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ORIGINAL ARTICLE

Self-Perceived Facial Attractiveness, Fluctuating Asymmetry, and Minor Ailments Predict Mental Health Outcomes

Javier I. Borráz-León, et al. ***[full author details at the end of the article]***

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Abstract

Objective Phenotypic markers associated with developmental stability such as fluctuating asymmetry, facial attractiveness, and reports of minor ailments can also act as indicators of overall physical health. However, few studies have assessed whether these markers might also be cues of mental health. We tested whether self- and other-perceived facial attractiveness, fluctuating asymmetry, and minor ailments are associated with psychopathological symptoms in a mixed sample of 358 college students, controlling for the effects of body mass index, age, and sex.

Methods We applied the Symptom Checklist-90-Revised (SCL-90-R) questionnaire to assess psychopathological symptoms, a battery of questionnaires about self-perceptions of facial attractiveness, and gathered information about the number of previous minor ailments as well as demographic data. Other-perceived attractiveness was assessed by an independent mixed sample of 109 subjects. Subjects' facial fluctuating asymmetry was determined by geometric morphometrics.

Results The results revealed that in both men and women, higher self-perceived attractiveness and fewer minor ailments predicted lower scores of Somatization, Obsessive–Compulsive, Interpersonal Sensitivity, Depression, Anxiety, Phobic Anxiety, Paranoid Ideation, Psychoticism, and a General Psychopathology Index. Higher facial fluctuating asymmetry was associated with higher Interpersonal Sensitivity, but did not contribute to its prediction when controlling for the other studied variables.

Conclusions The observed strong associations between self-perceived attractiveness, minor ailments, and psychopathology indicate common developmental pathways between physiological and psychological symptomatology which may reflect broader life history (co)variation between genetics, developmental environment, and psychophysiological functioning.

Keywords Psychopathology · Attractiveness · Fluctuating asymmetry · Mental health · Minor ailments · Life history theory

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Introduction

According to sexual selection theories, humans may obtain relevant information about the biological quality of potential mates and sexual rivals through the evaluation of phenotypic characteristics (Borráz-León et al., 2014; Little et al., 2011; Thornhill & Gangestad, 1999; Stephen & Luoto, 2021). For example, a variety of facial traits such as averageness (i.e., how closely the face resembles the majority of other faces in a population), sexual dimorphism (masculinity/femininity), adiposity, skin color, texture, and symmetry may be considered attractive because of their relation to general health (Jones et al., 2001; Rantala et al., 2013; Foo et al., 2017; Stephen & Luoto, 2021; but see Cai et al., 2019).

From a mate choice point of view, the ability to identify and prefer attractive facial traits associated with health would benefit organisms by decreasing the costs related to poor biological condition such as transmission of infectious diseases and parasitism (Thornhill & Gangestad, 1999). One of the main physical characteristics associated with attractiveness is fluctuating asymmetry (FA) (Foo et al., 2017; Grammer & Thornhill, 1994; Scheib et al., 1999). FA refers to small random deviations from perfect symmetry in normal bilateral traits in a population (van Valen, 1962). It has been suggested that lower levels of FA signal the ability of organisms to cope with genetic and environmental stress such as low food quality, mutation, homozygosity, extreme temperatures, toxins, or parasitism (Møller, 1997; Møller & Swaddle, 1997).

Low facial FA (i.e., high facial symmetry) is associated with fewer psychological, emotional, and physical problems (Shackelford & Larsen, 1997), with attractive characteristics such as increased sexual dimorphism (i.e., masculinity/femininity) (Little et al., 2008), intelligence (Banks et al., 2010), extraversion (Pound et al., 2007), assertiveness (Borráz-León & Cerda-Molina, 2015), and apparent physical health (Jones et al., 2001) (with effect sizes being low-to-moderate: i.e., $r < 0.30$ in all cases) in such a way that low facial FA would increase the mate value of individuals by honestly signaling good genetic quality and health (Scheib et al., 1999; Jones et al., 2001; Foo et al., 2017; Borráz-León et al., 2017a; but see Pound et al., 2014). However, these traits might not only be associated with sexual selection as previously suggested by Thornhill and Møller (1997), but also with mental health (e.g., Shackelford & Larsen, 1997).

