*). Higher results indicate higher satisfaction with social support. The Cronbach alpha in the original version was .84 and in this study was .80.

*Composite cognitive and affective well-being index.* Based on the proposals of Cloninger and Zohar (2011) and Josefsson et al.. (2011), we estimated a Cognitive and Affective Well-being Index indicators of cognitive (health/wellness) and affective (happiness) well-being, respectively. The Cognitive Well-being Index was calculated as

the mean score across Satisfaction with Social Support, Satisfaction with Life, and Health-related Quality of Life. The Affective Well-being Index was calculated as Positive affect minus Negative affect, meaning it captures the emotional tonality of adolescents' experiences; that is, the salience of positive emotions (desirable) versus the salience of negative emotion (undesirable). These indices were already used in similar samples (Moreira et al. 2015, 2019 a,b,c).

### **Statistical analysis**

Pearson correlation coefficients were calculated to examine the relationships between study variables. Gender was coded as 0 for boys and 1 for girls. The sample size has a reduced number of participants in the IPPA questionnaire because not all the adolescents filled the questionnaire regarding the mother and the father. Some of them only reported data about the mother and others about the father. Therefore, from a total sample of 336 adolescents, 322 filled the IPPA questionnaire about both the parents.

To assess the degree to which personality dimensions and attachment predict affective and cognitive well-being, we tested a set of four hierarchical multiple linear regressions, each with three steps. We used hierarchical regression to assess a) if personality dimensions predict significant variance in well-being after controlling for age and gender, and b) if parental attachment can account for additional variance than that already explained by personality, age, and gender. Because we measured maternal and paternal attachment independently, we tested two models for each outcome variable (affective and cognitive well-being). All the scales of JTCI and IPPA were included in the regression models regardless of their significant relationship with the outcomes. In these analyses, IPPA subscales were used. The assumptions for performing the hierarchical regression models were satisfied.



Thus, to analyze whether there is evidence of a moderation effect of personality in the relationship between attachment to father/mother and cognitive and affective well-being, moderation analyses were carried out using the PROCESS macro for SPSS, developed and described by Hayes (2013) and Preacher and Hayes (2008). In these analyses, IPPA total score was used. All the analyses were performed with Software IBM® SPSS®, version 26.0, and alpha was set at  $p \leq .05$ .

## **Results**

### **Associations between adolescents' personality, attachment, and affective and cognitive well-being**

Descriptive statistics and associations between adolescents' personality, parental attachment (maternal and paternal), and affective (happiness) and cognitive (health) well-being are displayed in Table 2 and 3. Affective well-being was associated with all the dimensions of JTIC except self-transcendence and with maternal and paternal attachment (total score and subscales). Cognitive well-being was only significantly associated with persistence and self-directedness, as well as both maternal and paternal attachment (except the involvement subscale). Boys registered better cognitive and affective well-being than girls. Cognitive and affective well-being were also negatively associated with age, indicating that younger adolescents had better cognitive and affective well-being than older adolescents.

Insert table 2 and 3

### **Predictors of Cognitive Well-being**

The first hierarchical multiple regression model (Model 1, Table 4), tested the variance in cognitive well-being explained by personality dimensions and maternal attachment. Gender ( $\beta = -.19$ ), age ( $\beta = -.22$ ), harm avoidance ( $\beta = -.13$ ), and involvement in the maternal relationship ( $\beta = -.27$ ) were significant predictors of

cognitive well-being. Maternal attachment accounts for a significant amount of variance of cognitive well-being controlling for personality, age, and gender.  $R^2$  change value was .05, and change statistics showed that Anova results for change in  $R^2$  for Model 3 were the following,  $F(3,321)= 7.321, p<.001$ . The final model (Step 3) explained 23% of the variance,  $F(3,321)= 8.157, p <.001$  (Table 4).

The second model was the same as Model 1 (Model 2, Table 4), with the difference that it included paternal rather than maternal attachment as a predictor. In this model (Table 4), gender ( $\beta = -.20$ ), age ( $\beta = -.21$ ), trust ( $\beta = .25$ ) and involvement ( $\beta = -.26$ ) in the paternal relationship were significant predictors of cognitive well-being. Paternal attachment accounts for a significant amount of variance of cognitive well-being controlling for personality, age, and gender.  $R^2$  change value was .05, and change statistics showed that Anova results for change in  $R^2$  for Model 3 were the following,  $F(3,313)= 7.263, p <.001$ . The final model (step 3) accounted for 24% of the variance,  $F(12, 313)= 8.252, p <.001$  (Table 4).

Insert table 4

### **Predictors of Affective Well-being**

The third hierarchical multiple regression model (Model 3, Table 5), tested the variance in affective well-being explained by personality dimensions and maternal attachment. Gender ( $\beta = -.21$ ), harm avoidance ( $\beta = -.24$ ), self-directedness ( $\beta = .27$ ), cooperativeness ( $\beta = .14$ ) and involvement in the maternal relationship ( $\beta = .12$ ) were significant predictors of adolescents' affective well-being. Maternal attachment accounts for a significant amount of variance of affective well-being controlling for personality, age, and gender.  $R^2$  change value was .018, and change statistics showed that Anova results for change in  $R^2$  for Model 3 were the following,  $F(3,321)= 3.334,$

$p=.02$ . The final model (step 3) explained 42% of the variance,  $F(12, 321)= 19.48$ ,  $p<.001$  (Table 5).

The fourth-hierarchical multiple regression model (Model 4, Table 5) tested the variance in affective well-being explained by personality dimensions and paternal attachment. Gender ( $\beta = -.21$ ), harm avoidance ( $\beta = -.24$ ), self-directedness ( $\beta = .28$ ), and communication ( $\beta = -.17$ ), trust ( $\beta = .20$ ), and involvement ( $\beta = .17$ ) in the paternal relationship were significant predictors of affective well-being. Paternal attachment accounts for a significant amount of variance of affective well-being controlling for personality, age, and gender.  $R^2$  change value was .04, and change statistics showed that Anova results for change in  $R^2$  for Model 3 were the following,  $F(3,313)= 7.474$ ,  $p <.001$ . The final model (step 3) explained 44% of the variance,  $F(12, 313)= 20.685$ ,  $p<.001$  (Table 5).

Insert table 5

### **Personality as a moderator of the relationships between parental attachment and affective well-being**

The first regression model tested whether maternal attachment, self-directedness and their interaction predict affective well-being. These predictors accounted for 30% of the variance in affective well-being,  $F(3, 330) = 46.47$ ,  $p < .001$ . Crucially, the interaction term was significant,  $\beta = -.0264$ , 95% CI  $[-.0511, -.0017]$ ,  $t = -2.099$ ,  $p = .037$ , indicating that the relationship between maternal attachment and affective well-being is moderated by self-directedness (Table 6). An assessment of simple slopes (see Figure 1) indicated that for adolescents with low levels ( $-1$  SD) of self-directedness there was a positive effect of maternal attachment on affective well-being,  $b = .0163$ , 95% CI  $[-.0020, .0305]$ ,  $t = 2.24$ ,  $p = .026$ . In contrast, for adolescents with high levels ( $+1$  SD) of self-directedness there was no effect of maternal attachment on affective

well-being. An independent analysis indicated that the relationship between paternal attachment and affective well-being was not moderated by personality dimensions.

