Human Nature (2021) 32:387–405
https://doi.org/10.1007/s12110-021-09396-7

Parental Investment Is Biased toward Children Named for Their Fathers

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Accepted: 5 April 2021 / Published online: 6 July 2021

Abstract

Namesaking (naming a child after a parent or other relative) can be viewed as a mechanism to increase perceived parent-child similarity and, consequently, parental investment. Male and, to a lesser extent, firstborn children are more frequently namesakes than female and later-born children, respectively. However, a direct link between namesaking and parental investment has not been examined. In the present study, 632 participants (98 men and 534 women) from Central Europe indicated their first name, sex, birth order, number of siblings, sexual orientation, socioeconomic status, paternal and maternal first names, as well as relationship quality with, and time and financial investment they received from, both parents during childhood. Mixed-effects models revealed associations between namesaking and parental investment. However, the effect of namesaking often appeared significant only in interaction with specific predictors, such as sex and primogeniture. It suggests instead that namesaking has an additive effect—it enhances the effect of biological factors on parental investment. In general, we found evidence for the bias in parental investment linked to name similarity among both parents, and support for the hypothesis that namesaking serves as a mechanism to increase paternity confidence and, thus, paternal investment. The effect of namesaking influences only certain types of parental investment—namely, those at the level of relationship quality. In addition, nonheterosexual orientation was the strongest negative predictor of paternal investment. Our study extends the research on parental investment by showing that cultural mechanisms, such as namesaking, can also exert some influence on parental rearing behavior.

Keywords Namesake · Name similarity bias · Parental investment · Paternity uncertainty · Relationship quality · Sexual orientation

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In humans, homophily, or the preference for people similar to oneself, is systematically found across various contexts, including mating and social networks (Luo, 2017; McPherson et al., 2001; Nojo et al., 2012) in most studied populations (Smits et al., 2000; Štěrbová et al., 2017) and across time (Schwartz & Graff, 2009). Tendencies for homophily are also observed at the level of attitudes (Bacon et al., 2014) and behavior (Rhule-Louie & McMahon, 2007), suggesting that this widespread phenomenon is relatively strong and influential (Štěrbová & Valentová, 2012).

Name similarity bias—showing a preference for similar names (Howard & Kerin, 2011)—can be a manifestation of homophily. For instance, a political candidate having a familiar or similar name has a positive influence on voting preference (Cialdini, 1993; Dubois, 1979). In experimental settings, when told to evaluate student resumes, participants spent more time reviewing, showed greater information recall, and gave more favorable evaluations to resumes of students with names similar to their own (Howard & Kerin, 2011). Not only are people more attracted to those whose names resemble their own, they are disproportionately more likely to be married to people with a similar first or last name (Jones et al., 2004). People clearly show more positive attitudes toward individuals with names similar to their own.

In a family context, the custom of naming a child after a parent or other relative is not uncommon. This phenomenon is called "namesaking," and it can be viewed as a mechanism that increases perceived parent–child similarity (Bird & McAndrew, 2019; McAndrew et al., 2002). In general, the assignation of a name can have profound social implications for an individual (e.g., how a newborn is integrated into a broader kinship network; Gutman, 1977; Rossi, 1965; Smith, 1977). This practice is a common feature across human societies (Henrich, 2016). For example, among the Ju/'hoansi hunter-gatherers, newborns are named after their grandparents, which, as the Ju/'hoansi believe, creates a special bond between them and helps to carry on the essence of their grandparents (Draper & Haney, 2005). This act connects a paternal line to the newborn (Henrich, 2016). Moreover, namesaking extends beyond genetic kin. For example, the Ju/'hoansi commonly assign *xaro* trading partners based on a name relationship, which widens the network of cooperation to distantly related (e.g., affinal) kin (Wiessner, 2002). In Christian tradition, children are often baptized with the names of their godparents, who may be (but are not necessarily) relatives. Overall, the practice of namesaking may have not only symbolic but also functional significance (McAndrew et al., 2002; Obasi, 2016).

