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Sibling relationship quality and parental rearing style influence the development of Dark Triad traits

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Abstract

Currently our understanding of environmental factors that influence the development of dark personality traits (DT) is limited. Therefore, we conducted three studies using online questionnaires, each examining a different aspect of the relation between dark personality traits and family environment. In Study 1, 117 adults (mean age: 30.36 years, SD = 10.19) filled out questionnaires regarding their childhood relationship with siblings and their own DT traits. We found that the amount of conflicts with siblings during adolescence correlated positively with Machiavellianism and psychopathy. The feeling of closeness towards the siblings showed negative correlation with Machiavellianism. Parental partiality towards the other sibling was positively correlated with narcissism. In Study 2, 111 adolescents (mean age: 15.92, SD = 1.24) reported their perceptions of the rearing style of their parents, in addition to their sibling relationships and DT traits. Perceived parental emotional warmth was negatively associated, whereas both rejection and overprotection were positively correlated with psychopathy. Parental warmth was positively, while rejection negatively associated with narcissism. Machiavellianism was positively associated with the amount of conflicts with siblings, but negatively with closeness to siblings. In Study 3, 110 adults (mean age: 32.62 years, SD = 12.25) reported their levels of the Vulnerable Dark Triad that included measures of primary and secondary psychopathy, maladaptive covert narcissism, and borderline personality organization. Results indicated that sibling relationship quality had a significant effect on primary psychopathy and borderline traits. Parental rejection and overprotection correlated with borderline traits and vulnerable narcissism. The results of these studies shed some light on how environmental impulses, particularly the quality of relationships between family members, affect the development of personality.

Keywords Dark triad · Vulnerable dark triad · Sibling relationships · Perceived parenting style · Adolescence · Adulthood

Introduction

Personality is shaped by a combination of genetic and environmental factors (Bornovalova et al., 2009; Carroll et al., 2021; Hopwood et al., 2011; Jang et al., 1996; Plomin & Nesselroade, 1990). The quality of relationships between family members varies widely across society (e.g., Ross et al., 2005), so it is important to take into account the differences in each family to understand child development. The focus of our research has therefore been on parental treatment and sibling relationships,

as these are the first experiences of bonds for the developing child. They learn from others' behaviour towards them and gradually develop behavioural strategies appropriate to the situation. In our research, we have sought to answer the question, which family factors may lead to a greater emergence of dark personality traits (members of Dark Triad and Vulnerable Dark Triad). To this end, we gathered data in three subsequent studies, each focusing on different aspects of family functioning. We hypothesised that a negative family environment in general, such as rejection from the parents or conflicts with siblings, are associated with the development of dark personality traits. The hypotheses are detailed in the sections of each study separately.

The Dark Triad and associated environmental etiological factors

The Dark Triad (DT) is a cluster of three interrelated socially aversive traits (Williams & Paulhus, 2004):

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Machiavellianism, subclinical narcissism, and subclinical psychopathy. According to different theoretical approaches, the common core of the DT is the lack of agreeableness (Paulhus & Williams, 2004), lack of honesty and humility (Book et al., 2015; Lee & Ashton, 2014), lack of empathy (Baron-Cohen, 2011), maladaptive schemas connected to impaired limits (Láng, 2016), and antagonism (Dinić et al., 2021). Machiavellianism – i.e., being manipulative, cynical, and amoral (Christie & Geis, 1970) – is uniquely characterised by long-term oriented manipulation and alliance-building (Bereczkei & Birkas, 2014; Bereczkei & Czibor, 2014; Jones & Paulhus, 2014). Narcissistic individuals have exhibitionistic tendencies and a uniquely grandiose self-image with the feeling of entitlement (Raskin & Terry, 1988) that are strongly correlated with positive self-esteem in normative samples (Campbell et al., 2002). Unique traits associated with psychopathy are impulsivity and callousness (Jones & Paulhus, 2014). Taking the multidimensional nature of narcissism (Wink, 1991) and psychopathy (e.g., Hare 2003) into account, narcissism in the DT model is unambiguously linked to grandiose narcissism, whereas psychopathy is represented as a mixture of Factor 1 (primary) and Factor 2 (secondary) psychopathy.

In investigating similarities between mono- and heterozygotic twins, Vernon and colleagues (Vernon et al., 2008) found that psychopathy is most likely to be influenced by genetic factors. With regard to narcissism and Machiavellianism, unique and shared environments were the most influential, respectively. Research on environmental etiological factors associated with the DT has been mostly focusing on parenting issues. Machiavellianism is consequently linked to parental neglect (Láng & Lénárd, 2015) and to disengaged and chaotic family functioning (Láng & Birkás, 2014). Narcissism – at least in its grandiose form – is hypothesised to be rooted in unconditional positive parental feedback (Horton et al., 2006). This permissive parental attitude might be responsible for the emergence of entitlement ('I am allowed to do whatever I want') and grandiosity ('I am perfect'). Undeniably formed by genetic influences, early stress and traumatic experiences not only intensify the expression but also contribute to the development of psychopathic traits (Frazier et al., 2019).

Etiology and origins of the Vulnerable Dark Triad

The Vulnerable Dark Triad (VDT) is a collection of three dark personality traits that parallel the DT (Miller et al., 2010). Borderline Personality Disorder (BPD), vulnerable narcissism, and Factor 2 psychopathy constitute the VDT. VDT traits have emotional vulnerability in common.

Vulnerable variants of narcissism and psychopathy are joined by BPD because BPD is also associated with low agreeableness and high neuroticism (Miller et al., 2010). According to the Alternative Model of Personality Disorders (American Psychiatric Association, 2013), BPD is characterised by the instability of identity, life-goals, and interpersonal relationships; inability to recognize affective states of self and others; intensive hypersensitivity, accompanied by separation anxiety, impulsivity, risk taking, and hostility. In contrast to the emotionally stable and extraverted nature of grandiose narcissism, vulnerable narcissists are characterised by high neuroticism and low extraversion (Miller et al., 2011). Vulnerable narcissism is further characterised by grandiose fantasies, shifts between superior and inferior self-representation, and fragile self-confidence (Wink, 1991). Whereas Factor 1 psychopathy consists of the interpersonal and affective characteristics of psychopathy, Factor 2 psychopathy is associated with deviant lifestyle and antisocial tendencies. More specifically, Factor 2 psychopathy is characterised by boredom, risk-taking, lack of long-term goals, impulsivity, parasitism, aggression, juvenile delinquency, and criminal acts (Neumann et al., 2006). Whereas the connectedness of grandiose and vulnerable narcissism, and Factor 1 and Factor 2 psychopathy is obvious, Machiavellianism and BPD are not terminologically related. However, empirical studies show evidence of the association between Machiavellianism and borderline traits and functioning (McHoskey, 2001; Láng, 2015).

With regard to their childhood origins, VDT traits can be traced back to adverse childhood experiences just like DT traits (Miller et al., 2010). Negative family environment, parental anxiety disorder, and history of abuse were all found to independently predict BPD symptoms (Bradley et al., 2005). Vulnerable narcissism was found to be linked to harsh parenting (Horton et al., 2006) and inconsistent discipline (Mechanic & Barry, 2015). Contrasted to Factor 1 psychopathy, Factor 2 psychopathy is more strongly affected by childhood abuse (Moreira et al., 2020). A further study (Jackson et al., 2021) also found parenting by lying – i.e., controlling the child emotionally and behaviourally through lying to them – to be uniquely associated with Factor 2 psychopathy.