Insert table 6

### **Personality as a moderator of the relationship between parental attachment and cognitive well-being**

We tested a regression model in which maternal attachment, self-directedness, and their interaction predict cognitive well-being. Overall, these predictors explained 12% of the variance,  $F(3, 330) = 14.93, p < .001$ . Within the model, the interaction term was statistically significant,  $\beta = -1.583$ , 95% CI  $[-.2362, -.0805]$ ,  $t = -4.001, p < .001$ , indicating that the relationship between maternal attachment and cognitive well-being was moderated by self-directedness (Table 6). An assessment of simple slopes (Figure 2) indicated that for adolescents with low self-directedness (-1 SD) there was a positive effect of maternal attachment on cognitive well-being,  $b = 1.392$ , 95% CI  $[.0942, .1842]$ ,  $t = 6.091, p < .001$ . In contrast, there was no significant effect of maternal attachment on cognitive well-being for adolescents with high self-directedness.

Next, we tested a similar model testing the moderating effect of persistence on the relationship between maternal attachment and cognitive well-being. The model explained 11% of the variance in cognitive well-being and was statistically significant,  $F(3, 330) = 14.09, p < .001$ . The persistence-by-maternal attachment interaction term was significant,  $\beta = -.1094$ , 95% CI  $[-.1718, -.0468]$ ,  $t = -3.441, p = .001$ , implying a moderation effect (Table 6). Simple slopes (Figure 3) indicated a significant effect of maternal attachment of cognitive well-being for adolescents with low persistence (-1 SD), but no effect for those with high persistence (+1 SD).

The final model included paternal attachment, self-directedness, and their interaction as predictors of cognitive well-being. This model was significant,  $F(3, 322)$

= 13.08,  $p < .001$ , and accounted for 11% of the variance in cognitive well-being. The self-directedness-by-paternal attachment interaction term was significant,  $\beta = -.0788$ , 95% CI [-.1401, -.0175],  $t = -2.528$   $p = .012$ , implying a moderating effect (Table 6). Simple slopes (Figure 4) revealed a significant effect of paternal attachment on cognitive well-being for adolescents with low self-directedness,  $b = .1007$ , 95% CI [.0641, .1373],  $t = 5.417$ ,  $p < .001$ , but no significant effect for those with high self-directedness.

### **Gender as a moderator of the relationship between parental attachment and cognitive/affective well-being**

We tested a regression model in which maternal attachment, gender, and their interaction predict cognitive well-being. Overall, these predictors explained 14% of the variance,  $F(3, 330) = 18.57$ ,  $p < .001$ . Within the model, the interaction term was statistically significant,  $\beta = -.0961$ , 95% CI [-.1603, -.0319],  $t = -2.946$ ,  $p < .01$ , indicating that the relationship between maternal attachment and cognitive well-being was moderated by gender (Table 7). An assessment of simple slopes (Figure 5) indicated that for boys (-1 SD) there was a positive effect of maternal attachment on cognitive well-being,  $b = .1354$ , 95% CI [.0872, .1836],  $t = 5.524$ ,  $p < .001$ . In contrast, there was no significant effect of maternal attachment on cognitive well-being for girls.

We tested a regression model in which paternal attachment, gender, and their interaction predict cognitive well-being. Overall, these predictors explained 14% of the variance,  $F(3, 322) = 18.00$ ,  $p < .001$ . Within the model, the interaction term was statistically significant,  $\beta = -.0885$ , 95% CI [-.1222, -.0149],  $t = -2.513$ ,  $p < .01$ , indicating that the relationship between paternal attachment and cognitive well-being was moderated by gender (Table 7). An assessment of simple slopes (Figure 6) indicated that for boys (-1 SD) there was a positive effect of paternal attachment on

cognitive well-being,  $b = .1083$ , 95% CI [.0675, .1490],  $t = 5.227$ ,  $p < .001$ . In contrast, there was no significant effect of paternal attachment on cognitive well-being for girls. In addition, gender was not a moderator of parental attachment on affective well-being.

Insert table 7

### **Age as a moderator of the relationship between parental attachment and affective/cognitive well-being**

We tested a regression model in which maternal attachment, age, and their interaction predict cognitive well-being. Overall, these predictors explained 16% of the variance,  $F(3, 322) = 21.33$ ,  $p < .001$ . Within the model, the interaction term was statistically significant,  $\beta = -.0223$ , 95% CI [-.0418, -.0027],  $t = -2.244$ ,  $p < .05$ , indicating that the relationship between maternal attachment and cognitive well-being was moderated by age (Table 7). An assessment of simple slopes (Figure 7) indicated that for younger adolescents (-1 SD) there was a positive effect of maternal attachment on cognitive well-being,  $b = .1213$ , 95% CI [.0695, .1730],  $t = 4.607$ ,  $p < .001$ . In contrast, there was no significant effect of maternal attachment on cognitive well-being for older adolescents.

Then, we tested a regression model in which paternal attachment, age, and their interaction predict cognitive well-being. Overall, these predictors explained 17% of the variance,  $F(3, 322) = 22.43$ ,  $p < .001$ . Within the model, the interaction term was statistically significant,  $\beta = -.0198$ , 95% CI [-.0342, -.0055],  $t = -2.714$ ,  $p < .01$ , indicating that the relationship between paternal attachment and cognitive well-being was moderated by age (Table 7). An assessment of simple slopes (Figure 8) indicated that for younger adolescents (-1 SD) there was a positive effect of paternal attachment on cognitive well-being,  $b = .1017$ , 95% CI [.0626, .1408],  $t = 5.119$ ,  $p < .001$ . In contrast, there was no significant effect of paternal attachment on cognitive well-being

for older adolescents. In addition, age was not a moderator of parental attachment on affective well-being.

The next sets of analyses were exploratory, in nature, and had the aim of understanding the contribution of well-being for each dimension of personality. Results showed that affective well-being negatively predicted novelty seeking ( $\beta=-.203$ ), and harm avoidance ( $\beta=-.431$ ), and positively predicted reward dependence ( $\beta=.215$ ), persistence ( $\beta=.304$ ), self-directedness ( $\beta=.569$ ) and cooperativeness ( $\beta=.372$ ). In turn, cognitive well-being predicted self-transcendence ( $\beta=.130$ ) (Table 8). Regarding the contribution of well-being to attachment, affective well-being predicted paternal attachment ( $\beta=.160$ ) and cognitive well-being predicted maternal ( $\beta=.243$ ) and paternal ( $\beta=.196$ ) attachment.