In this regard, Life History (LH) theory may serve as a suitable theoretical framework for explaining the association between attractive phenotypic traits and physical and mental health. LH is a mid-level theory derived from general evolutionary theory focusing on how the entire lifecycle of an organism is designed by natural selection to optimize reproductive success despite environmental challenges (Ellison, 2017; Stearns et al., 2008). At the most basic level, an organism must distribute limited resources between *somatic effort* and *reproductive effort* (Del Giudice & Ellis, 2016). These distribution processes are regulated by constraints and trade-offs that have been shaped by past evolutionary pressures and current environmental contingencies such as resource availability and mortality (e.g., Krams et al., 2017, 2019; Woodley of Menie et al., 2021). Thus, LH works

on the materials out of which organisms are built, as well as the developmental, physiological, and psychological traits that organisms inherited from their ancestors and that are specifically calibrated to their environments (Luoto, 2019; Woodley of Menie et al., 2021).

The evolution and development of LH strategies is thought to be moderated by two dimensions of environmental risk: harshness (the level of morbidity and mortality caused by external factors) and unpredictability (the degree to which changes in morbidity and mortality cannot be anticipated by organisms) (Ellison, 2017; Young et al., 2020). For example, in stable and predictable environments, organisms are predicted to allocate more resources in growth, delaying reproductive activities (i.e., they would exhibit slow life history strategies), whereas in harsh and unpredictable environments, organisms are predicted to allocate more energy in reproductive activities than in growth processes (i.e., they would exhibit fast life history strategies) (Kaplan & Gangestad, 2005). Dynamics from a slow-to-fast continuum of LH strategies may also be associated with the expression of personality traits as they are a reflection of stable individual differences in motivation, behavioral disposition, and self-regulation (Del Giudice, 2014; Luoto et al., 2019). Therefore, environmental harshness and unpredictability that affect resource allocation and LH strategies during the development of an individual might also be associated with phenotypic impairments, affecting symmetrical traits, attractiveness, and possibly mental health (Del Giudice, 2014; Del Giudice & Ellis, 2016; Kavanagh & Kahl, 2018; Luoto et al., 2021). Prior research has found associations between socioeconomic position, immune function, and facial attractiveness, supporting life history models of costly trait development (Krams et al., 2019; Luoto et al., 2021).

Since perceptions of attractiveness may result from previous complex interactions between genetics, biological markers, and social experiences throughout life (e.g., Jacobson et al., 2020; Luoto et al., 2021), self- and other-perceived attractiveness could also be associated with the development of psychopathological symptoms. Evidence supporting this hypothesis shows that non-attractive children have higher probabilities of being treated less favorably by teachers in preschool (Sweeting & West, 2001). These previous negative experiences during childhood and adolescence could contribute to the development of low self-esteem, low self-perceptions of attractiveness, and possibly, poor mental health in adulthood, affecting other-perceived attractiveness (e.g., perceptions made by possible mates and potential sexual rivals). According to an alternative hypothesis, genetics and early developmental conditions (rather than purely social experiences) affect the development of, and covariation between, physical attractiveness and psychopathological symptomatology.

Existing evidence suggests that perceptions of lower physical attractiveness could be related to poor psychological condition. For example, Jones et al. (1978) observed that developmental psychopathologies are more likely to be attributed to unattractive target persons. Burns and Farina (1987) noted that physically more attractive women had a lower incidence of perceived risk of mental disorder. McLaren et al. (2008) reported that variation in body mass index (BMI), a trait closely related to health and attractiveness (Brierley et al., 2016), is associated with substance use and mood disorders. More recently,

Tsiga et al. (2016) suggested that physicians have a higher probability of missing the diagnosis of unattractive people in comparison to attractive people. In a meta-analysis, Laglois et al. (2000) reported that attractive subjects were perceived as more socially skilled, mentally healthy, and intelligent than less attractive ones (see also Zebrowitz et al., 2002). Regarding personality characteristics, observers can accurately perceive extraversion, agreeableness, emotional stability (Penton-Voak et al., 2006), openness, and neuroticism from facial photographs (Kramer and Ward 2010). Those who express a preference for certain personality traits in a romantic partner rated the faces of opposite-sex people who report that personality trait as more attractive (Little et al., 2006). Overall, this previous literature has shown: (1) positive associations between higher physical attractiveness, lower facial FA, and apparent health; and (2) negative associations between perceptions of physical attractiveness and some indicators of psychological condition. Although this previous research has suggested an association between phenotypic traits and apparent general health, the possibility of facial FA and self- and other-perceptions of attractiveness acting as cues of mental health has not been properly analyzed.

