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Fathers high in psychopathy invest more in offspring who resemble them

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ABSTRACT

Over ancestral time, men had more paternity uncertainty than women. If the father and his offspring have similar facial features, the former is more confident of his paternity and he, therefore, tends to invest more resources in the child. In 158 dyads of adolescents (i.e., teenagers) and their fathers, we tested—using actor-partner interdependence modeling (APIM)—the relationship between facial resemblance and personality similarity on the one hand and paternal investment (i.e., emotional and financial) on the other hand. We also examined how important personality (i.e., emotionality, psychopathy, narcissism, and Machiavellianism) similarity is in predicting paternal investment controlling for facial resemblance. Both facial and personality resemblance were associated with paternal investment. We also found that personality similarity accounts for incrementally more variance in paternal investment over facial resemblance. Additionally, we found that psychopathy moderated the relationship between facial resemblance and paternal investment.

1. Introduction

Parenting strategies and the quality of the relationship between parents and children have important implications and consequences for children's development like mental health, delinquency, and academic performance (Bean, Barber & Crane, 2006). Parenting represents the process of supporting and promoting the physical, emotional, social, and intellectual development of a child, from infancy to adulthood (Yu et al., 2019). From an evolutionary perspective, parents try to ensure the survival, and, therefore, the reproductive fitness of their offspring and, as such, manifest caretaking behaviors that are often called parental investment (Trivers, 1972). In the case of humans (according to life history theory), men invest more in mating than in parenting, whereas, women invest more in parenting than in mating (Geary, 2015) because of sex differences in the minimum obligation to offspring (Trivers, 1972), the costs and benefits of multiple matings (Buss & Schmitt, 1993), and—as is the focus in the present study—certainty of parentage of any one child (Yu et al., 2019).

Unlike mothers who have no doubts as to whose baby she gives birth to, fathers are not equally certain that any one baby is theirs; in other words, men have a higher degree of paternity uncertainty than women do (Alvergne, Faurie & Raymond, 2010). Given this uncertainty, ancestral men developed strategies for minimizing cuckoldry risks by being attuned to a partner's fidelity and the resemblance a child has with the father (Apicella & Marlowe, 2004). For example, if father and child have similar facial features, the former is more confident of his paternity and he, therefore, tends to invest more resources in the child (Alvergne, Faurie & Raymond, 2009, 2010). As such, various trade-offs take place, as, for example, fathers sacrifice mating opportunities and related self-interests that may enhance his reproductive success, by investing more resources (e.g., time, money, emotional support) in their offspring (Alvergne et al., 2010; Gallup, Ampel, Matteo & O'Malley, 2016). Consequently, facial resemblance and paternal investment may be positively correlated (Apicella & Marlowe, 2004; Yu et al., 2019). We expect to replicate this association between facial resemblance and paternal investment.

1.1. Personality similarity and paternal investment

Relying on paternal investment theory, researchers have shown that behavioral resemblance can be considered an indicator of genetic relatedness between father and child (Gallup et al., 2016). This may be because of the fact that there is a 30 to 50% personality similarity between parents and offspring that stems from genes (Plomin, DeFries, Knopik & Neiderhiser, 2013). Few studies have focused on personality or behavioral similarity and paternal investment (Gallup et al., 2016; Van Tuijl, Branje, Semon Dubas, Vermulst & Van Aken, 2005). However, to date, no other study (that we know of) considered the role of

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both facial resemblance and personality similarity as predictors of paternal investment. Personality traits are expressed in a variety of frequent, recurrent, and observable behaviors, from managing problems or interacting with others to personal preferences or values. We argue that if there is similarity regarding personality between the father and the child, the former will invest more in the child as he is likely to share more genes and the chances of reproductive fitness increase. The perception of similarity leads to feelings of empathy, enhancing paternal investment, by noticing the sharing of similar experiences and needs (Batson, Lishner, Cook & Sawyer, 2005). Like seeking physical similarity cues to assuage paternity uncertainty, seeking personality and behavioral similarity cues may also relate to paternal investment. While both facial and personality resemblance are likely caused by shared genes, personality traits may be more easily observable and more polygenic than facial structure leading them to account for incrementally more variance in paternal investment than facial resemblance.