Insert table 8

## Discussion

The objective of this study was to deepen our understanding of the individual predictors of well-being. We described the contributions of parental attachment to adolescent well-being, after controlling for age, gender, and personality. We found three major results. Firstly, male gender and young age, low harm avoidance, high self-directedness, and cooperativeness were linked to increased affective and cognitive well-being in adolescents. Secure attachments (high trust, communication, and involvement) were linked to higher affective well-being but more distant attachments, and particularly paternal attachments (high trust, low communication, and low involvement), were linked to higher cognitive well-being. A second major finding was that attachment explained additional variance in well-being after controlling for personality dimensions. Finally, gender and age were moderators of the relationship between parental attachment and cognitive well-being only (not affective well-being); and the self-

directedness and persistence personality dimensions were found to be moderators of the relationship between parental attachment and both affective and cognitive well-being. In the following, we will discuss each of these groups of results.

### **Associations among socio-demographics, parental attachment, personality, and well-being**

Our results on the linear associations among socio-demographics, personality, and well-being are generally consistent with the theoretically expected.

Girls registered lower levels of both affective and cognitive well-being. Lower affective well-being reflects a more negative emotional tonality. In turn, negative emotions (e.g. fear, sadness, etc.) tend to be associated with the inhibitory system, which prone individuals (including adolescents) to feel more negative emotionality (Moreira et al. 2015). Also, females tend to register higher levels of harm avoidance than males (Moreira et al., 2012; Moreira et al., 2017). These evidences come from research using different personality models, from lexical models (e.g. Big Five) to psychobiological models (e.g. Cloninger's model) (Cloninger and Zohar 2011; Garcia et al. 2012; Moreira et al. 2015). As in our study, and specifically in adolescents' females, studies conducted by Garcia and colleagues (2012, 2014) for example, consistently show that girls register higher levels of negative affect, and lower levels of affective well-being. In turn, cognitive well-being is mainly influenced by socio-cognitive dimensions of personality (e.g. Zohar and Cloninger 2011). We found that personality dimensions of self-directedness and cooperativeness were positively associated with affective well-being but not with cognitive well-being. These results are consistent with previous research describing socio-cognitive influences on well-being (Moreira et al. 2015). Evidence about these been associated with females or males are not as consistent. However, our findings that cognitive well-being correlates negatively with



age are consistent with previous studies. For example, Moreira and colleagues (2015) found that younger adolescents registered higher cognitive well-being than older adolescents, which can be explained by the progressive differentiation of the socio-cognitive processes during adolescence.

Regarding the associations between parental attachment and both cognitive and affective well-being, our results globally confirm the positive associations between dimensions of attachment and cognitive and affective well-being. The exceptions are the dimensions of involvement with parents (captured in a reverse way, as alienation) and communication with fathers.

A curious finding of the study was that parental involvement (reversed alienation) had a negative association with cognitive well-being, meaning that adolescents who felt more alienated from their mothers and fathers (reflecting less parental involvement) reported increased cognitive well-being. The IPPA (Armsden and Greenberg 1987), is a measure of attachment centered on adolescents' differences and their ability to evaluate their relationships with parents. The alienation subscale (parental investment reversed) refers to adolescents' feelings of isolation, anger, and detachment from parents, including items such as contains items such as: *"I get upset a lot more than my mother/father knows about"*, *"My parents do not understand what is currently happening to me"*. This may be understood in light of the marked need for autonomy developed during adolescence. From an adolescent point of view, being autonomous in experiencing and dealing with negative experiences may be perceived as a desirable "status". Therefore, perceiving not being understood by parents and considering that their parents do not have access to their experiences (including negative ones) may be perceived positively by adolescents, as they may consider that this is an indicator of autonomy. In adolescents, this may not have the linear meaning that

“alienation” is associated with higher cognitive well-being. In fact, the meaning maybe the other way around: it may be an indicator that higher levels of cognitive well-being (which refers to more positive representations about the self, the others, and life) may prone adolescents to perceive themselves as being more autonomous and – as a consequence – to experience being “alienated” in a more salient way, as a result of higher levels of differentiation of the experience of being more autonomous. Besides, adolescents who show a low level of communication with their fathers (but not with their mothers) reported increased affective well-being. The communication subscale refers to adolescents' perceptions that parents are sensitive and responsive to their affective states and assessing the extent and quality of involvement and verbal communication with them, including items such as contains items such as: “*I tell my father about my problems and troubles*”, “*My father helps me to talk about my difficulties*”. This negative association between communication with fathers (but not with their mothers) and affective well-being (but not cognitive) need to be understood with caution. Future studies need to clarify this question by, for example, controlling variables of fathers-adolescents relationship.

In sum, linear associations found in the present study are largely consistent with previous research, describing positive associations between dimensions of parental attachment and both cognitive and affective. The exceptions found in this study require further investigation.

### **Gender, age, personality but also attachment predicts affective and cognitive well-being differently**

Generally, our results confirm that gender, age, and some dimensions of personality are significant predictors of adolescent affective and cognitive well-being. Linear associations described in Table 3 confirm the importance of personality

dimensions to well-being. Cognitive well-being was negatively associated with harm avoidance and positively associated with persistence and self-directedness. Affective well-being negatively correlated with harm avoidance (as it happened with cognitive engagement, although this association is much stronger in the case of affective well-being), but also with novelty seeking; and positively associated with reward dependence, persistence, self-directedness, and cooperativeness. These results confirm previous findings of Moreira and colleagues (2015) who found that combinations of personality dimensions were strong predictors of different dimensions of well-being, and highlighted the fact that a full understanding of the effects of personality on well-being requires a non-linear approach. They only described the combinations of personality dimensions of self-directedness, cooperativeness, and self-transcendence, because these character dimensions function as self-regulatory mechanisms, and they showed that each character dimensions gives an independent contribution to well-being depending on the interactions with other character dimensions (Moreira et al. 2015). As in the present study, they found that self-directedness was the personality dimension that explained more variance of the different aspects of well-being. The results from the present study expand those pieces of evidence in two ways. First, regarding personality dimensions, we included in the present study also the temperament dimensions as predictors of well-being (rather than character dimensions only). Second, besides personality dimensions, we included in our regression models age and gender, but also parental attachment dimensions as predictors of both cognitive and affective well-being. These facts help to understand why in our regression models (Tables 4 and 5) the beta coefficients were significant in the final model. However, and because our interest in this study was not the understanding of how personality dimensions only predicted well-being, but how they personality predicted well-being together with attachment

dimensions, we think that these models are informative for this objective. On the one hand, as described previously, final regression models confirm that personality dimensions are significant predictors of well-being. On the other hand, attachment dimensions of communication, trust, and involvement were significant predictors of well-being, even after controlling for personality dimensions. And this is one of the most important findings of this study.

### **Age and gender, but also personality dimensions of Self-directedness and Persistence moderates the associations between attachment and well-being**

In this study, we were particularly interested in describing the interactions between personality dimensions and attachment in explaining adolescent well-being. Consistently, we tested models estimating the moderation effect of age, gender, and persistence and self-directedness on the relationship between parental attachment and well-being.