The role of parents in the development of personality

The role of the family, especially parents', in the development of personality is of paramount importance. Children need constant and repeated feedback from their parents in order to develop habits of behaviour and to become stable in their personality. Traits are acquired through imitation and pattern following, which become fixed and become the child's resources (Pomerantz & Thompson, 2008). With

different educational attitudes, children encounter different environments and have different experiences, which influence the development of their personality. Maccoby and Martin (1983) characterised parenting styles along the lines of parental constraint and emotionality, while Baumrind (1971, 1980) argued that most parenting styles can be classified into three groups. Based on Baumrind's experiment, parenting styles can be paired with children's behaviour, i.e., parenting attitudes shape the child's personality and displayed behavioural strategies. More specifically, authoritative parenting has been associated with emotional stability, adaptive coping patterns and general life satisfaction; authoritarian parenting is linked with poor academic achievement and depressive symptoms; and permissive parenting style has been associated with poor self-control, low self-esteem, and aggression (Power, 2013). Our assumptions are close to Baumrind's idea that parental treatment can have a significant impact on children's development and the shaping of their personality and behaviour.

Recent studies have also supported the significant influence of parenting style on the development of a child's personality (Mensah & Kuranchie, 2013). In accordance with this claim, parenting styles which involve rational reasoning, understanding, communication, consensus and partnership between parents and children, generally favour the development of prosocial tendencies. In contrast, strict rules, verbal and physical punishment, as well as a rigid and unequal relationship between parents and children may co-occur with antisocial traits in children's personality (Masud et al., 2019; Mensah & Kuranchie, 2013). Furthermore, different parental styles may result in different types of behaviours a child might adopt in certain social contexts. With an authoritative parental background, where the parents are both demanding and responsive towards the child, fewer behavioural problems occur, and a higher level of achievement is reached (Pong et al., 2010). The children of permissive parents, who tend to show a high rate of responsiveness without demanding, are more likely to show internalising and externalising behaviour, anxiety, passivity towards others and a lower level of social responsibility. Authoritarian parenting style, due to the lack of warmth and the involvement of various kinds of punishments and the presentation of parental dominance, while also maintaining a high level of demanding, could induce discipline problems, anti-social behaviour, depression, dissatisfaction and, in some extreme cases, suicide (Alizadeh et al., 2011; Martínez & García, 2007).

Empirical studies suggest that attachment style shows correlation with the development of DT traits as well. Machiavellianism, for instance, is connected to both parental neglect (Jonason et al., 2014; Láng & Lénárd, 2015) and disengagement of family members (Láng & Birkás, 2014), whereas the level of narcissism is correlated with parental feedback (Horton et al., 2006) and with the quality of

maternal care (Jonason et al., 2014). Beside genetic factors, a stressful family environment in childhood (Frazier et al., 2019), and avoidant attachment (Jonason et al., 2014), contribute to the development of psychopathic traits. The connection between parental attachment and children's DT traits has been confirmed in a non-WEIRD population as well, for both retrospective memories and current relationships between parents and their children in their early adulthood (Tajmiriyahi et al., 2021).

Sibling relationships

Most research focuses on parental influences on child development, yet the majority of the impulses that affect children come not only from their parents but also from their siblings. Although parents do play a primary role in child development, the role of siblings cannot be overlooked (Parke & Buriel, 1998). Namely, they are usually the longest social relationships in human life (Michalski & Euler, 2007).

The relationship between siblings is characterised by ambivalence, due to competition for parental love and attention. The personality of the children is also an important factor in the quality of the sibling relationship. Hostile, active, restless children are more likely to have a conflictual sibling relationship (Munn & Dunn, 1989), just as the emotional climate of the family can affect the relationship between siblings. In the event of parental disagreement or divorce, siblings may quarrel more (Buehler et al., 1997). Parental favouritism may also affect sibling relationship quality; if children perceive that they are not treated equally by their parents, each may behave negatively towards the other (Barrett Singer & Weinstein, 2000). Sibling rivalry is most pronounced in early adolescence, and declines towards the end of it. The reason for the reduction in rivalry is that offspring begin to take charge of their own lives and, once they no longer live at home, the competition for parental resources ceases (Pollet, 2007; Pollet & Hoben, 2011; Pollet & Nettle, 2009). Given the limited availability of resources that parents can provide at any specific time, a larger age gap is associated with less conflict between siblings (Gyuris et al., 2020; Kocsor et al., 2022). Nevertheless, despite rivalry, siblings – especially older siblings – provide each other with personal, financial and emotional support.

Parental influence on sibling relations

The relationship between parental behaviour and sibling relationships can be interpreted in several ways. Some research has found a link between maternal behaviour and sibling interactions. The results show that when mothers use non-punitive parenting techniques, sibling relationships are less likely to exhibit conflictual behaviour and more likely to be

characterised by prosocial attitudes (Dunn & Kendrick, 1981; Howe, 1987; Brody et al., 1987; Stocker et al., 1989) found an association between the parenting behaviour of the mother (positive, negative or controlling) and siblings' relationship (see also Brody et al., 1986; Feinberg et al., 2003). More recent findings also showed that marital satisfaction may also be linked to siblings' relations (Kocsor et al., 2022).

Observational findings show that discriminative maternal attitudes (e.g., responsiveness, attachment, control) result in more negative relationships between siblings (Brody et al., 1987; Stocker et al., 1989). Brody and colleagues (Brody et al., 1992) investigated the effects of maternal and paternal direct and discriminative behaviours. The results show that direct negative parental behaviour leads to more conflictual sibling relationships, whereas direct positive parental behaviour leads to more balanced bonds between children. In addition, discriminatory behaviour also shifted sibling interactions in a negative direction. Regardless of which sibling was favoured and who received more attention, inequality resulted in greater sibling conflict. Parental favouritism during childhood and recollections of those memories are suggested to make an even greater impact on adult siblings' relations than current experiences of the same behaviour. The reason for this is that parental favouritism in childhood affects both closeness and rivalry between siblings, while the same parental behaviour in adulthood influences closeness only (Suitor et al., 2009).

Dark traits and sibling relations

The literature on the association between the DT and sibling relationships is remarkably scarce. We are not aware of any study investigating the sibling relationships of Machiavellian individuals. With regard to friendships as peer relationships similar to that of siblings, Machiavellianism is associated with devaluing intimacy and closeness in friendships (Lyons & Aitken, 2010). Machiavellian traits also increase competitiveness, as well as decrease cooperativeness and reciprocity in friendships (Abell & Brewer, 2018). In the study of Finzi-Dottan and Cohen (2010), higher levels of narcissism predicted lower levels of warmth and higher levels of conflict in the sibling relationships of adults. Moreover, parental – especially paternal – favouritism exacerbated narcissistic traits. Youth exhibiting psychopathic behaviour reported elevated levels of conflict in their peer relationships, including sibling relationships (Muñoz et al., 2008), and traits linked to psychopathy such as delinquency and lack of empathy were found to be predictive of severe inter-sibling violence (Khan & Cooke, 2008).