A father's parenting style is influenced by personality traits (Prinzie, Stams, Deković, Reijntjes & Belsky, 2009). We concern ourselves with four personality traits here: emotionality (Lee & Ashton, 2004), psychopathy (e.g., limited self-control and callous attitudes), narcissism (e.g., grandiosity, power-seeking), and Machiavellianism (e.g., manipulation and cynicism). From the HEXACO model, we relied only on emotionality, as there is a substantial overlap between other interpersonal factors such as Honesty-Humility and Agreeableness and the Dark Triad traits. Therefore, Honesty-Humility and Agreeableness should not offer enough increment in explaining parenting behavior over and above the Dark Triad traits. A key aspect of parenting is empathic concern (Ashton & Lee, 2007). Those high in emotionality tend to be characterized by high rates of empathic concern (Lee & Ashton, 2004) whereas those high in the Dark Triad traits—especially psychopathy—tend to be low in empathic concern (Jonason, Lyons, Bethell & Ross, 2013). Moreover, Ashton and Lee (2007) argue that empathic concern for others and the tendency to feel intense emotional bonds with others (characteristics of the sentimentality dimension of emotionality) could be related to kin-altruism. High scores on the fearfulness, anxiety, and dependence (dimensions of emotionality) point out to features such as worrying, vulnerability to stress, harm-avoidance, and help-seeking, so we can assume, that parents high on emotionality, due to their predisposition to risk-avoidance, have the natural tendency to help and protect their offspring from danger (Ashton & Lee, 2007). This may mean that those fathers who are low in emotionality and high in the Dark Triad traits may invest less in their offspring simply as a matter of their dispositional biases away from forming strong affective bonds with anyone. As such, we predict that these personality traits in the fathers may moderate the relationship between resemblance and investment.

Beyond limited empathic concern, there is another important reason to expect limited investment from fathers who are characterized by the Dark Triad traits (Paulhus & Williams, 2002). The Dark Triad traits of narcissism, Machiavellianism, and psychopathy are associated with a harsh rearing style (Beaver et al., 2014). This may be because they represent *fast* or *r*-selected life history strategies that trade parental care for mating effort (Jonason & Zeigler-Hill, 2018) consistent with work by evolutionary psychologists who use life history theory to understand the Dark Triad traits (Jonason, Koenig & Tost, 2010). Life history theory (Figueredo et al., 2006) is a mid-level theory that describes the allocation of resources to important life contexts (i.e., surviving, growth, and reproduction) that often involve tradeoffs (Szepsenwol & Simson, 2019). Those characterized by *fast* traits like the Dark Triad tend to lack self-control (Jonason & Tost, 2010), to be agentic (Jonason & Fletcher, 2018), and to engage in and even prefer casual sex over serious relationships (Jonason, Li, Webster & Schmitt, 2009) which may enhance reproductive success at the cost of parental effort (Kruger, 2017). Thus, we expect that the Dark Triad traits to be negatively related to paternal investment and will have a buffering effect in the relationship between father-child resemblance and paternal investing, moderating the relationship.

1.2. The current study

While there is research on the role of father-child resemblances for face and personality, this research tends to rely on single indicators of paternal investment, may inadequately account for the lack of independence of father-child similarities, and generally examines personality and facial resemblance independently (Alvergne et al., 2010; Gallup et al., 2016; Yu et al., 2019). In hopes of addressing these concerns, we examine paternal investment with two indicators (i.e., emotional and financial support) and adopt actor-partner interdependence modeling (APIM; Cook and Kenny, 2005) to test the relationships between perceived facial resemblance, (perceived) personality similarity and (perceived) paternal investment. In addition, we investigate what the incremental validity of personality similarity is over facial resemblance alone. Finally, this study aims to test the moderating effect of emotionality and the Dark Triad traits in the relationship between facial resemblance and perceived personality similarity and paternal investment.