Overall, these findings suggest that adolescents low in self-directedness and low persistence are more dependent on their parental attachment to have better well-being. This is the most compelling result of this study: personality dimensions of self-directedness and persistence are amongst the main predictors of several developmental positive processes and outcomes, including different aspects of well-being.

Recent advances have shown that not only subjective well-being is predicted by personality dimensions, but also it predicts different personality dimensions over time (Soto, 2015). Because of the outreaching importance of those results, we sought to explore these trends also in our study. We found that affective well-being was a negative predictor of personality dimensions of novelty seeking, and harm avoidance, but a positive predictor of reward dependence, persistence, cooperativeness, and self-directedness. In turn, cognitive well-being predicted self-transcendence. Besides,

affective well-being was a predictor of paternal attachment while cognitive well-being was a predictor of maternal and parental attachment. In sum, and confirming Soto's findings (2015), not only personality traits predicted well-being, but also well-being levels predicted personality dimensions. However, the design of the present study was cross-sectional, which does not allow for such inferences. Again, we test this hypothesis merely in an exploratory way, and further studies that replicate Soto's results (using longitudinal designs) are highly needed.

The study has some limitations that are important to acknowledge. First, the sample was recruited from a limited number of schools in the North of Portugal, which poses a risk to the generalizability of our findings, particularly if considering adolescent samples from outside of Portugal. Secondly, the study had a cross-sectional design, meaning that observed associations should not be interpreted as being causal. More research employing longitudinal designs are required to expand the current understanding of how personality and attachment influence adolescent well-being over time. While the purpose of the study was to examine the specific effects of parental attachments in adolescence, an interesting avenue for further research would be to consider attachments to peers and romantic partners, who often become attachment figures in this developmental period (Ainsworth, 1991).

These results have theoretical and practical implications. A first implication is that parental attachment accounts for variance in well-being above and beyond that accounted for psychobiological personality dimensions. Second, these results suggest that interventions for promoting well-being need to incorporate the benefits of promoting the development of a healthy personality. Thus, adolescents low in self-directedness and persistence (and therefore more at risk for developmental trajectories) especially benefit from parental attachments also to their well-being, meaning that

interventions and the promotion of positive parental attachment are even more relevant to more vulnerable youth, in a two- bidirectional ways: on the one hand, parental attachment functions as a protective factor for those low in self-directedness and persistence, buffering the negative impact that low values on these dimensions have on adolescent well-being; on the other hand, positive parental attachment are amongst the stronger mechanisms underlying the positive development of persistence and self-directedness. This means that parental attachment is one of the most crucial mechanisms for the promotion of well-being because they act both as promoters of the development of adolescent socio-cognitive processes (such as self-directedness, which development depend strongly on parental factors) and as a coping mechanism for those having less adaptive personality characteristics.

Sustainable well-being programs for adolescents (Well-Being Therapy/Coaching) in school, and at the community should be implemented to acknowledge the individual differences and needs of all types of adolescents. Cloninger (2006) suggested a simple and practical approach to well-being that integrates biological, psychological, social, and spiritual methods. This approach addresses and focuses on enhancing positive emotions, character development, life satisfaction, and spirituality. Adolescents can learn to flourish and be more self-directed by becoming calmer, accepting their limitations, and letting go of their fears and conflicts. Adolescents can also develop cooperativeness by increasing mindfulness and working in the service of others. The personality traits of self-directedness, cooperativeness, and self-transcendence are each essential for well-being and interventions that improve character lead to an alleviation of destructive behavior patterns and mental disorders, and increased positive emotions, life satisfaction, sense of meaning, and well-being (Albieri et al. 2009; Cloninger 2006; Cloninger 2013; Fava 2016; Mousavi et al. 2015).

Moreover, positive well-being during adolescence predicts better perceived general health and fewer risky health behaviors during young adulthood (Hoyt et al. 2011). To improve long term health and happiness is essential to nurture well-being during adolescence. A growing popular approach to promote youth healthy personality development is the promotion of long-term and curriculum infusion interventions for the promotion of social and emotional skills (Moreira et al. 2010; Moreira et al. 2014). In fact, understanding schools as contexts of holistic development is one of the main challenges in next decades, if we want that schools in our societies are active agents on youth positive development promotion.

A key priority in the EU Framework for Action and H2020 is the prevention of psychological problems in adolescents and the promotion of mental health and well-being (European Union 2016). Health promotion is more effective when it relies on the cultivation of well-being (Cloninger and Cloninger 2013). The school has the potential to be one of the most important and effective agencies for the promotion of well-being. School interventions are effective at promoting positive emotions and well-being, as well as decreasing distress, anxiety, and somatization (Ruini et al. 2009) and increasing adolescents' perceptions of usefulness, self-efficacy, emotional coping, and overall well-being (Veltro et al. 2015).

Although personality, attachment, and well-being are universal phenomena, their expression (resulting from the interaction among them) is shaped by contextual factors. Despite the importance of societal and cultural influences, studies describing the communalities and differences underlying the expression of these phenomena in different contexts are highly needed. In fact, estimating the effect of cultural features on the associations among personality, attachment and well-being will allow us for a

deeper understanding of how culture interacts with individuals and its attachments to humans in predicting happiness.

## **Conclusions**

The present study expands current knowledge in three ways. First, attachment dimensions of communication, trust, and involvement were significant predictors of well-being, even after controlling for age, gender, and personality dimensions. Second, age and gender moderate the associations between parental attachment and cognitive (but not emotional) well-being, reflecting the representations systems, which are culturally and socially construed, underlying cognitive well-being. Third, adolescents low in self-directedness and low persistence are more dependent on their parental attachment to have better well-being. In sum, our results support the idea that parental attachment is one of the most crucial mechanisms for the promotion of well-being because they act both as promoters of the development of adolescent socio-cognitive processes (such as self-directedness, which development depends strongly on parental factors) and as a coping mechanism for those having less adaptive personality characteristics.



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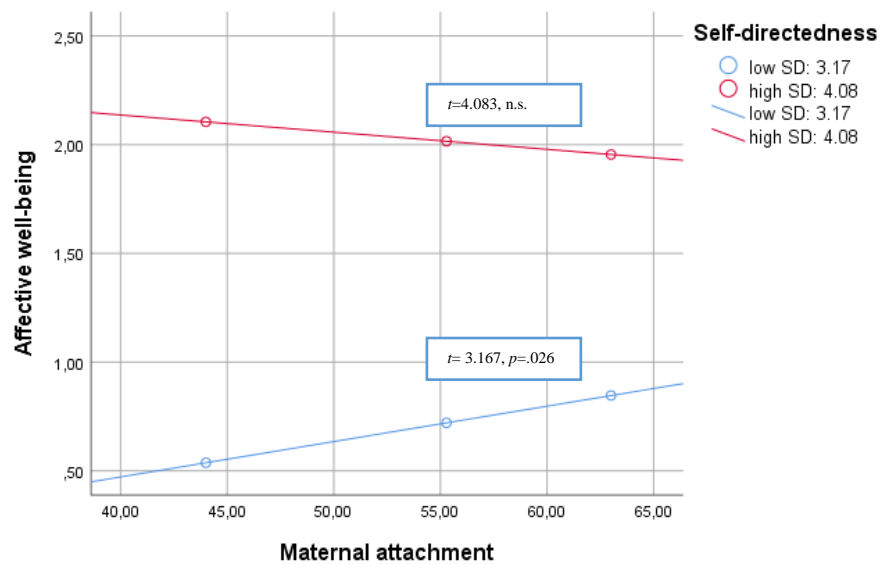