Literature on the association of the VDT and sibling relationships is even scarcer than it is with regard to the DT. Literature on BPD and sibling relationships focuses more on how individuals experience the mental disorder of their siblings (e.g., Ntshingila et al., 2021). Bullying victimisation

(Winsper et al., 2017) – including sibling bullying (Foody et al., 2020) – can contribute to the development of BPD in adolescents. Vulnerable narcissism in general is associated with high interpersonal distress, domineering, vindictive, cold, and socially avoidant interpersonal problems (Dickinson & Pincus, 2003; Miller et al., 2012). With regard to Factor 2 psychopathy, Newberry (2016) found that it was uniquely related to being fearful of separation and rejection.

Study 1 – The development of the Dark Triad personality and its association with sibling relationships

Our first study focused on sibling relationships. Our research question was whether the family environment influences the formation of the Dark Triad. The following hypotheses were formulated:

- Hyp. 1. The higher the amount of conflict between siblings was, and the less close they felt towards each other during childhood, the higher the likelihood is that the person will show dark traits.
- Hyp. 2. As parental partiality towards the other sibling increases, the likelihood of having dark traits also increases.

Methods

Participants

Recruitment of participants happened on social media platforms with convenience sampling. People with more than one siblings were asked not to take part in the survey. A total of 127 people completed the questionnaires, all of whom had only one sibling. We excluded those who did not have a full sibling and one person who was 24 years younger than their sibling. This left a total of 117 persons in the sample. The average age was 30.36 years, with a standard deviation of 10.19 years. The youngest subject was 18 and the oldest 56. The sex distribution in the sample was 22 males ($M = 27.91$, $SD = 10.64$) and 96 females ($M = 30.93$, $SD = 10.05$). Fifty-seven respondents had a sister and 60 had a brother. The smallest age difference between participants and their siblings was 1 year and the largest was 13 years ($M = 3.92$; $SD = 2.31$).

Questionnaires

We used one questionnaire to assess participants' relations with their siblings in their childhood, and another to measure dark personality traits.

SRQ-HU (Sibling Relationship Questionnaire – Hungarian version) The Sibling Relationship Questionnaire (SRQ) was developed by Furman and Buhrmester (1985) to measure the quality of the relationship between siblings. The questionnaire originally had 48 items, but a shortened version with 27 items was also constructed. The short version of the SRQ was used as a basis by Barlay and Péley (2016), who created the Hungarian version of the questionnaire, describing its psychometric properties and validity. Based on their results, the Hungarian version of the SRQ (SRQ-HU) is a reliable and valid measurement tool with ten factors which can be arranged into three main dimensions: *Conflicts between siblings* (5 items), *Closeness* (16 items), and *Parental partiality* (6 items). The questionnaire does not have any reversed items. Cronbach's alphas of all ten factors and that of the *Closeness* dimension are higher than 0.78; whereas those of *Conflicts* and *Parental partiality* are both higher than 0.60 (Barlay & Péley, 2016). High scores on the first and second factor indicate high levels of conflict and closeness, respectively. High scores on the parental partiality factor indicates that the parent shows more care towards the self than towards the sibling. (See example items for this and every other scale in [Supplementary Materials](#)). In the current sample all scales had good internal reliability (Cronbach's $\alpha > 0.78$).

Short Dark Triad (SD3) The Short Dark Triad questionnaire by Jones and Paulhus (2014) contains 27 items, 9 per scale (subclinical narcissism, Machiavellianism, subclinical psychopathy), five of which are reversed. Respondents are asked to indicate their responses to each item on a 5-point Likert scale, ranging from 1 (completely disagree) to 5 (completely agree). The Cronbach's alphas of the three subscales range from 0.73 to 0.78 (Jones & Paulhus, 2014).

In the current sample, according to Cronbach's α values, all scales had good internal reliability (Cronbach's $\alpha > 0.73$) except for psychopathy. The internal reliability of psychopathy (Cronbach's $\alpha = 0.66$) was only acceptable (see detailed reliability values in the [Supplementary Materials](#)).

Procedure

The participants took part in an online survey that was shared on social media. Given that the number of participants who can be reached with this method is limited, we ended data collection when there were no new participants for five consecutive days. The same rationale was used in all subsequent studies as well. Before completing the questionnaires, we informed respondents of the purpose and nature of the study, they were assured of data confidentiality and anonymity, and we asked them to read all questions

carefully. We also informed them that they could withdraw from answering the questions at any time without any negative consequences. First, participants answered demographic questions, including items about the family structure of their childhood (number and age of siblings, their sex, etc.). The next set of questions in the survey included items from the SRQ-HU and the SD3.

The participants who were included in the analyses responded to each of the questions, hence the dataset had no missing data. We used correlation analyses and linear regressions. In the latter, participants' relation with their siblings were used as predictors, and participant's sex as a factor variable in each of the regression analyses. Other control variables, such as sibling's sex, birth order, and age difference between the participants and their sibling, were put into Block 2 of the regression to check for their relevance in the model.

Results

Means, standard deviations, the internal reliabilities of the scales, and the complete matrix of Pearson's correlations are presented in [Supplementary Materials](#). Results showed that Machiavellianism was positively associated with *Conflicts* ($r = .345$; $p < .001$) and negatively with *Closeness* ($r = -.364$; $p < .001$). Narcissism was negatively associated ($r = -.283$; $p = .002$) with *Parental partiality* scores, that is, parents' favouritism towards siblings was associated with higher narcissism scores. Psychopathy showed a positive significant correlation with *Conflict* ($r = .375$; $p < .001$).

Further, we used multiple linear regressions to regress sibling relationship variables on each DT trait. Results are presented in Table 1; for detailed statistics see [Supplementary Materials](#). Sibling relationship variables explained a significant proportion of variance for each DT trait. Neither participants' sex, nor the control variables had any significant effects on the model for Machiavellianism and Narcissism, and there was no significant difference between the models with and without control variables. For the model with psychopathy as a target variable, however, both participants' and their siblings' sex was a significant predictor; both being male and having a male sibling increased scores on psychopathy. All Variable Inflation Factor (VIF) values were below 1.02, thus, no harmful multicollinearity was detected for predictors. All estimates in the analyses are standardised estimates.

Discussion

In accordance with Hyp. 1, results of the correlation analyses – that were also supported by the results of multiple linear regressions – showed that those who recalled more conflict or less emotional closeness in their childhood sibling

Table 1 Sibling relationship variables regressed on Dark Triad traits; results of multiple linear regressions

		Dark Triad traits					
		Machiavellianism		Narcissism		Psychopathy	
		β	<i>p</i>	β	<i>p</i>	β	<i>p</i>
Sibling Relationship	Sex ^a	−0.339	0.102	−0.319	0.164	−0.451	0.040*
	Closeness	−0.359	<0.001*	0.083	0.354	−0.110	0.196
	Conflict	0.344	<0.001*	0.087	0.331	0.364	<0.001*
	Parental partiality	−0.027	0.738	−0.290	0.001*	−0.100	0.236
R ² (<i>p</i>)		0.281 (<0.001*)		0.119 (0.006*)		0.201 (<0.001*)	

*Values are significant on a <0.05 level

^aCalculation of standard estimates is based on a female–male contrast: negative β values mean that being a male predicts higher scores of the trait

relationships reported higher levels of Machiavellianism. The above results are not surprising given the fact that Machiavellianism is associated with devaluing intimacy and closeness in friendships (Lyons & Aitken, 2010) and also with increased competitiveness and decreased cooperativeness in friendships (Abell & Brewer, 2018). Participants who reported that their parents favoured their siblings over them reported higher levels of narcissism, echoing the assumptions of Hyp. 2. Parental partiality towards siblings can be conceived of as a narcissistic wound; lack of positive parental feedback can be compensated with narcissistic functioning (Horton et al., 2006). Individuals who reported more conflict with their siblings in childhood reported higher levels of psychopathy. Just like in the case of Machiavellianism, conflicting relationships can contribute to the emergence of psychopathic traits. However, it could also be congruent with literature that the genetically formed coercive nature of psychopathic individuals results in conflicting relationships (e.g., Sokić, 2019).