Therefore, this study aimed to assess whether self-reports of minor ailments (as an indicator of general health), facial FA measurements (as a marker of developmental stability), and self- and other-perceptions of attractiveness (as a result of genetics, developmental environment, and previous sociobiological interactions) may signal mental health through the expression of psychopathological symptoms in a mixed-sex sample of young adults. Accordingly, we expected lower facial FA, lower reports of minor ailments, and higher perceptions of attractiveness (both self- and other-perceptions) to predict lower scores of psychopathological symptoms as a signal of good mental health in both sexes.

Material and Methods

Participants and Study Procedure

A group of 358 healthy college students (168 men and 190 women) from various Faculties at the National Autonomous University of Mexico, voluntarily participated in this study. The mean age was 22.77 years ($SD = 4.56$) for men and 21.21 years ($SD = 3.28$) for women. Following the approval of the appropriate local ethics committee, participants received detailed information about the aim of the study, signed an online letter of informed consent, and answered a general lifestyle and demographic questionnaire (i.e., body mass, height, age, and the number of previous minor ailments in the last year). A minor ailment is defined as a health complaint which, with simple actions, patients can handle themselves (Welle-Nilsen et al., 2011). Participants received their psychological profiles as compensation for taking part in this research.

Psychopathology Symptom Checklist

We used the Symptom Checklist-90-Revised (SCL-90-R) (Derogatis & Unger, 2010) to evaluate symptoms of general psychopathology. SCL-90-R is a 90-item self-report symptom inventory that assesses psychological distress in nine primary symptom dimensions and three summary scores termed 'global scores', using a five-point Likert-type scale (1 = not at all; 5 = extremely). In this research, we used the nine primary symptom dimensions of SCL-90-R labeled Somatization ($\alpha = 0.80$), Obsessive–Compulsive ($\alpha = 0.79$), Interpersonal Sensitivity ($\alpha = 0.80$), Depression ($\alpha = 0.78$), Anxiety ($\alpha = 0.81$), Hostility ($\alpha = 0.76$), Phobic Anxiety ($\alpha = 0.81$), Paranoid Ideation ($\alpha = 0.80$), and Psychoticism ($\alpha = 0.81$), as well as a General Psychopathology Index which is the result of the sum of the nine dimensions.

Facial FA Measurements

A picture of each participant's face was taken using a Samsung NX1100, 20.3MPx Semi-Pro digital camera at a constant distance of 2 m. The pictures were taken in the same natural light conditions without using flash. The participants were instructed to assume a neutral and relaxed facial expression with mouth closed. Before taking facial fluctuating asymmetry measurements, all pictures were horizontally aligned and scaled according to inter-pupillary distance (Borráz-León et al., 2019a; Grammer & Thornhill, 1994). This ensures that the facial landmarks rigorously correspond with the same position in every face (Fink et al., 2005).

Facial FA was calculated according to the procedure employed by Sanchez-Pages and Turiegano (2010) and Muñoz-Reyes et al. (2012). In general, facial FA was calculated from 39 facial landmarks (LM) using the TPS software toolkit (freely available at http://www.life.bio.sunysb.edu/morph). According to Sanchez-Pages and Turiegano (2010), these LM have been chosen because they can be unambiguously identified in every picture. Therefore, they rigorously correspond with the same position in every face (Fink et al., 2005; Muñoz-Reyes et al., 2012). To assess any measurement error, the LM were placed twice by two of the authors. Facial FA was calculated from the Procrustes distances between each LM and the corresponding LM of its mirror image using the MorphoJ software (Klingenberg, 2011) (freely available at http://www.flywings.org.uk/MorphoJ_page.htm). These distances were then decomposed into directional asymmetry and facial FA employing the Procrustes ANOVA (Klingenberg et al., 2002). In our sample, facial FA significantly and positively correlated with total (object) asymmetry (where the structure is symmetric in itself because the median plane passes through it) ($r = 0.93$, $p < 0.001$), indicating that our facial FA measurements were not considerably affected by the systematic differences between left and right structures (i.e., directional asymmetry) (Muñoz-Reyes et al., 2012).