Human males, on average, provide considerably more care (in the form of resource provision and/or direct interaction) to their offspring than males of any other ape species (Bjorklund & Shackelford, 1999; Marlowe, 2000; Puts, 2010). Still, the minimal obligatory investment in reproduction and care is significantly lower in men than in women (Geary, 2000; Hewlett, 2017; Marlowe, 2000). The amount of parental investment depends on the genetic relatedness between the offspring and the parent (Wilson & Daly, 1992). Thus, a universal cue enhancing parental investment can be the degree of phenotypic resemblance between the parent and its offspring (Apicella & Marlowe, 2004, 2007; Prokop et al., 2010), because individuals sharing the same alleles show stronger mutual phenotypic similarity. An accurate assessment of paternity is particularly important for mammalian

males since fertilization is internal, eggs develop inside of the female reproductive tract, and paternity certainty is low (Clutton-Brock & Isvaran, 2006; Goetz & Shackelford, 2009).

Research has shown a stronger bias toward emphasizing the paternal rather than maternal resemblance of newborns (Daly & Wilson, 1982; McLain et al., 2000; Regalski & Gaulin, 1993). In a hypothetical adoption scenario, men placed greater importance on infant resemblance than on any other facial cues (e.g., health, cuteness), and indeed, resemblance played a more prominent role in the adoption preferences of men in comparison to those of women (Volk & Quinsey, 2002). Since adopted children are not genetically related to their foster parents, it can be expected that namesaking would be more prevalent among adopted than among biological children. Indeed, in a study using a sample of 96 adoptive and 104 nonadoptive families, Johnson et al. (1991) found that adopted children were significantly more often namesakes than biological children (76% vs. 48%, respectively). Lastly, emphasizing paternal resemblance and concerns about choosing the father's name for the child are more prevalent among mothers and other maternal relatives than among fathers and paternal relatives (Daly & Wilson, 1982; Furstenberg & Talvitie, 1980; Levine & Willis, 1994). This suggests that namesaking can be considered a cultural mechanism increasing perception of similarity and subsequently paternity confidence, which, in turn, may secure paternal investment (Daly & Wilson, 1982; Gutman, 1977; Henrich, 2016; Johnson et al., 1991; McAndrew et al., 2002).

Studies investigating namesaking practices across populations (predominantly Western) have revealed several consistent patterns. There is a persistent sex bias in namesaking, which usually takes two forms. Firstly, male children are more often namesakes than female children (Furstenberg & Talvitie, 1980; Johnson et al., 1991; McAndrew et al., 2002; Rossi, 1965; Smith, 1977). Secondly, these children are more frequently named after a patrilineal than a matrilineal relative (Gutman, 1977; Johnson et al., 1991; McAndrew et al., 2002; Obasi, 2016; Rossi, 1965). In addition, a same-sex bias in namesaking also occurs: males are more commonly named after a paternal relative; females, after a maternal relative (McAndrew et al., 2002; Rossi, 1965). Interestingly, adopted male and female children are equally likely to be named after paternal or maternal relatives (Johnson et al., 1991).

Birth order has also been shown to influence namesaking patterns, but the associations are weaker. Several studies reported that firstborn males are more often named after either parent than later-born males (McAndrew et al., 2002; Smith, 1977). On the other hand, Rossi (1965) found comparable proportions of firstborn son (78%) and firstborn daughter (61%) namesakes among a sample of middle-class families, and Obasi (2016) did not find any difference in the proportions of firstborn son or daughter namesakes in rural Nebraska. Interestingly, McAndrew et al. (2002) observed that second-born children were more frequently namesakes when the firstborn child was female, suggesting that namesaking decisions may be more strongly influenced by sex than by birth order.

Finally, many factors contribute to the variability in parental investment, critical for the survival of children. Thus, sources of this variability need to be thoroughly studied. Besides biological and psychological mechanisms, cultural mechanisms may be expected to modulate parental investment as well. Namesaking could be

one of such mechanisms. However, while the existence of a functional link between namesaking and parental investment is highly intuitive, there is very little research on this topic (e.g., Furstenberg & Talvitie, 1980), and inferences about such a link are rather anecdotal. In this paper, we therefore investigate whether there is a direct association between namesaking and parental investment. Our predictions were (i) that we would find a stronger association of namesaking with sex rather than with birth-order, in concordance with the existing research; (ii) that the effect of namesaking on parental investment will remain significant even after controlling for the effects of sex, birth order, or socioeconomic status; and (iii) that namesaking will have a greater influence on paternal than maternal investment.