Study 2 – family factors influencing the development of Dark Triad personality traits

In the Introduction ("The role of parents in the development of personality" section) we have already referred to studies showing that dark traits can be associated with relations with parents as well (Frazier et al., 2019; Horton et al., 2006; Jonason et al., 2014; Láng & Birkás, 2014; Láng & Lénárd, 2015; Tajmiriyahi et al., 2021). Based on these results and that of Study 1, in our subsequent studies, in addition to the aspects of sibling relationship quality that were associated with the Dark Triad, we also examined the role of parental treatment. In contrast to Study 1, where retrospective questionnaires were used to test relations both with parents and

siblings, Study 2 was conducted using an adolescent sample. The following hypotheses were formulated:

Hyp. 3. Those who experienced more parental rejection and overprotection during their childhood are more likely to have developed dark traits.

Hyp. 4. Those who experienced more parental emotional warmth during their childhood are less likely to have developed dark traits.

Hyp. 5. As parental partiality towards the other sibling increases, the likelihood of having dark traits also increases.

Hyp. 6. The higher the amount of conflict between siblings was, and the less close they felt towards each other during childhood, the higher the likelihood that the person will show dark traits.

Methods

Participants

Similar to Study 1, data collection happened online. The majority of the participants were underaged, hence we asked them to provide verbal consent while their parents signed a parental consent form. A total of 111 participants ($M = 15.92$, $SD = 1.24$) took part in the experiment, of which 51 were male ($M = 15.96$, $SD = 1.10$) and 65 were female ($M = 15.89$, $SD = 1.36$). The youngest subject was 13 years old and the oldest was 18 years old.

Of the respondents, 51 (45.9%) had one sibling, 48 (43.2%) had two siblings, and 12 (10.8%) had three siblings (median = 2). No data are available on whether siblings included half-siblings or step-siblings. However, previous research shows that there is no difference in relationship quality by sibling type among siblings living together (Gyuris et al., 2020), so this is unlikely to bias the results significantly.

Questionnaires

We used the SD3 and SRQ measurement tools as in Study 1. Participants who had more than one sibling also completed the SRQ questionnaire only once. We asked them to think not only about one sibling when responding, but to rate their sibling environment in general. This was made possible by the fact that we were not interested in the impact of each sibling in particular, but in the impact of the family environment as a whole.

Additionally, the s-EMBU-A (short Egna Minnen Beträffande Uppfostran – Adolescent; Gerlsma et al., 1991) was administered to measure relationship quality with parents. It measures dimensions of parental rejection (7 items), emotional warmth (7 items) and overprotection (9 items, one of which is reversed). The questionnaire initially consisted of 81 items, but a shorter version with 23 items was also developed (Penelo et al., 2012), with separate responses for perceived paternal and maternal behaviour. The Cronbach's alphas of the maternal and paternal subscales range from 0.72 to 0.85 (Arrindell et al., 1999).

According to Cronbach's alpha values obtained from the current sample, all scales had good internal reliability (Cronbach's $\alpha > 0.71$) except for parental partiality and Machiavellianism. The internal reliability of Machiavellianism (Cronbach's $\alpha = 0.67$) and parental partiality (Cronbach's $\alpha = 0.66$) was only acceptable (see detailed reliability values in [Supplementary Materials](#)).

Statistical analyses

The participants who were included in the analyses responded to each of the questions, hence the dataset had no missing data. We used correlation analyses and linear regressions. In the latter, participants' relation with their siblings were used as predictors, and participant's sex as a factor variable in each of the regression analyses. We put parental relationship variables into Block 2 to analyse their contribution to the level of DT traits. Number of siblings as a control variable was put into Block 3 of the regression to check for their relevance in the model.

Results

Means, standard deviations, the internal reliabilities of the scales and the complete matrix of Pearson's correlations are presented in [Supplementary Materials](#). Results showed that Machiavellianism was positively associated with conflicts ($r = .213$; $p < .001$) and negatively with closeness ($r = -.258$; $p < .001$). None of the parenting variables were significantly associated with Machiavellianism. Narcissism was positively associated with both paternal ($r = .353$;

$p < .001$) and maternal emotional warmth ($r = .189$; $p = .047$). None of the sibling relationship variables was significantly correlated with narcissism. Psychopathy showed positive significant correlations with inter-sibling conflicts ($r = .369$; $p < .001$), paternal ($r = .301$; $p = .001$) and maternal ($r = .334$; $p < .001$) rejection, and paternal ($r = .249$; $p = .008$) and maternal ($r = .275$; $p = .003$) overprotection. Psychopathy was significantly and negatively correlated with closeness to siblings ($r = -.300$; $p = .001$), parental partiality ($r = -.188$; $p = .048$), and maternal emotional warmth ($r = -.346$; $p < .001$).

Further, we used hierarchical multiple linear regressions to regress sibling relationship and parenting variables on each DT trait. This was done in order to see the unique effect of each variable, and whether the effects of sibling relationship variables survived the introduction of parenting variables. As noted in the introduction, the relationship between parenting variables and personality traits (including DT traits) has been widely researched in the past decades. It has been less so for sibling relationships, therefore, the selected statistical analysis corresponds with our primary research interest, and enhances the chance of finding meaningful results that can be interpreted within the proposed theoretical framework.

Results are presented in Table 2. Sibling relationship variables explained a significant proportion of variance for Machiavellianism – though conflict had only a marginal effect – and psychopathy, but not for narcissism. The introduction of parenting variables to the models increased the amount of explained variance for all three DT traits. In models with nonsignificant contribution to the prediction of dark personality traits, variable-level investigations of coefficients were omitted. Participants' sex had a significant effect on all of DT traits, being male increasing scores. Number of siblings as a control variable did not have any significant effect on the models. Detailed models are presented in [Supplementary Materials](#). All VIF values were below 3.55, thus no harmful multicollinearity was detected for predictors. All estimates in the analyses are standardised estimates.