Self- and Other-Perceived Attractiveness

As previously reported in the literature (e.g., Borráz-León & Rantala, 2021; Little et al., 2001), self-perceived attractiveness was rated by subjects themselves using

a 5-point Likert-scale (1 = low attractiveness, 3 = average attractiveness, 5 = high attractiveness). To evaluate other-perceived attractiveness, an independent group of 109 volunteers from the same university (55 men and 54 women, mean age ± SD: 21.15 ± 1.31) rated the attractiveness of faces presented in the photos used for facial FA measurements, using the same 5-point Likert-scale (1 = low attractiveness, 3 = average attractiveness, 5 = high attractiveness).

Statistical Analyses

Prior to conducting the main analyses, we evaluated whether there were any missing values. Since all the questionnaires, facial FA measurements and self-and other-perceived attractiveness evaluations were successfully completed, there were no missing values, and no participants were removed from the sample. Then, based on a priori design, Student *t*-tests for independent samples were performed to identify potential sex differences. Partial correlations controlling for the confounding variables of age, sex, and BMI were used to measure relationships among the variables. To test whether psychopathology symptom dimensions are associated with the independent variables (i.e., facial FA, self- and other-perceived attractiveness, and minor ailments), we ran a MANCOVA controlling for BMI, age, and sex, introducing each one of the nine psychopathology symptom dimensions and the General Psychopathology Index as dependent variables. As confirmatory analyses, we used linear regression models to test the predictive power of the independent variables on the General Psychopathology Index. The data were analyzed using SPSS version 25 (SPSS Inc., Chicago, IL, USA). All tests were two-tailed, and statistical significance was set at $p \leq 0.05$.

Ethical Note

The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008. Likewise, this study was approved by the Research and Ethics Committees of the National Institute of Psychiatry "Ramón de la Fuente Muñiz" (Project Number: NC 17076.0).

Results

Sex Differences

We found sex differences in BMI, reports of minor ailments, age, Somatization, Depression, and Phobic Anxiety (Table 1). In general, men had higher BMI, age, and reported lower minor ailments, Somatization, Depression, and Phobic Anxiety than women. No sex differences were found for the other variables (ps > 0.05 in all cases).

Table 1 Sex differences in facial FA, self- and other-perceived attractiveness, previous ailments, BMI, age, and psychopathology symptom dimensions

Variables	Mean (*SD*)		*t*	*p*	Cohen's *d*
	Men ($n = 168$)	Women ($n = 190$)			
Facial FA	4.24 (0.449)	4.23 (0.492)	0.210	0.883	0.02
Self-perceived attractiveness	3.42 (0.86)	3.45 (0.84)	−0.397	0.691	−0.03
Other-perceived attractiveness	1.76 (0.67)	1.82 (0.69)	−0.900	0.369	−0.08
Previous ailments	0.87 (0.66)	1.05 (0.72)	−2.425	0.016*	−0.25
BMI	24.60 (4.05)	23.40 (3.47)	3.009	0.003**	0.31
Age	22.77 (4.56)	21.21 (3.28)	3.735	0.001***	0.26
Somatization	0.74 (0.59)	0.99 (0.65)	−3.779	0.001***	−0.41
Obsessive–compulsive	1.30 (0.76)	1.36 (0.84)	−0.741	0.459	−0.07
Interpersonal sensitivity	0.90 (0.75)	1.02 (0.82)	−1.473	0.142	−0.15
Depression	0.94 (0.75)	1.17 (0.83)	−2.678	0.008**	−0.30
Anxiety	0.82 (0.660)	0.94 (0.71)	−1.665	0.097	−0.17
Hostility	0.84 (0.82)	0.77 (0.73)	0.926	0.355	0.08
Phobic anxiety	0.39 (0.48)	0.65 (0.68)	−4.087	0.001***	−0.53
Paranoid ideation	0.92 (0.72)	0.91 (0.76)	0.129	0.898	0.01
Psychoticism	0.67 (0.64)	0.66 (0.64)	0.157	0.875	0.01
General psychopathology index	14.22 (9.62)	15.44 (10.72)	−1.127	0.260	−0.11

SD standard deviation, *FA* fluctuating asymmetry, *BMI* body mass index

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$; dfs = 356 in all cases

Correlations

As reported before (e.g., Derogatis & Unger, 2010), we found moderate-to-high positive correlations between every psychopathology symptom dimension (i.e., Somatization, Obsessive–Compulsive, Interpersonal Sensitivity, Depression, Anxiety, Hostility, Phobic Anxiety, Paranoid Ideation, Psychoticism, and the General Psychopathology Index, rs > 0.65, dfs = 353, ps < 0.001 in all cases). There was a large positive correlation between self- and other-perceived attractiveness ($r = 0.680$, $df = 353$, $p < 0.001$), and a tendency for a negative correlation between self-perceived attractiveness and facial FA (r = -0.095, $df = 353$, $p = 0.075$). No correlations were found between other-perceived attractiveness, facial FA, and minor ailments (rs < 0.10, dfs = 353, ps > 0.10 in all cases). The correlations between these cues and the psychopathology symptom dimensions are given in Table 2.