Figure 1. Moderation effect of self-directedness in the relationship between maternal attachment and affective well-being

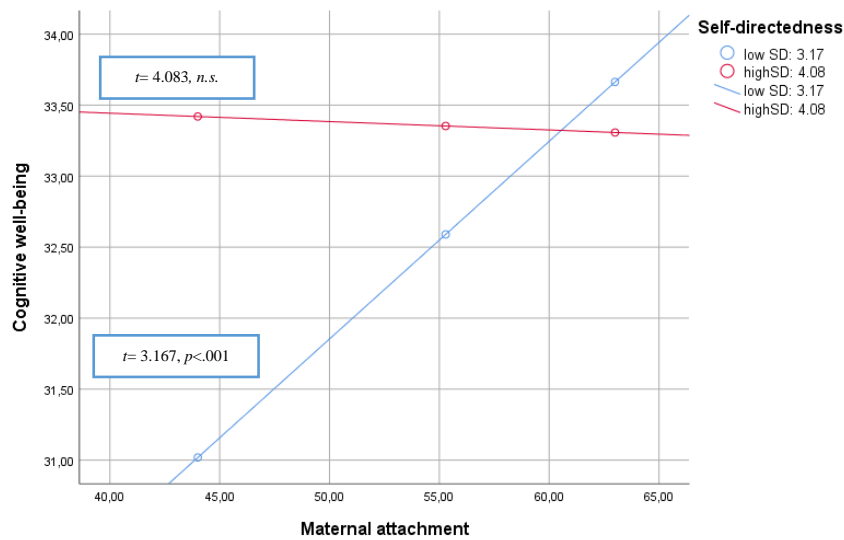


Figure 2. Moderation effect of self-directedness in the relationship between maternal attachment and cognitive well-being

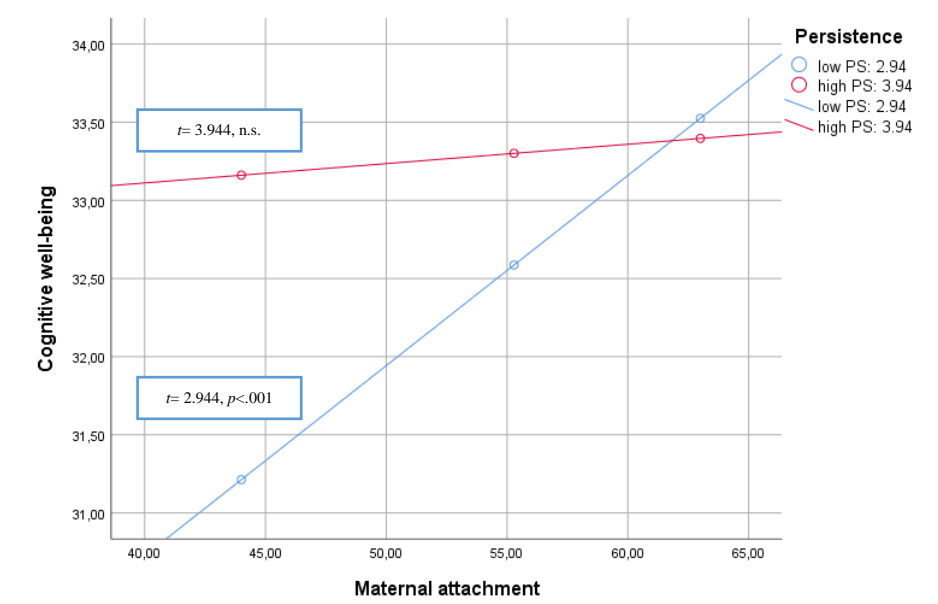


Figure 3. Moderation effect of persistence in the relationship between maternal attachment and cognitive well-being

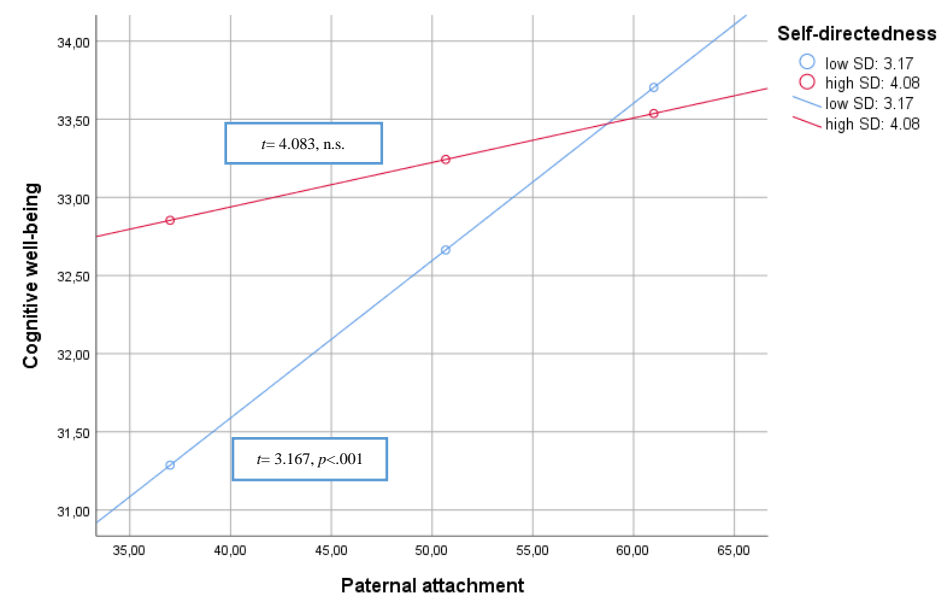


Figure 4. Moderation effect of Self-directedness in the relationship between paternal attachment and cognitive well-being