Material and Methods

Procedure

The study was administrated online using the *Qualtrics* platform in the form of a questionnaire. Prior to undertaking the online questionnaire, participants were provided with a brief overview of the research. They were informed that the main aim of the study was to investigate the influence of socioeconomic and cultural factors on family relationships. After providing informed consent, participants were asked to indicate their first name, their parents' first names, their own age, sex, birth order, and sexual orientation, the age until which they lived with both parents in the common household (i.e., biparental upbringing only), socioeconomic status, and parental investment. Completing the online questionnaire took approximately 10 min.

Participants

The initial sample consisted of 1090 participants, of whom 235 provided insufficient information and were therefore excluded. We further excluded participants who did not meet the criterion of biparental upbringing until at least 15 years of age (e.g., because of divorce). The final sample thus consisted of 632 participants, of whom 534 were women ($M_{age} = 29.49$, $SD_{age} = 8.96$) and 98 were men ($M_{age} = 31.41$, $SD_{age} = 10.05$). Participants were from Central Europe—namely, the Czech Republic ($N = 440$) and Slovakia ($N = 192$). Given the close historical, political, cultural, and geographical proximity between these two countries (formerly known as Czechoslovakia; for a general comparison, see www.indexmundi.com/factbook/compare/czech-republic.slovakia), data were considered as one sample. Volunteer participants were recruited via social media advertisements and from mailing lists of participants established in previous studies (Štěrbová et al., 2017).

Parental Investment

Firstly, we assessed the quality of the relationship with parents during childhood using s-EMBU (Egna Minnen Beträffande Uppofostran; Arrindell et al., 1999).

s-EMBU is one of the most widely utilized tools for the assessment of adults' memories of their parents' rearing behavior. The s-EMBU consists of 23 items and includes three scales: protection, rejection, and emotional warmth. Responses are indicated on a 4-point Likert-type scale ranging from *1 = No, never* to *4 = Yes, most of the time*. Participants were asked to rate each parent's behavior separately. For the Slovak sample, we used the Slovak version of s-EMBU (Poliaková et al., 2007) and for the Czech sample, we translated the questionnaire into the Czech language.

Secondly, participants were asked to rate the overall quality of the relationship with their mother and father, respectively, during childhood on a 7-point Likert-type scale ranging from *1 = Absolutely negative* to *7 = Absolutely positive*.

Thirdly, participants were asked to provide information on the amount of financial support that was given to them by each parent (e.g., buying clothes, toys, books, pocket money) and the amount of time each parent spent with them (e.g., assistance with studying, playing, free time activities) during their childhood. For both measures, participants indicated their responses on a 5-point Likert-type scale ranging from *1 = Very much* to *5 = Very little*. The latter question has also been used in previous research (Apicella & Marlowe, 2004, 2007). For more information about the response variables, see Table S1 in the Electronic Supplementary Material (ESM).

Namesaking and Covariates

We asked participants to provide their and their parents' first names. Namesaking was coded as a binary variable: identical names ($N = 95$) or nonidentical names ($N = 537$). Of 95 namesakes, 44 had names that were identical to their father's name and 51 had names that were identical to their mother's name. Although first names are commonly sex-typical, a nonnegligible proportion of names has an analog in both sexes: for example, Gabriel (♂)/Gabriela (♀), Jan (♂)/Jana (♀). In our sample, there are both males and females among paternal (male = 27, female = 17) and maternal namesakes (male = 2, female = 49) (Fig. 1b and c).

Regarding the covariates, participants were asked to report their sex and year of birth, as well as those of each of their siblings. From the latter question, we derived three additional covariates: number of children in the family, birth order, and whether a participant was firstborn (hereafter, primogeniture). Birth order was later removed from the analyses (see "Statistical Procedure"). The socioeconomic status of the family during childhood (up to 15 years of age) was indicated on a 5-point scale ranging from *1 = Much better than average in the country* to *5 = Much worse than average in the country*. Originally, we considered assessing the socioeconomic status by income. However, both countries experienced a significant economic and political transition in the twentieth century (from collectivistic to capitalistic economy in the 1990s), which affected the total income and also the currency and its value. For this reason, the income of participants born and raised during the collectivistic economy era and that of those born during the capitalistic economy were not