Table 2 Partial correlations between facial FA, self- and other-perceived attractiveness, minor ailments, and psychopathology symptom dimensions ($n = 358$: men = 168, women = 190)

Psychopathology symptom dimensions	Facial FA $r\,(p)$	Self-perceived attractiveness $r\,(p)$	Other-perceived attractiveness $r\,(p)$	Minor ailments $r\,(p)$
Somatization	0.059 (0.269)	−0.191 (0.001)***	−0.092 (0.084)	0.215 (0.001)***
Obsessive–compulsive	0.053 (0.322)	−0.194 (0.001)***	−0.129 (0.015)*	0.133 (0.012)*
Interpersonal sensitivity	0.105 (0.049*)	−0.336 (0.001)***	−0.189 (0.001)***	0.116 (0.029)*
Depression	0.059 (0.271)	−0.236 (0.001)***	−0.114 (0.032)*	0.172 (0.001)***
Anxiety	0.058 (0.277)	−0.199 (0.001)***	−0.103 (0.052)	0.169 (0.001)***
Hostility	0.040 (0.455)	−0.059 (0.264)	−0.022 (0.683)	0.140 (0.008)**
Phobic anxiety	0.087 (0.100)	−0.133 (0.012)*	−0.080 (0.132)	0.143 (0.007)**
Paranoid ideation	0.090 (0.091)	−0.187 (0.001)***	−0.138 (0.009)**	0.167 (0.002)**
Psychoticism	0.046 (0.391)	−0.154 (0.004)**	−0.082 (0.122)	0.151 (0.004)**
General psychopathology index	0.064 (0.227)	−0.213 (0.001)***	−0.111 (0.037)*	0.193 (0.001)***

FA fluctuating asymmetry

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$; dfs = 353 in all cases

Table 3 Multivariate effects

Source	Wilks λ	*F*	*p*	η^2	OP
Intercept	0.949	1.844	0.052	0.051	0.847
Facial FA	0.984	0.573	0.836	0.016	0.299
Self-perceived attractiveness	0.849	6.076	0.001***	0.151	1.000
Previous ailments	0.934	2.427	0.008**	0.066	0.942
Age	0.976	0.839	0.592	0.024	0.444
BMI	0.955	1.625	0.098	0.045	0.787
Sex	0.842	6.430	0.001***	0.158	1.000

FA fluctuating asymmetry, *BMI* body mass index, *OP* observed power

*$p<0.05$; **$p<0.01$; ***$p<0.001$; *df*s = 10/342 in all cases

Predictors of Psychopathology Symptom Dimensions

Since self- and other-perceived attractiveness were positively correlated, we decided to only introduce self-perceived attractiveness in the MANCOVA[1] to avoid multicollinearity in the analysis. Significant multivariate effects were found for self-perceived attractiveness (Wilks λ: 0.84, $F=6.076$, $df=10/342$, $p<0.001$, $\eta^2=0.15$, Observed power = 1.00), minor ailments (Wilks λ: 0.93, $F=2.427$, $df=10/342$, $p=0.008$, $\eta^2=0.07$, Observed power = 0.942), and sex (Wilks λ: 0.84, $F=6.430$, $df=10/342$, $p<0.001$, $\eta^2=0.16$, Observed power = 1.00) on the psychopathological symptoms, while no significant multivariate effects were found for facial FA, age, and BMI (Table 3).

Univariate effects were found for: self-perceived attractiveness on each one of the psychopathological symptoms: *F*s > 5.40, *df*s = 1/351, *p*s < 0.020 (except hostility: $p=0.315$); previous ailments on each one of the psychopathological symptoms: *F*s > 6.50, *df*s = 1/351, $p<0.022$; sex on Somatization ($F=12.268$, $df=1/351$, $p=0.001$), Depression ($F=6.512$, $df=1/351$, $p=0.011$), and Phobic Anxiety ($F=12.582$, $df=1/351$, $p<0.001$). A tendency for BMI on Hostility was also found ($F=3.847$, $df=1/351$, $p=0.051$). Non-significant results were found for the other studied variables (Table 4 in supplementary materials).