2. Method

2.1. Participants and procedure

For this study, 158 dyads of adolescents (36.7% boys, 63.3% girls) aged, on average 15.53 years (SD = 1.57) and their fathers (M= = 46.60, SD = 5.03) were recruited from various schools in Romania (77.8% of urban and 22.2% rural). Participants responded to the survey questions voluntarily. Half of the adolescents completed online questionnaires distributed on Facebook groups, and were asked to give a link to an online questionnaire for their father to complete. The other half of the adolescents received the questionnaire at school from one of the class teachers, for both them and their fathers. The adolescents were asked to bring back the completed questionnaires, which were returned to the research team. Informed consent was obtained from all participants. The study was approved (approval no.108) by the Ethics Committee at University of XXXXX.

2.2. Measures

Perceived facial resemblance was assessed with three items (i.e., *How much do you feel that you physically resemble your father?; How often are you told that you resemble your father?; Do you feel that you share specific facial features with your father?*) from the Composite Measure of Physical Resemblance (Gallup et al., 2016). The items were scored on a five-point Likert scale from 1 (“*not at all*”) to 5 (“*very much*”) and were administered to the adolescents (Cronbach's α = 0.82) and in an adapted form, they were administered to the fathers (e.g., *How much do you feel that your child physically resembles you?*; α =0.81). Individual scores (for fathers and adolescents) were computed by summing the items for each.

Perceived personality similarity (Gallup et al., 2016) was assessed with three items (*How much do your interests match those of your father's?; How similar are your mannerisms with your father's?; How much do your attitudes match those of your father's?*). Each item was rated using a 5-point Likert scale from 1 (“*not at all*”) to 5 (“*very much*”). The items were completed by the adolescents (α = 0.78) while the fathers were given an adapted version (e.g., *How much do your interests match those of your child?*; α = 0.75). Individual scores (for fathers and adolescents) were computed by summing the items for each.

The Child and Adolescent Social Support Scale (Malecki & Demaray, 2002) was used to assess the adolescents’ perception about parental support they received from their parents containing 10 items. Participant's rated how their fathers supported them (e.g., *Gave me good*

advice) from 1 (“*never*”) to 6 (“*always*”). Adolescents (α = 0.92) and fathers (α = 0.86) completed the same scale (in this regard, the scale administered to the fathers was adapted; e.g., *Give her/him good advice*). Individual scores (for fathers and adolescents) were computed by summing the items for each.

Financial support from the father was assessed with only one item (i.e., *How much financial supportdoyou receive from your father*) used by Gallup et al. (2016) in their paternal investment measurement. Both fathers and adolescents rated how much financial support was offered from 1 (“*not at all*”) *to* 5 (“*very much*”). Due to high convergence (>0.50) between The Child and Adolescent Social Support scale scores and Financial investment scores, we treated them as a single indicator.

In the fathers only, emotionality was assessed using the corresponding items from the 100-item HEXACO-PI-R (Lee & Ashton, 2004). The measure has 16 items (e.g., *I sometimes can't help worrying about little things*) on a five-point Likert scale from 1 (“*strongly disagree*”) to 5 (“*strongly agree*”). Items were summed to create an index of emotionality (α = 0.76).

The fathers also completed the Short Dark Triad (Jones & Paulhus, 2014). The scale contains 27 items that measure narcissism (e.g., *People see me as a natural leader*) Machiavellianism (e.g., *Most people can be manipulated*), and psychopathy (e.g., *It's true that I can be mean with others*). Each item was rated on a five-point Likert scale from 1 (“strongly disagree”) to 5 (“strongly agree”). Items were summed to create indexes of narcissism (α = 0.62), Machiavellianism (α = 0.78), and psychopathy (α = 0.68).

3. Results

Descriptive statistics and the correlations between all measured variables are presented in Table 1. The adolescent's perception of facial resemblance was positively related to his father's perception of their facial resemblance. Also, the adolescent's perception of facial resemblance was positively associated with his and his fathers' perception about paternal investment. The father's perception of facial resemblance was positively associated with his and his offspring's perception about paternal investment. Father's and offspring's perception of personality similarity were positively related to the father's and adolescent's perception of paternal investment. Narcissism was positively related to perceived paternal investment in fathers and adolescents. Psychopathy was negatively related to perceived paternal investment in adolescents only.