For Machiavellianism and with regard to sibling relationship variables, only relative lack of emotional closeness was able to uniquely predict higher levels of Machiavellianism. The unique effect of closeness remained significant even after introducing parenting variables. Parenting variables in general significantly increased the explanatory power of our model, but only paternal and maternal emotional closeness had unique predictive power. For narcissism, sibling relationship variables failed to significantly explain its level. With introducing parenting variables, the explained variance of narcissism significantly increased. Higher levels of paternal emotional warmth and lower levels of maternal rejection predicted higher levels of narcissism. Considering psychopathy and sibling relationship

Table 2 Sibling relationship variables and parenting variables regressed on Dark Triad traits; results of hierarchical multiple linear regressions

		Dark Triad traits					
		Machiavellianism		Narcissism		Psychopathy	
		β	<i>p</i>	β	<i>p</i>	β	<i>p</i>
Sibling Relationship (Model 1)	Sex ^a	-0.399	0.031*	-0.406	0.033*	-0.295	0.094
	Closeness	-0.250	0.012*	0.093	0.356	-0.203	0.033*
	Conflict	0.179	0.057	0.203	0.037*	0.318	<0.001*
	Parental partiality	0.072	0.459	-0.100	0.319	-0.087	0.354
R ² (p)	0.138 (0.003*)		0.0832 (0.054)		0.210 (<0.001*)		
Sibling Relationship + Perceived parenting (Model 2)	Sex ^a	-0.445	0.019*	-0.461	0.011*	-0.454	0.008*
	Closeness	-0.278	0.006*	-0.015	0.876	-0.139	0.127
	Conflict	0.150	0.122	0.163	0.082	0.266	0.003*
	Parental partiality	0.053	0.588	-0.115	0.229	-0.059	0.509
	Paternal rejection	0.131	0.359	0.089	0.519	0.086	0.508
	Paternal overprotection	-0.088	0.484	0.061	0.615	0.072	0.526
	Paternal emotional warmth	0.377	0.005*	0.452	<0.001*	0.169	0.156
	Maternal rejection	-0.233	0.162	-0.334	0.039*	0.062	0.680
	Maternal overprotection	0.236	0.087	0.240	0.070	0.138	0.269
	Maternal emotional warmth	-0.347	0.013*	-0.182	0.174	-0.336	0.008*
ΔR^2 (p)	0.227 (0.003*)		0.284 (<0.001*)		0.364 (<0.001*)		

*Values are significant on a $\alpha < 0.05$ level

^aCalculation of standard estimates is based on a female–male contrast: negative β values mean that being a male predicts higher scores of the trait

variables, relative lack of emotional closeness and more intense inter-sibling conflicts both uniquely predicted higher levels of psychopathy. However, after introducing parenting variables, only the level of conflict remained a significant predictor. With regard to the effect of parenting variables, only the relative lack of maternal emotional warmth could uniquely predict higher levels of psychopathy.

Discussion

The results of the correlational analyses showed that those adolescents who reported more conflict and less emotional intimacy in their current sibling relationships scored higher on Machiavellianism. These results are in line with Hyp. 5 and 6, and they replicate the findings of Study 1. Participants who reported more emotionally warm and sensitive parenting from both their fathers and mothers reported higher levels of narcissism. This finding supports Hyp. 4 and previous results (Horton et al., 2006) that emphasise unconditional positive parental feedback (i.e., too much parental warmth) could be an etiological factor in the development of narcissism.

There is additional support for the assumption about the association between dark traits and sibling influence (Hyp. 5 and 6). Our results show that participants who reported that their parents favoured their siblings over them, and those who had more conflict and less emotionally positive relationships with their siblings, scored higher on the

psychopathy scale. These results are also in accord with the findings of Study 1, and they have already been discussed. In line with Hyp. 3, higher levels of psychopathy were also reported by individuals who saw their parents (both father and mother) as more rejecting and overprotective, and who saw their mothers as less affectionate to them. This pattern of decreased warmth, increased rejection and overprotection or control was found to be related to overall problems in self-regulation and delaying gratification by Baker and Hoerger (2012). These characteristics are all part of the impulsive nature of psychopaths. However, we also speculate that lack of warmth and presence of rejection could be the main factors contributing to the emergence of psychopathy (Guo et al., 2021), and overprotection might rather be a form of parental coping with the reckless nature of adolescents who are high in psychopathy.

Study 3 – The impact of sibling relationship quality and parental attitudes on the Vulnerable Dark Triad

As an extension of our research findings on the Dark Triad, we continued to examine our assumptions about the role of family influences in shaping personality in the context of the development of Vulnerable Dark Triad (VDT)

personality traits. Because of the common features of the two triads, we postulated that similar processes may underlie their emergence, and thus the results may support our assumptions, or we may find more commonalities between the two constructs. We already have some knowledge about VDT traits and its connection with adverse childhood experiences (Miller et al., 2010). For instance, similar to DT traits, negative family environment – including sibling bullying (Foody et al., 2020) – predict borderline personality disorder symptoms (Bradley et al., 2005), and childhood abuse is related to secondary psychopathy (Moreira et al., 2020). Harsh parenting (Horton et al., 2006) and being afraid of separation and rejection (Newberry, 2016) were found to be linked to vulnerable narcissism. We formulated our hypotheses regarding the relationship between the VDT and family influences based on the above findings and our previous research:

Hyp. 7. Rejective, cold parenting attitudes can play a role in the development of the Vulnerable Dark Triad.

Hyp. 8. As the intensity of conflict between siblings increases, the likelihood of showing traits typical of the Vulnerable Dark Triad also increases, while an increase in closeness between siblings decreases the likelihood of developing VDT traits.

Methods

Participants

Data collection happened with online questionnaires. The average age of the 110 participants was 32.62 years, with a standard deviation of 12.25 years. The youngest participant was 19 and the oldest 74. The sex distribution of the sample was 21 males ($M = 28.71$ years; $SD = 9.06$ years) and 89 females ($M = 33.54$ years; $SD = 12.76$ years). Of the respondents, 65 had one sibling, 30 had two siblings, 10 had three siblings and 5 had more than three siblings. There is no information on whether the responses referred to half-siblings and step-siblings as well.

Questionnaires

Study 3 included the Sibling Relationship Questionnaire (SRQ-HU) as before, and the retrospective parental relationship questionnaire (EMBU) developed for adults (Perris et al., 1980). We used the short translated version that has been also tested for its validity (s-EMBU, Arrindell et al., 1999). Instead of the Short Dark Triad (SD3) we used questionnaires measuring members of the Vulnerable Dark Triad. Currently there is no instrument available that measures all three traits together. Therefore, separate scales were used

for vulnerable narcissism, psychopathy, and borderline personality disorder.

MCNS (Maladaptive Covert Narcissism Scale) The Maladaptive Covert Narcissism Scale was developed by Cheek et al. (2013) to measure covert/vulnerable narcissism. The test contains a total of 23 items, incorporating items from the earlier Hypersensitive Narcissism Scale (Hendin & Cheek, 1997). Respondents are asked to rate, on a 5-point Likert scale, the extent to which a given statement is typical of them, where 1 represents “not typical at all”, and 5 means “very typical”. The Cronbach’s alphas of the scale, measured on two independent samples, were 0.85 and 0.89, respectively (Cheek et al., 2013).

LSRP (Levenson Self-Report Psychopathy Scale) Levenson’s Self-Report Psychopathy Scale (Levenson et al., 1995) is an instrument that measures both primary (16 items) and secondary psychopathy (10 items). The test contains 26 items, including 7 reversed ones. Subjects are asked to rate their agreement with the statements using a 4-point Likert scale, where 1 represents “completely disagree”, and 4 means “completely agree”. The Cronbach’s alpha coefficient for primary psychopathy is 0.82, whereas it is 0.63 for secondary psychopathy (Levenson et al., 1995).