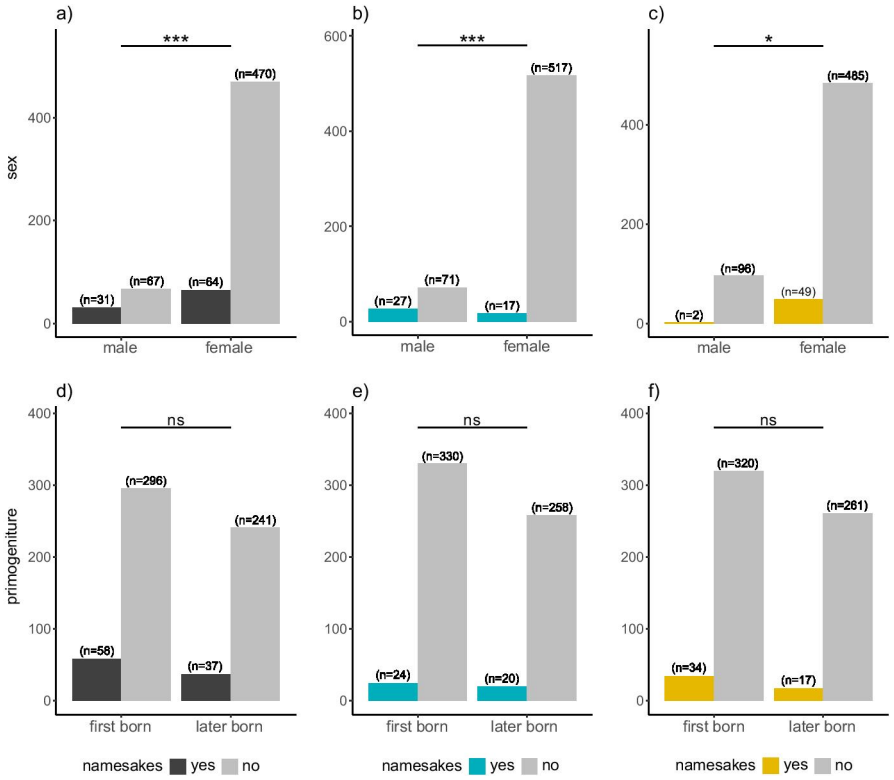

Fig. 1 Frequencies of general namesakes (**a**, **d**), paternal namesakes (**b**, **e**), and maternal namesakes (**c**, **f**) across sex (top row) and primogeniture (bottom row). Asterisks indicate significant differences at * < 0.05, ** < 0.01, *** < 0.001; "ns" is nonsignificant. *P*-values are based on the χ^2 test (see "Results")

comparable. Therefore, we decided to employ a subjective assessment of socioeconomic status (Quon & McGrath, 2014).

Participants also reported their level of education, as well as that of both their parents, on a 4-point scale ranging from *1 = Primary school* to *4 = University*. Sexual orientation was indicated on a 7-point Kinsey scale ranging from *0 = Exclusively heterosexual* to *6 = Exclusively homosexual* (Kinsey et al., 1948). Individuals who identified themselves in the range 0–2 were considered heterosexual, and those who identified as 3–6 were considered nonheterosexual ($N = 46$).

Overall, we considered six measures of parental investment for each parent: the three s-EMBU scales (protection, rejection, and emotional warmth), overall relationship quality, financial investment, and time investment during childhood. The other measurements (paternal and maternal namesakes, sex, birth order, sexual orientation, and socioeconomic status) were used as predictor variables. For more information on the measurements and coding of the predictor variables, see Table S1.

Statistical Procedure

Imputation of Missing Values Complete-case deletion of missing data can lead to biased parameter estimates and standard errors (Penone et al., 2014). Thus, we decided to impute missing values in our sample by utilizing a random forest method, a type of machine learning mechanism, implemented in the R package *missForest* (Stekhoven & Bühlmann, 2012). The iterative random forest algorithm predicts missing values by averaging over classification or regression trees until the difference between the newly imputed dataset and the previous one starts to increase. This method is especially suitable for categorical data. The imputation accuracy of this method does not depend on the number of missing values or autocorrelation among input variables. We thus favored random forest instead of the complete-case approach with the aim of maximizing the information value in our data.

Mixed-Effects Models To evaluate findings of previous research about nonrandom associations of namesakes with sex and birth-order in our sample, we used a Chi-square (χ^2) test of independence (Fig. 1, Table S2). For our main predictions (see above), we proceeded in the following steps.