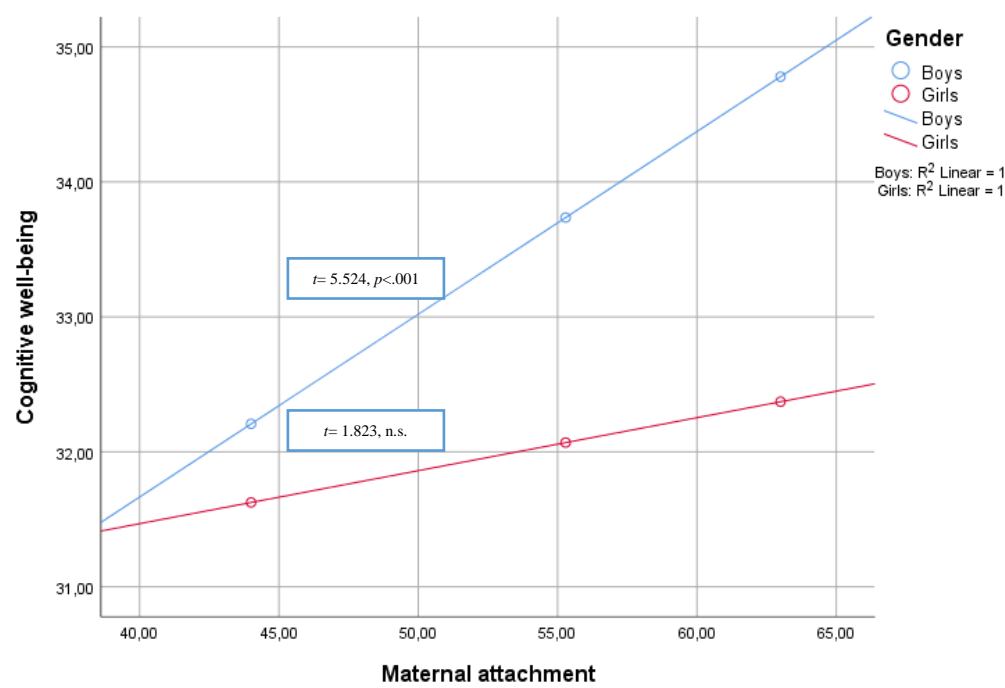


Figure 5. Moderation effect of gender in the relationship between maternal attachment and cognitive well-being

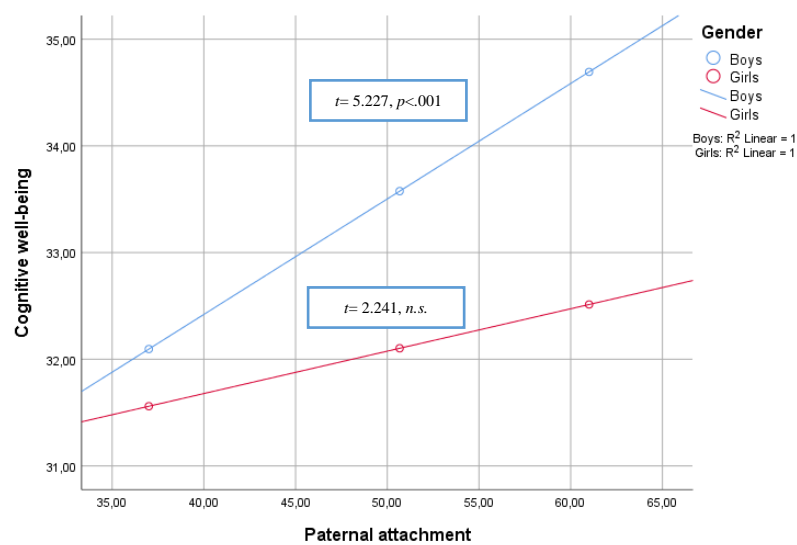


Figure 6. Moderation effect of gender in the relationship between paternal attachment and cognitive well-being

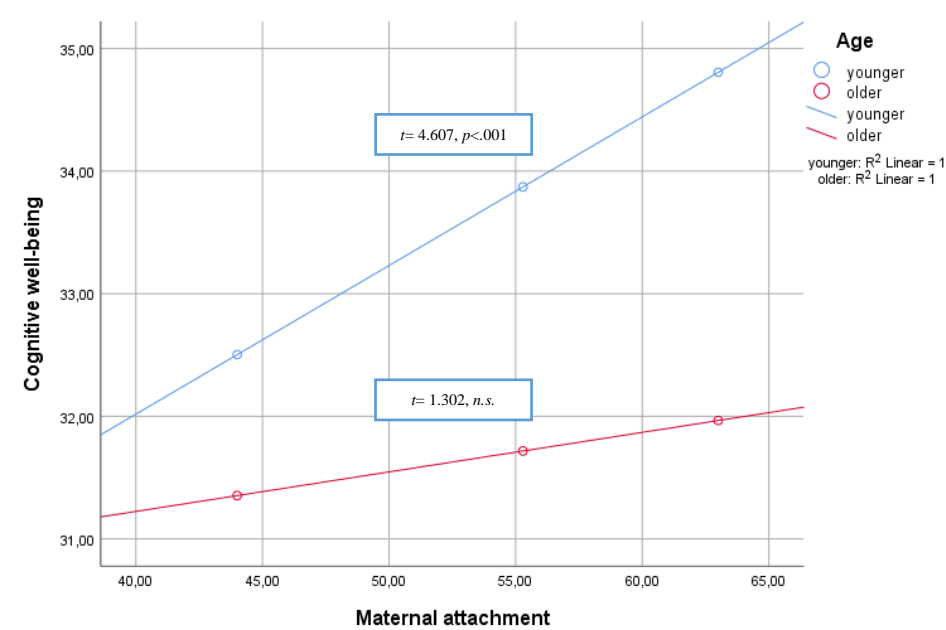


Figure 7. Moderation effect of age in the relationship between maternal attachment and cognitive well-being

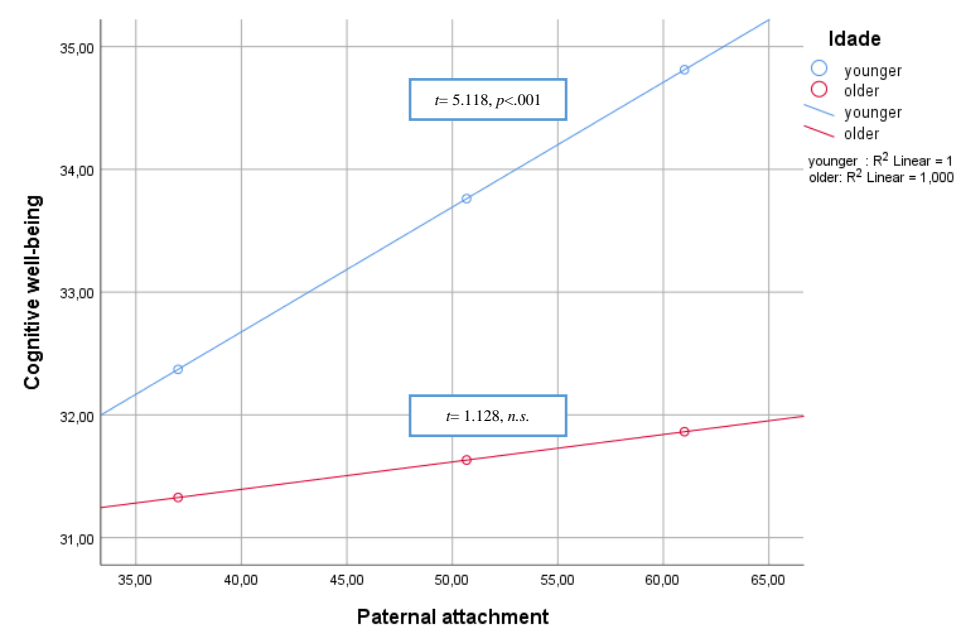


Figure 8. Moderation effect of age in the relationship between paternal attachment and cognitive well-being