BPI (Borderline Personality Inventory) Developed by Leichsenring (1999) to measure borderline personality disorder, this questionnaire contains 53 items assessing identity diffusion (10 items), primitive avoidance mechanisms (8 items), fear of closeness (8 items) and loss of sense of reality (5 items). None of the items is reversed. The total BPI score – which is used in our analyses – consists of all the items except the last two. The respondent is required to answer true-false questions. The Cronbach’s alpha of the scales range between 0.68 and 0.91 (Leichsenring, 1999).

According to Cronbach’s alpha values, all scales had good internal reliability (Cronbach’s $\alpha > 0.77$) except for parental partiality. The internal reliability of parental partiality (Cronbach’s $\alpha = 0.65$) was only acceptable (see detailed reliability values in [Supplementary Materials](#)).

Statistical analyses

The participants who were included in the analyses responded to each of the questions, hence the dataset had no missing data. We used correlation analyses and linear regressions. In the latter, participants’ relation with their siblings were used as predictors, and participant’s sex as a factor variable in each of the regression analyses. We put

parental relationship variables into Block 2 to analyse their contribution to the level of VDT traits. Number of siblings as a control variable was put into Block 3 of the regression to check for their relevance in the model.

Results

Means, standard deviations, the internal reliabilities of the scales, and the complete matrix of Pearson's correlations are presented in *Supplementary Materials*. Results showed that primary psychopathy was positively associated with inter-sibling conflicts ($r = .237$; $p = .013$). None of the parenting variables were significantly associated with primary psychopathy. Secondary psychopathy was uncorrelated both with sibling relationship and parenting variables. Vulnerable narcissism was positively associated with maternal rejection ($r = .200$; $p = .036$) and overprotection ($r = .324$; $p < .001$). None of the sibling relationship variables was significantly correlated with vulnerable narcissism. Borderline personality organisation showed positive significant correlations with inter-sibling conflicts ($r = .220$; $p = .021$), paternal ($r = .235$; $p = .013$) and maternal ($r = .315$; $p < .001$) rejection, and paternal ($r = .189$; $p = .049$) and maternal ($r = .271$; $p = .004$) overprotection. Borderline personality organisation was significantly and negatively correlated with parental partiality ($r = -.285$; $p = .003$), and maternal emotional warmth ($r = -.260$; $p = .006$).

Further, we used hierarchical multiple linear regressions to regress sibling relationship and parenting variables on each trait. The rationale for this was described in the "Results" section of Study 2 (3.2). Results are presented in Table 3. Sibling relationship variables explained a significant proportion of variance for primary psychopathy and borderline personality organisation, but not for secondary psychopathy and vulnerable narcissism. The introduction of parenting variables to the models only increased the amount of explained variance for primary psychopathy, but not for secondary psychopathy, vulnerable narcissism, and borderline personality organisation. In models with nonsignificant contribution to the prediction of dark personality traits, variable-level investigations of coefficients were omitted. Participants' sex had no effect on VDT traits, and number of siblings as a control variable did not increase the explanatory power of the model either. All VIF values were below 3.15, thus, no harmful multicollinearity was detected for predictors. All estimates in the analyses are standardised estimates.

For primary psychopathy and with regard to sibling relationship variables, only more intense inter-sibling conflicts were able to uniquely predict higher levels of primary psychopathy. The unique effect of conflict remained significant even after introducing parenting variables. Moreover, with the introduction of parenting variables, parental partiality also became a significant predictor, with

Table 3 Sibling relationship variables and parenting variables regressed on dark personality traits; results of hierarchical multiple linear regressions

		Primary psychopathy		Secondary psychopathy		Vulnerable narcissism		Borderline PD	
		β	p	β	p	β	p	β	p
Sibling Relationship (Model 1)	Sex ^a	-0.242	0.308	-0.129	0.594	-0.296	0.221	-0.334	0.148
	Closeness	0.021	0.834	-0.035	0.730	-0.020	0.846	-0.031	0.749
	Conflict	0.245	0.012*	0.125	0.204	0.169	0.085	0.202	0.032*
	Parental partiality	0.160	0.100	-0.131	0.190	-0.098	0.318	-0.269	0.005*
R ² (p)		0.092 (0.036*)		0.043 (0.329)		0.057 (0.182)		0.144 (0.002*)	
Sibling Relationship + Perceived parenting (Model 2)	Sex ^a	-0.232	0.335	-0.051	0.846	-0.207	0.404	-0.310	0.201
	Closeness	0.127	0.275	0.016	0.902	0.006	0.958	0.005	0.967
	Conflict	0.190	0.048*	0.120	0.248	0.123	0.212	0.175	0.070
	Parental partiality	0.333	0.010*	-0.118	0.398	0.037	0.782	-0.156	0.226
	Paternal rejection	0.119	0.441	0.052	0.757	0.199	0.215	0.011	0.946
	Paternal overprotection	-.248	0.035*	-0.084	0.507	-0.022	0.853	0.102	0.385
	Paternal emotional warmth	0.126	0.429	0.087	0.615	0.128	0.437	0.017	0.916
	Maternal rejection	0.236	0.140	-0.099	0.568	-0.086	0.600	0.046	0.774
	Maternal overprotection	0.080	0.514	0.131	0.329	0.320	0.013*	0.131	0.291
Maternal emotional warmth	-0.210	0.163	-0.180	0.271	-0.152	0.328	-0.126	0.405	
ΔR^2 (p)		0.210 (0.007*)		0.060 (0.781)		0.154 (0.070)		0.200 (0.011*)	

*Values are significant on a < 0.05 level

^aCalculation of standard estimates is based on a female-male contrast: negative β values mean that being a male predicts higher scores of the trait

parents' favouring of a sibling predicting higher levels of primary psychopathy. Lack of paternal overprotectiveness had a unique predictive power for primary psychopathy. In line with the results of correlations, both inter-sibling conflicts and parental partiality uniquely predicted borderline personality organisation.

Discussion

The results of the correlational analyses showed that those who reported more inter-sibling conflicts – retrospectively, about their childhood – reported higher levels of primary psychopathy. This result is in line with Hyp. 8 and the findings of Bank and Reid (1996) who found that maladaptive sibling relationships were linked to increased aggressive behaviour. In contrast with our assumptions (Hyp. 7 and 8), secondary psychopathy was independent from the measured aspects of family relationships. Although secondary psychopathy is conceived of as being highly affected by environmental factors such as traumatic experiences (Tatar et al., 2012), results are contradictory. For example, Blanchard and Lyons (2016) found no effect of parental factors on secondary psychopathy either for men or for women. Participants who reported that their mothers rejected and overprotected them frequently in their childhood scored higher on vulnerable narcissism. Both overprotection (Yaffe, 2020) and rejection (Aunola & Nurmi, 2005) are inversely related to self-esteem. In individuals with decreased self-esteem, vulnerable narcissism emerges as a compensation for their decreased self-worth (Horton et al., 2006). Those who reported that their parents favoured their siblings over them in childhood, and had more conflicts with their siblings, identified themselves more with borderline personality organisation. Parental dispreference could contribute to an unstable and low self-esteem, a main characteristic of borderline individuals (Zeigler-Hill & Abraham, 2006). Conflict-laden sibling relationships on the other hand could prevent these individuals, who show elevated levels of borderline personality organisation as adults, to use sibling relationships as buffers against harmful parental impacts (Michalski & Euler, 2007). Higher intensity of borderline personality organisation was reported also by individuals who saw their parents (both fathers and mothers) as more rejecting and overprotective, and who saw their mothers as having been less affectionate towards them. This is not surprising knowing that individuals with borderline traits have severe problems in regulating interpersonal distance. When they move closer to others, they fear that they will be dominated; when they move away, they fear that they will be abandoned (Melges & Swartz, 1989). This is analogous to having parents who are rejecting and overprotective at the same time.