We tested the incremental validity of perceived personality similarity in predicting paternal investment over perceived facial resemblance (see Table 2). In this hierarchical multiple regression, Step 1 included facial resemblance perceived by adolescent and father (F[1, 153] = 4.09, p = .02) and Step 2 included personality similarity perceived by adolescents and father (F[4, 153] = 10.44, p < .001). Paternal investment was computed as an index between the scores of father and adolescent paternal investment. Perceived facial resemblance explained 5% of the variance in paternal investment. When perceived personality similarity was added, in the second step, the amount of predicted variance increased substantially, explaining an additional 17% of the total paternal investment variance. Overall, the final model with facial resemblance and personality similarity perceived by father and adolescent explained 22% of the variance in paternal investment.

Table 2
Incremental validity of personality similarity in predicting perceived paternal investment.

Step	Independent variable	Total investment		
		β	R^2	ΔR^2
1	Adolescent's perceived facial resemblance	.22*	.05*	.05*
	Father's perceived facial resemblance	.02		
2	Adolescent's perceived facial resemblance	.18*	.22**	.17**
	Father's perceived facial resemblance	−0.05		
	Adolescent's perceived personality similarity	.10		
	Father's perceived personality similarity	.37**		

* p < .05;.
** p < .01.

We tested the dyadic relationship between perceived facial resemblance and perceived paternal investment and between perceived personality similarity and perceived paternal investment using the Actor-Partner Interdependence Model (Kenny, Kashy & Cook, 2006). The analysis was computed using the lavaan package for R (Stas, Kenny, Mayer & Loeys, 2018). Fig. 1 shows the APIM regarding the relationship between perceived facial resemblance and perceived paternal investment. The actor effect showed that the adolescent's perceived facial resemblance predicted the adolescent's perceived paternal investment. Also, father's perceived facial resemblance predicted the father's perceived paternal investment. The partner effect from father to adolescent and from adolescent to father were not statistically significant.

Fig. 2 shows the APIM regarding the relationship between perceived personality similarity and perceived paternal investment. The actor effect showed that adolescent's perceived personality similarity predicted the adolescent's perceived paternal investment. Father's perceived personality similarity predicted the father's perceived paternal investment. The partner effect was significant from father to adolescent was statistically significant. Therefore, father's perceived personality similarity predicted the adolescent's perceived paternal investment.

To test whether the father's emotionality and Dark Triad traits moderated the relationship between perceived facial resemblance, perceived personality similarity, and perceived paternal investment, we used the medmod package for R and Jamovi to perform moderation analysis (see Table 3 and Fig. 3). We found that father's psychopathy moderated the relationship between facial resemblance perceived by the adolescent and total paternal investment perceived by the adolescent. The result implies that adolescents perceive that fathers with high psychopathy were likely to invest more in them if they facially

Table 1
Bivariate correlations between all study variables.

	1	2	3	4	5	6	7	8	9	10	*M*	*SD*
1. Facial resemblance – Adolescent	–										3.38	0.67
2. Facial resemblance – Father	.56**	–									3.45	0.66
3. Personality similarity – Adolescent	.25*	.09	–								3.27	0.89
4. Personality similarity – Father	.15	.24**	.48**	–							3.41	0.79
5. Emotionality	.05	.00	−0.06	−0.07	–						3.17	0.58
6. Machiavellianism	.22*	.19*	.07	.19*	.07	–					3.10	0.68
7. Narcissism	.13	.18*	.17**	.30*	.03	.29**	–				3.02	0.50
8. Psychopathy	.06	.14	.03	.04	.07	.41**	.17*	–			2.10	0.61
9. Paternal investment – Adolescent	.27**	.17*	.39**	.34**	.01	.03	.23**	−0.18**	–		–	–
10. Paternal investment – Father	.28**	.32**	.21**	.39**	−0.02	.12	.24**	−0.15	.67**	–	–	–

* p < .05;.
** p < .01.