Table 1

*Participant characteristics (N = 336)*

<b>Continuous variables</b>	<b>Min/Max</b>	<b>M(SD)</b>
Adolescent Age	11-18	14.88(1.73)
Father age (n=339)	31-65	46.21(5.60)
Mother age (n=343)	30-61	43.43(5.15)
Years of schooling	6-13	9.26(1.63)
<b>Categorical variables</b>	<b>%(n=)</b>	
Adolescent gender	51.2 (n=176, female)	
Brothers	79.5 (n=267, yes)	
Parents marital status		
Married	83.3 (n=280)	
Divorced	13.7 (n=46)	
Widow	2.4 (n=8)	
Parents Education	Father education	Mother education
4 years of education	18.8(n=63)	12.5(n=42)
6 years of education	19.3(n=65)	16.1(n=54)
9 years of education	22.3(n=75)	21.1(n=71)
12 years of education	23.8(n=80)	26.8(n=90)
University degree	8.0(n=27)	16.1(n=54)
Master/Doctoral degree	3.3(n=15)	4.8(n=16)

Table 2.

*Descriptive statistics of adolescents' personality, maternal and paternal attachment*

<b>Personality (n=336)</b>	<b>Min-Max</b>	<b>M(SD)</b>
Novelty seeking	1.70-4.26	2.82(0.44)
Harm avoidance	1.26-4.42	2.85(0.47)
Reward dependence	1.73-4.73	3.41(0.44)
Persistence	2.11-4.83	3.45(0.50)
Self-directedness	2.75-4.92	3.64(0.43)
Cooperativeness	2.37-5.00	3.95(0.49)
Self-transcendence	1.56-4.89	3.58(0.56)
<b>Maternal Attachment (n=322)</b>	<b>Min-Max</b>	<b>M(SD)</b>
Communication	9-45	34.39(6.94)
Trust	17-50	41.61(6.26)
Involvement	7-30	22.52(5.10)
Total attachment	19-73	53.48(10.17)
<b>Paternal Attachment (n=322)</b>	<b>Min-Max</b>	<b>M(SD)</b>
Communication	9-45	30.98(8.22)
Trust	12-50	39.49(7.79)
Involvement	7-30	21.73(5.31)
Total attachment	5-72	48.74(12.63)

\* $p \leq .05$ ; \*\* $p \leq .01$ ; \*\*\* $p \leq .001$ ;

Table 3.

*Relationships between variables*

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.
1. Gender	1	.273**	-.097	.352**	.351**	.183**	-.055	.295**	.196**	.074	.018	.153**	-.119*	-.003	.098	-.236**	-.237**
2. Age			.060	.166**	.018	-.038	-.018	.127*	.109*	-.047	-.005	.100	-.170**	-.073	.079	-.117*	-.305**
3. Novelty seeking				-.006	-.224**	-.548**	-.439**	-.463**	.190**	-.235**	-.277**	-.376**	-.191**	-.266**	-.317**	-.187**	-.103
4. Harm avoidance					.102	-.161**	-.509**	-.041	.138*	.003	-.082	-.121*	-.151**	-.175**	-.119*	-.482**	-.195**
5. Reward dependence						.313**	.175**	.506**	.174**	.378**	.357**	.367**	.192**	.294**	.294**	.139*	.046
6. Persistence							.608**	.503**	.048	.243**	.236**	.298**	.177**	.227**	.226**	.278**	.159**
7. Self-directedness								.477**	-.071	.268**	.356**	.434**	.266**	.342**	.353**	.536**	.142**
8. Cooperativeness									.259**	.290**	.315**	.413**	.193**	.331**	.336**	.300**	.093
9. Self-transcendence										.119*	.068	-.069	-.039	-.012	-.085	.008	.060
10. Maternal communication											.775**	.545**	.582**	.513**	.382**	.182**	.175**
11. Maternal trust												.570**	.402**	.511**	.354**	.292**	.177**
12. Maternal involvement													.308**	.428**	.722**	.309**	-.0064
13. Paternal communication														.802**	.547**	.257**	.210**
14. Paternal trust															.627**	.359**	.210**
15. Paternal involvement																.340**	-.054
16. Affective well-being																	.363**
17. Cognitive well-being																	

\* $p \leq .05$ ; \*\* $p \leq .01$ ; \*\*\* $p \leq .001$

Table 4.

*Summary output of hierarchical multiple regression testing predictors of adolescents' Cognitive Well-being (Composite Health Index)*

Mother Model (Model 1)						Father Model (Model 2)					
	$R^2$	$R^2_{adj}$	$F$	$\beta$	$p$		$R^2$	$R^2_{adj}$	$F$	$\beta$	$p$
Step 1	.121	.115	22.738***			Step 1	.124	.119	22.887***		
Gender				-.167	.002	Gender				-.165	.003
Age				-.263	.000	Age				-.269	.000
Step 2	.181	.159	7.970***			Step 2	.187	.164	8.100***		
Gender				-.225	.000	Gender				-.224	.000
Age				-.246	.000	Age				-.249	.000
Novelty seeking				-.039	.576	Novelty seeking				-.050	.476
Harm avoidance				-.100	.135	Harm avoidance				-.110	.098
Reward dependence				.040	.516	Reward dependence				.042	.492
Persistence				.133	.068	Persistence				.126	.089
Self-directedness				-.059	.472	Self-directedness				-.057	.481
Cooperativeness				.077	.311	Cooperativeness				.075	.320
Self-transcendence				.113	.050	Self-transcendence				.112	.054
$\Delta R^2$			.060**			$\Delta R^2$			.063**		
Step 3	.234	.205	8.157***			Step 3	.240	.211	8.252***		
Gender				-.185	<b>.002</b>	Gender				-.195	<b>.001</b>
Age				-.215	<b>.000</b>	Age				-.207	<b>.000</b>
Novelty seeking				-.051	.457	Novelty seeking				-.063	.357
Harm avoidance				-.131	<b>.046</b>	Harm avoidance				-.103	.112
Reward dependence				.014	.825	Reward dependence				.033	.593
Persistence				.119	.098	Persistence				.116	.110
Self-directedness				-.059	.476	Self-directedness				-.053	.511
Cooperativeness				.111	.134	Cooperativeness				.066	.376
Self-transcendence				.060	.295	Self-transcendence				.091	.110
Communication with mother				.142	.083	Communication with father				.045	.606
Trust with mother				.145	.081	Trust with father				.250	<b>.007</b>
Maternal involvement				-.266	<b>.000</b>	Paternal involvement				-.264	<b>.000</b>
$\Delta R^2$			.052***			$\Delta R^2$			.053***		

Note: Gender was coded as a dummy variable with male gender = 0 and female gender = 1; \* $p \leq .05$ ; \*\* $p \leq .01$ ; \*\*\* $p \leq .001$ ;

Table 5.