General discussion

In this series of studies we aimed to reveal associations between dark personality traits and sibling relations. As the majority of previous studies, which focused on the development of dark traits, assessed childhood relations with parents, we incorporated questionnaires on this as well in two of the studies. The three studies we conducted have partly confirmed our main assumptions. Most importantly, the results suggest that relationships both with siblings and with parents stay in association with dark traits. Specifically, conflicts and closeness between siblings may play a role in the emergence of Machiavellianism and psychopathy. Similarly, paternal partiality towards the other sibling may also contribute to the development of psychopathic traits. An emotionally warm, overly permissive family atmosphere can promote narcissistic traits, while cold and dismissive parenting can promote psychopathy. Overall, the results point to the connection between childhood parental behaviour and sibling relationships, and the emergence of Dark Triad and Vulnerable Dark Triad personality traits.

In our first study, the hypotheses focused on the factors of sibling relationships. After analysing the data and summarising the results, we concluded that it would be worthwhile to look at the effects of parents' behaviour towards their children in addition to the quality of the sibling relationship, so that we could get a more complex picture of family effects on the emergence of the personality traits under investigation. For this reason, in our next study, in addition to the questions on sibling relationship quality, we included a set of questions measuring parental treatment. Comparing the results of the two studies, several factors emerged that both analyses found to be associated with individual members of the Dark Triad. In the majority of our studies, some dimensions of sibling conflict, parental bias, and parental treatment were found to be associated in some way with the emergence of Dark Triad and Vulnerable Dark Triad personality traits. A comparison of the results across the three studies is summarised in Table 4.

The correlations of Study 2 supported the findings of Study 1 about the possible connection between the development of narcissism and parental behaviour. However, the incorporation of parental rearing style in the study on an adolescent sample caused a slight contradiction. Beside parental favouritism towards the sibling being a significant factor, an emotionally warm parental environment also stays in association with the occurrence of narcissistic traits. The contradiction might be resolved by taking into account that more developmental trajectories could lead to similar behaviours. For instance, unconditional positive parental feedback could lead to narcissism (Horton et al., 2006). However, it was also found that narcissism, at least

Table 4 A simplified overview of the results based on the regression analyses. Only the direction of the significant relation is shown

DT traits measured	SRQ				EMBU			
	Closeness		Conflict		Parental partiality ^a	Rejection	Overprotection	Emotional warmth
Study 1								
Machiavellianism	-		+					
Narcissism					-			
Psychopathy			+					
Study 2	Model	1	2	1	2	1	2	
Machiavellianism		-	-					+ (p), - (m)
Narcissism				+		- (m)		+ (p)
Psychopathy		-		+	+			- (m)
Study 3	Model	1	2	1	2	1	2	
Primary psychopathy				+	+	+		- (p)
Secondary psychopathy								
Vulnerable narcissism								+ (m)
Borderline PD				+		-		

Maternal (m) and paternal (p) effects are marked in brackets

^aNegative correlations with parental partiality mean that the more supportive parents were towards the sibling and less towards the participant, the higher participants scored on the dark traits

the vulnerable form of it, was associated with both harsh parenting (Horton et al., 2006) and inconsistent discipline (Mechanic & Barry, 2015). There are also studies suggesting that if children perceive unequal treatment from their parents, their relationship might become overwhelmed by conflicts (Barrett Singer & Weinstein, 2000). According to Kernberg (1985), parental rejection and coldness may be behind narcissism, while Kohut (1972) sees the lack of parental approval as a major cause of the emergence of narcissistic traits. In the latter framework, discriminatory parental behaviour may result in an environment where the child feels less important compared to their siblings, which may even create a sense of parental rejection. The negative feedback and lack of recognition from the environment, accompanied by the constant competition with the sibling, may lead to feelings of worthlessness, and the child might develop narcissistic behavioural strategies to compensate.

Our findings on narcissism are also close to Millon's (2004) approach which is based on learning theory. He suggests that parental overvaluation might be responsible for the emergence of narcissistic behaviour. Excessive positive parental feedback leads to the development of false illusions in the child, which later leads to conflict with the external world. Narcissistic strategies are developed to resist negative stimuli from the environment and to protect the self. Similar to Millon's idea, our results suggest that an emotionally warm, overly permissive parental attitude can lead to the emergence of narcissistic traits.

The analysis of the effects of parental treatment has been part of all three studies, though the first one investigated this

from the perspective of sibling relation only. Study 2 found that a dismissive, cold maternal attitude can be favourable for psychopathic behaviour, while a warm, overly permissive family climate can be favourable for the development of narcissistic behavioural strategies. The findings on the Vulnerable Dark Triad suggest that both vulnerable narcissism and borderline personality disorder may reflect a childhood family environment where both rejecting and overprotective attitudes were present in parental behaviour. However, the later results were obtained with correlational analyses. More sophisticated regression models were unable to confirm these. Therefore, the relation between borderline personality organisation and parenting behaviour still needs to be investigated further.

Several studies have reported that conflict between siblings may play a role in the development of Machiavellianism and psychopathy. The findings of Láng & Birkás (2014) showed that families of Machiavellians are characterised by a lack of stable ties and clear rules, and poor communication between family members. Our findings on sibling conflict fit into this notion, as increasing conflict between siblings can lead to siblings becoming distant from each other, resulting in a less secure environment. In addition, frequent conflict can imply poor communication, as problems that arise are not discussed, thus conflict between children is not resolved. In the context of psychopathy, a number of authors (Ali et al., 2009; Hare, 1999; Karpman, 1941; Mealey, 1995a, b; Newberry, 2016; Paulhus & Williams, 2002; Porter, 1996) have pointed out that the defining characteristics of psychopathic traits are aggressive, hostile, and impulsive behaviour.

Interpreting our research findings, we can view childhood conflicts as environmental influences that may play a role in the emergence and reinforcement of these aggressive and hostile behavioural strategies (Moreira et al., 2020). However, we cannot ignore the possibility that the reverse is true, that children with psychopathic traits are more likely to be in conflict with their siblings because of their impulsive, aggressive, and hostile behaviour than their less aggressive and hostile peers.

Our findings on the role of parental partiality suggest that beside narcissism it may be linked to another member of the Dark Triad as well. More specifically, parental favouritism towards another sibling may facilitate the emergence of psychopathic traits. However, this result is not consistent across the studies: we were only able to capture this relation in Study 3 when the LSRP questionnaire – that measures primary and secondary psychopathy separately – was used. Though it is tempting to explain these results in the framework theorised by Porter (1996) who suggested that secondary psychopathy is an acquired emotional deficit, we did not find any significant association with secondary psychopathy. Quite the opposite, a reversed causal relationship may explain the connection between parental partiality and primary psychopathy better: if the parents sense their child's psychopathic traits they may develop discriminatory behaviour as a result.