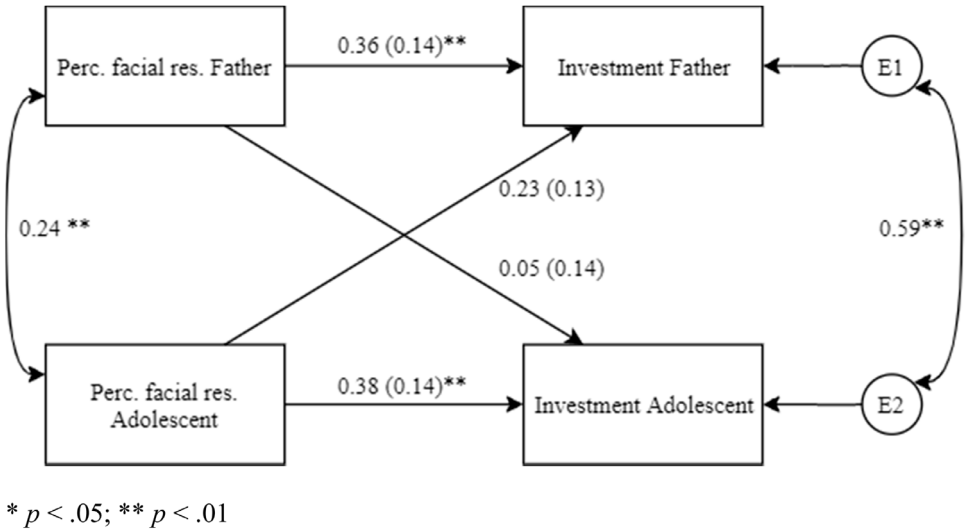

Fig. 1. APIM for the relationship between perceived facial resemblance and perceived paternal investment
*$p < .05$; **$p < .01$.

resembled their fathers (with 1 unit increase in SD, $B = 0.66$, $z = 4.19$, $p < .01$). We also found that fathers high in psychopathy reported investing more when their offspring are similar to them in terms of personality (with 1 unit increase in SD, $B = 0.73$, $z = 6.13$, $p < .01$). We found no other personality moderation effects.

4. Discussion

This study tested the importance of father-child resemblance in predicting paternal investment relying on dyadic actor-partner interdependence modeling (i.e., APIM). Our findings are partially consistent with previous research that tested the predictive power of father-adolescent child facial resemblance (Franklin & Volk, 2018) and supports the assumptions derived from parental investment theory, which states that the child's facial resemblance with her/his father represents a genetic relatedness cue. This type of similarity assures fathers that their resources are invested in their biological children (Alvergne et al., 2010), avoiding the risk of wasting resources on non-kin children. The dyadic analysis from the APIM, showed that this relationship was significant in terms of the actor effect. This means that the father's perception of facial resemblance predicted his perception of his paternal investment controlling for the partner effects. Also, child's perception of facial resemblance predicted adolescent's perception of the father's investment controlling for the partner effects. The partner effect was not significant. It may count more how the adolescent (actor) perceives facial resemblance in determining paternal investment,

Table 3
Moderating effect of emotionality and the Dark Triad in the relationship between perceived facial resemblance and perceived personality similarity and perceived paternal investment.

Analysis	Variable	*B*	*SE*	*z*
1	Perceived facial resemblance - Adolescent	.42	.11	3.74**
	Father's psychopathy	−0.33	.12	−2.74**
	Facial resemblance × psychopathy	.40	.19	2.19*
2	Perceived personality similarity - Father	.47	.09	5.18**
	Father's psychopathy	−0.28	.12	−2.43*
	Personality similarity × psychopathy	.43	.14	3.08**