The confirmatory analyses showed that lower scores of the General Psychopathology Index are predicted by higher self-perceptions of attractiveness (Fig. 1) and lower reports of previous ailments (Fig. 2) both in men and women.

[1] Similar results were found when introducing other-perceived attractiveness (instead of self-perceived attractiveness) in the MANCOVA.

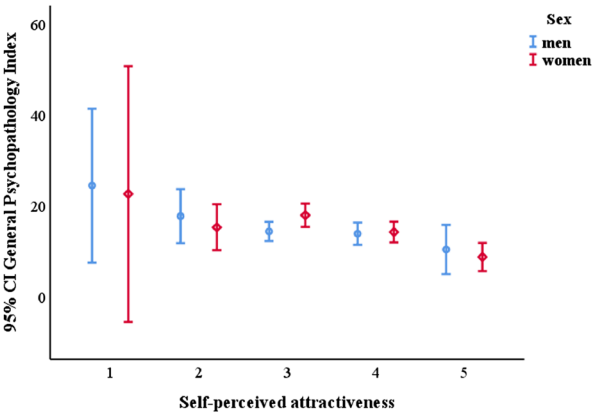

Fig. 1 Lower general psychopathology index is predicted by higher self-perceptions of attractiveness both in men and women ($n = 358$, $B = -3.138$, $\beta = -0.262$, $t = -3.757$, $p < 0.001$)

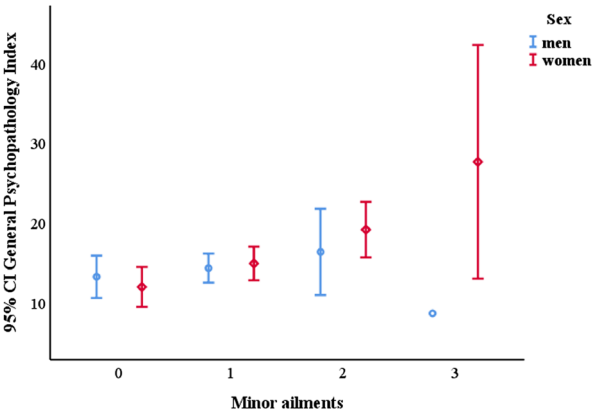

Fig. 2 Lower general psychopathology index is predicted by lower reports of previous ailments both in men and women ($n = 358$, $B = 2.821$, $\beta = 0.193$, $t = 3.723$, $p < 0.001$)

Discussion

This research assessed whether facial FA measurements, perceptions of attractiveness, and reports of minor ailments are associated with mental health through a lower occurrence of psychopathological symptoms in a mixed sample of young adults. The results indicated that in both men and women, higher self-perceptions of facial attractiveness and fewer minor ailments predicted lower scores of Somatization, Obsessive–Compulsive, Interpersonal Sensitivity, Depression, Anxiety, Phobic Anxiety, Paranoid Ideation, Psychoticism, and the General Psychopathology Index. Higher facial fluctuating asymmetry was associated only with higher Interpersonal Sensitivity, but did not contribute to its prediction when controlling for the other studied variables.

The observed strong associations between self-perceived attractiveness, reports of minor ailments, and mental health outcomes in both sexes support and extend previous results on the relationship between phenotypic indicators of attractiveness and developmental psychopathologies (e.g., Ehlinger & Bashill, 2016). According to

previous literature, perceived high attractiveness is associated with higher physical fitness (Hönekopp et al., 2004), greater reproductive success (Singh, 1993), better social competence (Eagly et al., 1991), better immune function (Luoto et al., 2021), and good self-esteem (Bale & Archer, 2013; but see Mares et al., 2010). This would explain why, in the present study, higher self-perceptions of attractiveness contributed to the expression of lower psychopathological symptoms.