*Summary output of hierarchical multiple regression testing predictors of adolescents' Affective Well-being (Happiness Index)*

Mother model (Model 3)						Father model (Model 4)					
	$R^2$	$R^2_{adj}$	$F$	$\beta$	$p$		$R^2$	$R^2_{adj}$	$F$	$\beta$	$p$
Step 1	.064	.058	11.279***			Step 1	.055	.049	9.348***		
Gender				-.230	.000	Gender				-.204	.000
Age				-.060	.280	Age				-.070	.214
Step 2	.403	.387	24.336***			Step 2	.402	.385	23.636***		
Gender				-.210	.000	Gender				-.192	.000
Age				-.045	.331	Age				-.049	.288
Novelty seeking				.001	.985	Novelty seeking				.002	.969
Harm avoidance				-.250	.000	Harm avoidance				-.256	.000
Reward dependence				.109	.036	Reward dependence				.110	.038
Persistence				-.041	.510	Persistence				-.043	.497
Self-directedness				.329	.000	Self-directedness				.337	.000
Cooperativeness				.153	.018	Cooperativeness				.151	.021
Self-transcendence				.047	.338	Self-transcendence				.046	.351
$\Delta R^2$			.340***			$\Delta R^2$			.348***		
Step 3	.421	.400	19.480***			Step 3	.442	.421	20.685***		
Gender				-.210	.000	Gender				-.207	.000
Age				-.063	.171	Age				-.076	.103
Novelty seeking				.033	.580	Novelty seeking				.044	.456
Harm avoidance				-.244	.000	Harm avoidance				-.235	.000
Reward dependence				.072	.189	Reward dependence				.057	.280
Persistence				-.010	.873	Persistence				-.003	.968
Self-directedness				.271	.000	Self-directedness				.283	.000
Cooperativeness				.139	.031	Cooperativeness				.113	.076
Self-transcendence				.059	.237	Self-transcendence				.066	.174
Communication with mother				-.114	.109	Communication with father				-.170	.023
Trust with mother				.140	.053	Trust with father				.203	.011
Maternal involvement				.119	.047	Paternal involvement				.169	.004
$\Delta R^2$			.018*			$\Delta R^2$			.040***		

Note. Gender was coded as a dummy variable with male gender = 0 and female gender = 1; \* $p \leq .05$ ; \*\* $p \leq .01$ ; \*\*\* $p \leq .001$

Table 6.

*Personality as a moderator of the relationships between paternal/maternal attachment and affective/cognitive well-being*

<b>Mother`s models</b>			
<b>Affective Well-being</b>	<b><i>b</i></b>	<b><i>SE B</i></b>	<b><i>t</i></b>
Constant	-9.266 [-15.25, -4.277]	2.54	-3.65***
Self-directedness (SD)	2.869	.712	4.03***
Maternal attachment	.0997	.045	2.21*
SD x Maternal attachment	-.0264	.013	-2.10*
<b>Cognitive Well-being</b>	<b><i>b</i></b>	<b><i>SE B</i></b>	<b><i>t</i></b>
Constant	-5.461 [-21.19, -10.27]	7.99	-.683
Self-directedness (SD)	9.586	2.24	4.27***
Maternal attachment	.6405	.142	4.51***
SD x Maternal attachment	-.1583	.039	-4.00***
<b>Cognitive Well-being</b>	<b><i>b</i></b>	<b><i>SE B</i></b>	<b><i>t</i></b>
Constant	5.960 [-5.774, -17.69]	5.97	.999
Persistence (PS)	6.758	1.77	3.82**
Maternal attachment	.4435	.108	4.11**
PS x Maternal attachment	-.1093	.032	-3.44***
<b>Father`s model</b>			
<b>Cognitive Well-being</b>	<b><i>b</i></b>	<b><i>SE B</i></b>	<b><i>t</i></b>
Constant	12.91 [1.566, 24.26]	5.77	2.24*
Self-directedness (SD)	4.63	1.63	2.84**
Paternal attachment	.3503	.112	3.13**
SD x Paternal attachment	-.0788	.031	-2.53*

\* $p \leq .05$ ; \*\* $p \leq .01$ ; \*\*\* $p \leq .001$



Table 7.

*Gender and age as a moderator of the relationship between parental attachment and affective/cognitive well-being*

<b>Mother`s models</b>			
<b>Cognitive Wellbeing</b>	<b><i>b</i></b>	<b><i>SE B</i></b>	<b><i>t</i></b>
Constant	26.25 [23.61, 28.88]	1.34	19.59***
Gender	3.648	.025	5.524***
Maternal attachment	.1354	1.78	2.047*
Gender x Maternal attachment	-.0961	.033	-2.946*
<b>Cognitive Wellbeing</b>	<b><i>b</i></b>	<b><i>SE B</i></b>	<b><i>T</i></b>
Constant	18.17 [1.467, 34.877]	8.49	2.140*
Age	.6919	.558	1.240
Maternal attachment	.4106	.151	2.726**
Age x Maternal attachment	-.0223	.009	-2.244*
<b>Father`s models</b>			
<b>Cognitive Wellbeing</b>	<b><i>b</i></b>	<b><i>SE B</i></b>	<b><i>t</i></b>
Constant	28.09 [25.99, 30.19]	1.07	26.30***
Gender	1.999	1.38	1.45
Paternal attachment	.1083	.021	5.23***
Gender x Paternal attachment	-.0685	.027	-2.513*
<b>Cognitive Wellbeing</b>	<b><i>b</i></b>	<b><i>SE B</i></b>	<b><i>t</i></b>
Constant	22.46 [11.17, 33.75]	5.74	3.91***
Age	.4729	.376	1.26
Paternal attachment	.3595	.111	3.25**
Age x Paternal attachment	-.0198	.007	-2.71**

\* $p \leq .05$ ; \*\* $p \leq .01$ ; \*\*\* $p \leq .001$

Table 8

*Summary output of the final model of regression analyses testing affective and cognitive well-being as predictors of personality*

Predictors	Novelty seeking	Harm avoidance	Reward dependence	Persistence	Self-directedness	Cooperativeness	Self-transcendence	Maternal attachment	Paternal attachment
	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$
Age	.069	.061	-.059	-.051	.018	.091	.095	-.020	-.108
Gender	-.175**	.243***	.430***	.292***	.063	.376***	.206***	.065	-.008
Affective WB	-.203**	-.431***	.215***	.304***	.569***	.372***	.020	.071	.160**
Cognitive WB	-.050	.038	.051	.102	-.044	.075	.130*	.243***	.196**
R <sup>2</sup>	.06	.30	.18	.16	.30	.24	.06	.07	.12

*Note:* WB: Well-being; \* $p \leq .05$ ; \*\* $p \leq .01$ ; \*\*\* $p \leq .001$