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

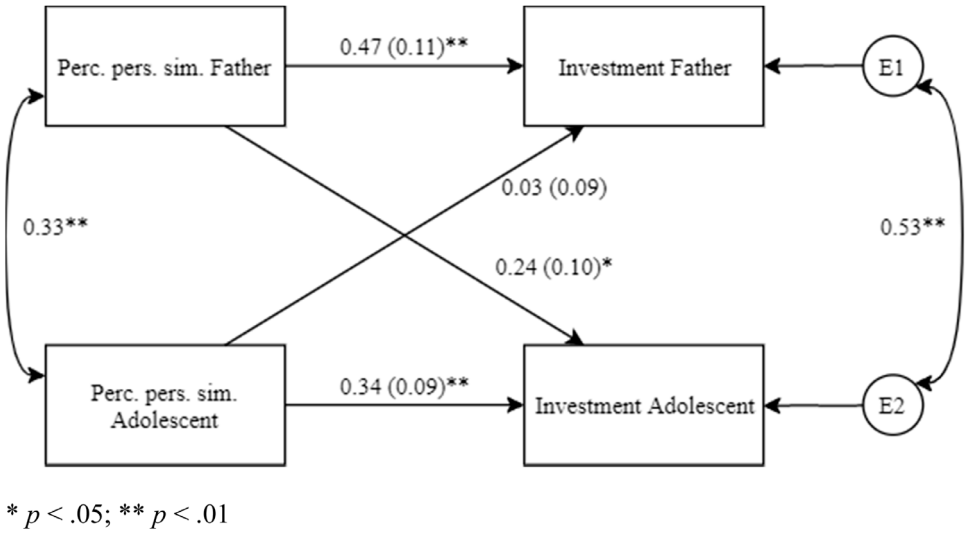

Fig. 2. APIM for the relationship between perceived personality similarity and perceived paternal investment
*$p < .05$; **$p < .01$.

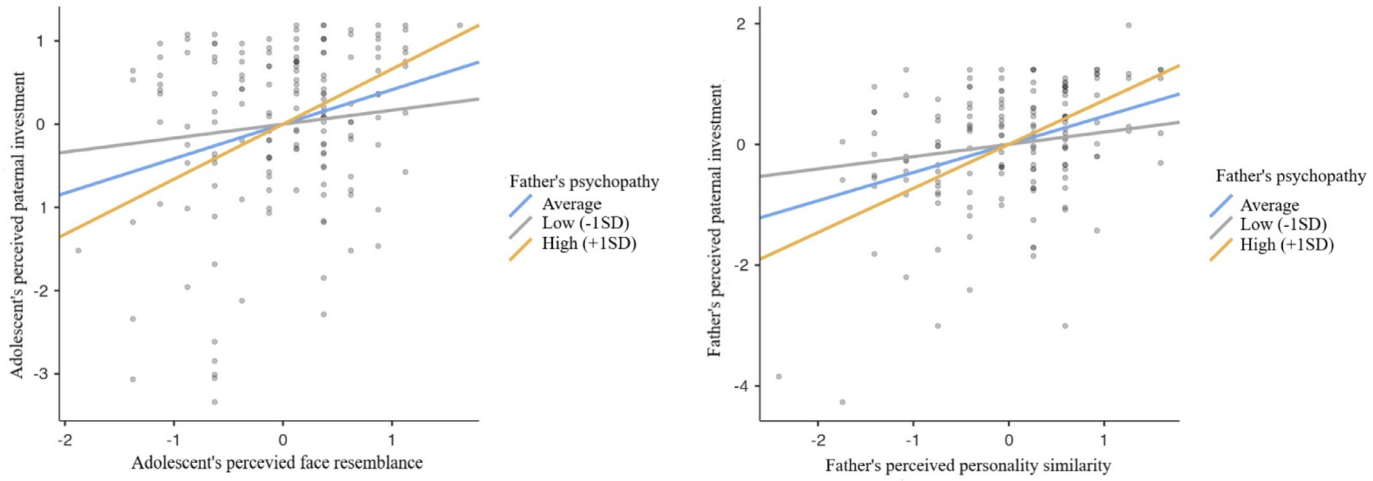

Fig. 3. Simple slopes plot for the moderating role of father's psychopathy on the relationship between perceived facial resemblance, personality similarity, and paternal investment.

irrespective of what the father believes. This is also the case for the father-father relationship (actor).