Although the relationships between minor ailments and mental health have not been tested in these previous studies, our results suggest that both self-perceived attractiveness (as a result of genetics, developmental environment, and previous sociobiological interactions) and minor ailments (as indicators of general health) could be cues of mental health in men and women. Thus, the present findings build on previous literature by going beyond the use of questionnaires to evaluate mental health by integrating phenotypic traits and markers of general health. This approach allows establishing a more holistic understanding of the variables that play a role in the development of psychopathological symptoms that might also be involved in the development of mental disorders. Moreover, even though our study did not aim to test the association between LH strategies and mental health outcomes, our results suggest that LH dynamics might be associated with the expression of physically attractive traits and mental health outcomes through environmental disturbances that affect resource allocation during the development of an individual (cf. Kahl et al., 2020; Kavanagh & Kahl, 2018; Luoto et al., 2021). Further research may benefit from integrating phenotypic indicators of attractiveness and markers of general and mental health with LH theory to test how these variables are predicted by LH strategies and/or experienced harshness/unpredictability.

The impact of innate attractiveness on social interactions during development is evident very early in life, even before other traits like musculature, sports ability, or dominant behavior (Bobadilla et al., 2013). For example, Langlois et al. (1995) observed that mothers of attractive infants were more prone to be emotional and playful with them. In contrast, the opposite effect was observed with less attractive infants. Likewise, Cash (1980) reported that observers and parents gave better ratings on behavior, health, and intelligence to attractive infants than less attractive ones. Other studies have found that less attractive children had higher probabilities of being physically abused and treated less favorably by teachers than more attractive ones in preschool years (Sweeting & West, 2001). Thus, lower self-perceived attractiveness could be associated with stressful social situations in the early stages of life, a risk factor that contributes to the development of psychopathological symptoms in later years (e.g., Doom & Cicchetti, 2018; Eisenbarth et al., 2019). However, based on these studies, it is not possible to disentangle correlation from causation, and other latent variables—some of which may be endogenous rather than exogenous—may be driving the association between attractiveness and the nature of social experiences.

Stressful life events and limited resource availability contribute to impaired health and immune function in children and adolescents (Dunkel et al., 2020; Kim et al., 2020; Schmeer et al., 2019; Wickrama et al., 2005; Yiğit et al., 2018). For example, children born in socioeconomically disadvantaged families had higher probabilities to have developmental impairments due to the inability to provide proper

nutrition, vaccination, and adequate access to health care (Krams et al., 2019; Lauringson et al., 2020; Rubika et al., 2020). Likewise, children from unstable family environments are more likely to develop fast LH strategies which can contribute to the development of higher psychopathological symptoms (Hurst & Kavanagh, 2017; Kahl et al., 2020). Chronically stressful life experiences and/or lack of resources may exert deleterious effects on biological functioning (Luoto et al., 2021) that could be translated into a higher number of minor ailments and fast LH strategies that, based on our results, would contribute to the prediction of psychopathological symptoms (Hurst & Kavanagh, 2017; Schmeer et al., 2019; Wickrama et al., 2005). Thus, this previous literature supports the view of self-perceived attractiveness and minor ailments as outcomes of mental health, rather than the other way around. However, it is also possible that perceptions of attractiveness, minor ailments, and mental health can be mutually influenced and/or be connected by a latent variable, such as genetic heritability and covariation between those traits. As another possibility, previous studies have reported that some mental disorders such as depression and bipolar disorder are associated with low-grade neuroinflammation (Rantala et al., 2018, 2021). This low-grade neuroinflammation and the increase of proinflammatory cytokines may reduce the bioavailability of neurotransmitters such as serotonin, norepinephrine, and dopamine (Miller, 2009), leading to low mood and sickness behavior that may promote a warped self-image and, probably, lower self-perceptions of attractiveness (Rantala et al., 2019).

On the other hand, even though we found that facial FA—a physical trait related to apparent health and developmental stability (Stephen & Luoto, 2021)—was positively correlated with Interpersonal Sensitivity scores, the effect size was low ($r = 0.105$) as most of the previous studies have reported (e.g., Borráz-León & Cerda-Molina, 2015; Pound et al., 2007). Facial FA was not correlated with any of the other psychopathological dimensions. Thus, it is possible that facial FA is more related to indicating an optimal developmental environment rather than mental health both in humans and non-human animals (Borráz-León et al., 2017b; De Anna et al., 2013; Luoto et al., 2021). However, it is noteworthy that the present research partially replicates and extends previous results (e.g., Shackelford & Larsen, 1997; Thornhill & Møller, 1997) on the relationship between facial FA and psychophysiological stress, with the advantage of using statistical analyses beyond a bivariate correlational approach, a more reliable technique for calculating facial FA (Fink et al., 2005), and a higher sample size (i.e., three times higher) than in previous research (e.g., Shackelford & Larsen, 1997).