In general, the results of the studies examining the relationship between parental treatment and the Dark Triad personality traits suggest that both parental rejection and the emotional climate of the family may be related to the individual members of the Dark Triad. Psychopathy may occur in a dismissive, emotionally neglectful climate, while narcissism may develop as a result of emotionally warm, overly permissive parental attitudes. This idea fits into the theoretical framework presented earlier, in which several authors report similar findings. In relation to the development of psychopathy, several authors (Karpman, 1955; Láng, 2016; Mealey, 1995a, b; Moreira et al., 2020; Porter, 1996) take the view that parental neglect, abuse, and childhood trauma may play a role in the development of these traits. However, we should not forget that we have not addressed the direction of causality, so it is possible that the child's personality traits shape parental attitudes, rather than the other way around.

As an extension of our findings on the development of the Dark Triad, in Study 3 we continued our research on the topic of the Vulnerable Dark Triad. Based on our previous studies and the similarities between the two triads, we proposed that family factors associated with the Dark Triad may also play a role in the emergence of VDT members. For this reason, we investigated the role of sibling conflict, parental partiality, and parental treatment on the emergence of the Vulnerable Dark Triad. The results of the analyses showed that both sibling conflict and parental discriminatory

attitudes were related to primary psychopathy and borderline personality organization. However, when sibling relationship and parenting variables were regressed on the scale that measures vulnerable narcissism, the model showed only a nonsignificant tendency, with a significant effect of maternal overprotection. This result is not conclusive in respect of whether overprotective parental behaviour may contribute to the development of vulnerable narcissism. In Kohut's (1972) approach, inappropriate parental behaviour and lack of recognition may damage the grandiose part of the child's self, to which they may respond with repression or compensatory grandiose behaviour as a solution. The consequences of repression may include low self-esteem, depressed mood, avoidant attitudes, and anxious attachment, which are characteristics of vulnerable narcissism as described by Pincus (Pincus et al., 2009). This framework also suggests that parental attitudes experienced by the child may create a sense of insecurity and inadequacy. Correlational data show that some connection between high levels of parental rejection and vulnerable narcissism may exist as well, but this needs further elaboration. Besides, as a note of caution, we would like to emphasise the importance of theoretical differentiation of grandiose and vulnerable narcissism, which is also highlighted by the fact that the few significant results with the latter pointed to the opposite direction.

The development of borderline personality disorder may be underpinned by a conflictual relationship with parents, an emotionally distant attitude and a cold family atmosphere (Zanarini et al., 1997). Accordingly, our results show that parental rejection and controlling behaviour, often resulting in intra-familial conflict, are correlated with borderline personality disorder. The positive association of conflicts with siblings and borderline personality organisation underpins the assumption that family environment may contribute to the development of the latter trait (Bornovalova et al., 2009; Ntshingila et al., 2021; Winsper et al., 2017; Zanarini et al., 1997).

Limitations

It is worth mentioning a few factors that may have influenced the results obtained. The problem of causality in the study has been briefly discussed earlier. We interpreted the results as indicating that several family factors may influence the emergence of the Dark Triad and the Vulnerable Dark Triad. However, there is also the possibility that the child's personality traits shape the parent-child relationship and the relationship between siblings. In this vein, the child's behavioural strategies (e.g. narcissistic, manipulative, etc.) may trigger the parents' behaviour towards the child or the conflicts between siblings. Furthermore, specific perceptual and memory biases related to dark personality traits could have

affected their perceptions and recollections of the quality of their relationships (e.g., Morgan, 2010). Another influencing factor is the interaction between parental treatment and sibling relationships. Parental behaviour can affect the relationship between siblings and sibling relationships can also shape parents' behaviour towards their children. This causality and interaction were not explored in depth in the current research and may have biased the results. In addition to these shortcomings, it is worth noting that many of the subjects in the study reported having siblings who were not of similar age, but significantly younger or older. The study may have included siblings who did not live together during childhood, so that their influence in the child's personality development is not decisive. However, in Study 1 when age difference between siblings was controlled for, the introduction of this variable did not increase the explanatory power of the model.

The homogeneity of the study sample may also be a limitation. Data collection was carried out online. The questionnaires were posted on social networking sites, which resulted in a majority of the subjects being friends and acquaintances of the authors. For this reason, in respect of socioeconomic status, the sample is presumably rather homogeneous and the results obtained may not hold for a heterogeneous sample. Social desirability was not measured either. Future research should amend these limitations.

In the three studies we used similarly built hierarchical regression models to keep the studies comparable. However, in each of the studies there were several variables which could be linked to DT and VDT traits, such as birth order, age difference, sex of the sibling, and number of siblings. Incorporating these variables into the models – with the only exception of the effect of sibling's sex on psychopathy – did not change the inferences that can be drawn. Still, as the focus of our studies were not on these demographic variables, we cannot fully exclude their potential contribution to the development of dark personalities.

Conclusions

In this paper, we have tried to show the importance of the role of family influences in shaping personality, focusing on the Dark Triad and the Vulnerable Dark Triad traits. To this end, we have summarised the results of our three research studies on this topic, which have produced findings both consistent with and contradictory to the ideas and approaches presented in the theoretical background. We would like to highlight those that are consistent across our research:

- Conflicts and closeness between siblings may play a role in the emergence of Machiavellianism or psychopathy.

- Bias towards the other sibling may contribute to the development of psychopathic traits.
- An emotionally warm, overly permissive family atmosphere can promote narcissistic traits, while cold and dismissive parenting can promote psychopathy.

Overall, the results point to the important role of childhood parental behaviour and sibling relationships in the emergence of Dark Triad and Vulnerable Dark Triad personality traits, and may provide a new perspective for future research. As a general conclusion we might infer that an emotionally negative family environment is associated with undesirable personality traits. Though the development of these traits might be adaptive within the specific family, at later life stages they are likely to be judged as socially harmful. It would be worthwhile to continue the studies in light of the mentioned limitations and gaps, in which the interactions between parenting attitudes and sibling relationship quality could be analysed. In addition, studying the possible causal relationship of the variables would be of great importance in further research, providing feedback on whether family influences shape the child's personality or whether the child's personality traits play a role in shaping family behavioural patterns.

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Author contributions Petra Gyuris, Andars Lang, and Tas Ferencz conceived the study design. Tas Ferencz and Ferenc Kocsor wrote the first draft of the manuscript. Tas Ferencz, Ferenc Kocsor and Andras Lang discussed the statistical analyses, Andras Lang and Tas Ferencz carried out the analyses. Tas Ferencz made the data collection, Tas Ferencz and Ferenc Kocsor contributed to data processing. Petra Gyuris, Andras Lang, Ferenc Kocsor and Luca Kozma helped prepare the final version of the manuscript, Ferenc Kocsor finalized the layout and Luca Kozma proof-read the manuscript.

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The research plan was approved by the United Ethical Review Committee for Research in Psychology, Hungary, reference number 2016/072. (Declaration moved here from the Declarations and statements section for blind review.)

Data availability The datasets generated during and/or analysed during the current study are available in the OSF repository, https://osf.io/m5cy6/?view_only=9d8613266fdf4e9c9b033239818c850b.

Declarations

The research was made in accord with the Declaration of Helsinki. The participants above 18 years provided their written informed consent

to participate in this study. Parents of the participants below 18 years provided their consent for the participation of their children.

Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

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