Perceived personality similarity predicted perceived paternal investment. The dyadic analysis showed that this relationship was significant at the actor effect and partially significant at the partner effect (only for father-to-adolescent). Father's perceived personality similarity predicted his perceived paternal investment controlling for partner effects. Adolescent's perceived personality similarity predicted his perceived paternal investment controlling for partner effects. Father's perceived personality similarity predicted adolescent's perceived paternal investment controlling for actor effect. As we expected, taking into account the fact that personality is partially heritable, this type of similarity is perceived by fathers as evidence of paternity and assures them that their resources are invested in their biological children. Adolescent's perceived personality similarity did not predict father's perceived paternal investment. This may be explained be the fact that it counts more how the father perceives personality similarity as important for paternal investment, irrespective of what the adolescent believes.

We found that personality similarity represents a stronger indicator for the father regarding paternity compared to facial resemblance. Given the fact that some personality traits are inherited (Plomin et al., 2013), these characteristics can be distinguished as evidence of fatherhood. Although facial resemblance is a characteristic that can be easily and directly observed, personality traits are expressed in a multitude of ways such as attitudes, preferences, daily behaviors, coping mechanisms, and social behavior, thus, fathers perceive this type of similarity more explicitly and widely, and take it into account when it comes to their investment. Moreover, there are several genes associated with variation in personality traits (Comings et al., 2000) and few linked to craniofacial traits (Sherwood et al., 2011). This may lead to the idea that there might be more genes associated with personality than facial structure. Therefore, personality similarity should lead to more parental investment as we found.

The only trait which had a significant moderating effect on the relationship between facial resemblance and personality similarity on one hand and perceived paternal investment on the other hand is fathers' psychopathy. Counterintuitively, even if we expected psychopathy to decrease the effect of facial resemblance or personality similarity on paternal investment, it had a positive impact. Our results showed that father's psychopathy moderated the relationship between father's perceived personality similarity and his perceived paternal investment. Further, father's psychopathy moderated the relationship between child's perceived facial resemblance and child's perceived paternal investment. A possible explanation may be that fathers high in psychopathy do not explicitly identify the importance of facial resemblance when it comes to their investment, but, its importance is identified by their children. Fathers high in psychopathy consider that behavioral and personality similarity is more important to them to invest in their children, compared to facial resemblance.

Consequently, when father-child resemblance was high, psychopathic fathers tended to invest in and provide more resources to their offspring. Even if psychopathic traits are linked to low empathy and cold behavior and though men characterized by these traits tend to be more authoritative, and coldhearted parents (Cox, Kopkin, Rankin, Tomeny & Coffey, 2018), the certainty regarding their paternity occludes all the adverse effects. Research showed that psychopathy tends to be the most strongly linked factor with a *fast* life history strategy among the Dark Triad traits (Jonason et al., 2010), being associated with high reproductive success (Carter, Lyons & Brewer, 2018). For these fathers, having a child who resembles them may be perceived as a prize in their paternal investment cost-analysis. Moreover, researchers showed that psychopathy is the most heritable trait from the Dark Triad traits (Vernon, Villani, Vickers & Harris, 2008). As such, we can interpret psychopathy as an adaptive individual trait from an evolutionary perspective. This evidence should explain why fathers high in psychopathy invest more in their children when they have cues of paternity.

4.1. Limitations and conclusions

While this study adopted a more sophisticated analytical technique, examined distinct dimensions of paternal investment, and integrated personality and facial resemblance, it was, nonetheless limited in several ways. First, the research design was cross-sectional. This affects the possibility of drawing causal conclusions. Second, we relied on self-report measures, which may lead to social desirability from participants. Third, we restricted our sample to adolescents. Future studies should include offspring from a wider range of ages to enhance the generalizability of the findings.

This research showed that besides facial resemblance, personality similarity is also perceived as a cue for paternity. We showed that fathers with high psychopathy are likely to invest more in their children if there is father-child resemblance. This may contribute to altering the negative beliefs about how psychopaths interact with their families, relatives, and close persons. Our findings have practical implications in family psychotherapy. Family therapists that work with clients interested in parenting behavior could introduce evolutionary-based information in their assessment and intervention techniques such as facial resemblance and personality similarity between father and child,

paternity uncertainty, and paternal investment.

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