It is also possible that insults from poor developmental environments may contribute to a dysregulation of physiological systems (e.g., the hypothalamic–pituitary–adrenal axis) affecting the development of symmetrical traits and contributing to altered cortisol responses and higher stress perceptions (Borráz-León et al., 2017b), which, in turn, would affect mate value, attractiveness, and health indicators (Borráz-León et al., 2017a; Rantala et al., 2019). In contrast, self-perceived attractiveness could be more directly related to mental health. This hypothesis is in line with the multiple fitness model (Cunningham et al., 1995) which proposes that perceived physical attractiveness results from the evaluation of multiple features rather than a single one, signaling different aspects of mate value (Little et al., 2006; Luoto,

2019; Miller & Todd, 1998; Stephen & Luoto, 2021). Thus, our results suggest that self-perceived attractiveness and number of previous ailments may not only signal general health, thereby affecting sexual selection processes, but that they may also covary with mental health outcomes.

Limitations

It is possible that our findings arose from response bias covariance since SCL-90-R is a self-rating instrument and its accuracy relies on correct interpretation of questions, which is susceptible to denial, minimization, and bias mechanisms (Eisen et al. 1999). Nevertheless, a moderate-to-high reliability and internal consistency of the SCL-90-R have been reported in the literature (e.g., Otte et al., 2017), including in this study. The αs of the psychopathological symptoms range from 0.76 to 0.81, which reduced the probability of bias in the responses.

Another possible limitation of this study is that we did not measure self-esteem in our sample. Since self-esteem tends to be associated with positive social outcomes (e.g., Borráz-León et al., 2018, 2019b; Harris & Orth, 2020), and since higher self-perceived attractiveness predicted lower psychopathological symptoms in our sample, it is possible that mechanisms such as low self-esteem, warped self-image, and adverse childhood experiences, which could be driven by psychopathology, could lead to lower self-perceived attractiveness and impaired mental health (cf. Rantala et al., 2019).

As this study was conducted only on university students, further studies with more heterogeneous samples are needed to increase the generalizability of the results, as well as to investigate the role of self-esteem as a mediator in the associations between self-perceived attractiveness and psychopathological symptoms. Based on these data, we are unable to verify the direction of causality between self-perceived attractiveness, minor ailments, and psychopathological symptoms, or whether latent variables underlie these associations.

Conclusions

In conclusion, the strong associations between self-perceived attractiveness, minor ailments, and psychopathological symptoms highlight the importance of considering these traits as correlates of mental health and to further consider them as developmental risk factors that may interact with LH strategies in the etiology of developmental psychopathologies. Based on the results of this and other studies (e.g., Langlois et al., 1995; Tsiga et al., 2016; Rantala et al., 2018, 2019, 2021), we encourage families and governments to create ecologically and socially healthy environments where children can develop good self-esteem and learn about the importance of self-care, well-being, and their associations with mental health to prevent psychopathologies throughout individual development.

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Data Availability All data generated or analyzed during this study are included in this published article (and its supplementary information files).

Declarations

Conflict of Interest The authors declare no conflict of interest.

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Authors and Affiliations

Javier I. Borráz-León[1,2,3] · Markus J. Rantala[1] · Severi Luoto[4,5] · Indrikis A. Krams[6,7,8] · Jorge Contreras-Garduño[3] · Tatjana Krama[6] · Ana Lilia Cerda-Molina[2]

✉ Javier I. Borráz-León
jibole@utu.fi; borraz@comunidad.unam.mx

1 Department of Biology, University of Turku, Turku, Finland

2 Department of Ethology, National Institute of Psychiatry "Ramón de La Fuente Muñiz", Mexico City, Mexico

3 Evolutionary Ecology Lab, ENES, National Autonomous University of Mexico, Morelia, Mexico

4 School of Population Health, University of Auckland, Auckland, New Zealand

5 School of Psychology, University of Auckland, Auckland, New Zealand

6 Department of Biotechnology, Daugavpils University, Daugavpils, Latvia

7 Institute of Ecology and Earth Sciences, University of Tartu, Tartu, Estonia

8 Department of Zoology and Animal Ecology, University of Latvia, Riga, Latvia