All s-EMBU parental investment response variables (i.e., protection, rejection, and emotional warmth of both parents) represent sums of scores of several items and were treated as continuous. To model parental investment based on s-EMBU, we used linear and generalized linear mixed-effects models (LMM/GLMM) implemented in the R package *lme4* (Bates et al., 2015). For protection and emotional warmth of both father and mother, Gaussian error distribution was assumed. For rejection of the father and rejection of the mother, we assumed Gamma error distribution since probability of rejection peaks at lower values and decreases with increasing values of rejection.

The remaining parental investment response variables (relationship quality, financial investment and time investment of father and mother) are ordinal variables on 7-point and 5-point scales, respectively (Table S1). To model these variables, we used cumulative link (mixed) models (CLMM), which are ordinal logistic regression models, implemented in the R package *ordinal* (Christensen, 2011, 2019). In all CLMM, we used a canonical logit link function and assumed that the odds are proportional across all response categories. Coefficients of such models are thus on the logit scale and are interpreted in terms of log odds.

Because of potential influence of socioeconomic conditions on the variation in parental investment (Matijasevich et al., 2012; Sparks, 2011; Vázquez-Vázquez et al., 2013), we accounted for the random effects of socioeconomic status and parental education. However, in most models, the estimated variance in education of both parents was essentially zero, and thus, only the random effect of the socioeconomic status was included.

For each parental investment response variable, we fitted one model of the same structure. To ensure that the estimates were not correlated, we evaluated potential collinearity among predictors by assessing variance inflation factors (VIFs) on each model, with levels > 3 considered as evidence of collinearity. The only predictor that was found to be collinear with other predictors, particularly primogeniture, was birth

order (VIFs ~ 4). Therefore, birth order was removed from further analyses. Next, we tested whether there are interaction effects between paternal or maternal namesakes and sex or primogeniture status of the participant. Goodness-of-fit of the models with and without one of the four possible interactions was assessed by a Likelihood Ratio Test. Only those interactions that significantly improved the fit of a given model were considered.

Lastly, LMM in the package *lme4* does not provide conventional null hypotheses tests of model coefficients. Thus, *p*-values for the *t*-statistics were obtained using the Kenward-Roger method for computing degrees of freedom (Kenward & Roger, 1997) implemented in the R package *lmerTest* (Kuznetsova et al., 2017). In order to account for the uncertainty in our estimates, we computed 95% confidence intervals (CI) for each regression parameter. All the analyses and figures were carried out in the R statistical software (R Development Core Team, 2013).

Results

Namesaking Frequency

Analysis of the frequency of namesaking showed that males were significantly more often namesakes than females ($\chi^2 = 23.51$, $p < 0.001$), with no association between namesakes and primogeniture ($\chi^2 = 0.92$, $p = 0.33$). Males were significantly more often paternal namesakes than females ($\chi^2 = 72.19$, $p < 0.001$), whereas there was no effect of firstborns on the frequency of paternal namesaking ($\chi^2 = 0.002$, $p = 0.96$). Similarly, females were significantly more likely to be maternal namesakes than males ($\chi^2 = 4.76$, $p = 0.02$), with, again, no effect of firstborns on the frequency of maternal namesaking ($\chi^2 = 2.10$, $p = 0.14$) (Fig. 1, Table S2). Our results indicate that sex plays a more important role in namesaking, in contrast to primogeniture, which has virtually no effect.

Paternal Investment

Among all predictors, paternal namesakes showed the strongest effect on father's protection, whereas there was no association between father's protection and maternal namesakes. Being a firstborn also had a significant positive effect on father's protection. Although there was no association between paternal namesakes and father's rejection, maternal namesakes reported significantly higher paternal rejection. The strongest predictor of father's rejection, however, was nonheterosexual orientation, with nonheterosexual children reporting significantly higher rejection. Neither paternal nor maternal namesakes were associated with father's emotional warmth. However, nonheterosexual orientation was, again, significantly negatively associated with father's emotional warmth. On the other hand, overall quality of the relationship with the father was best predicted by paternal namesakes in interaction with sex and firstborns. That is, a better relationship quality with the father was reported

by male paternal namesakes than female paternal namesakes, and later-born paternal namesakes reported a better relationship with their father than firstborn paternal namesakes. Being a maternal namesake had a negative but nonsignificant effect on relationship quality with the father. Again, nonheterosexual participants indicated a significantly worse relationship quality with their father than heterosexuals. With respect to financial investment, both paternal and maternal namesakes showed negative but nonsignificant associations. The same was found for time investment, with both paternal and maternal namesakes having negative nonsignificant effects. However, father's time investment was significantly negatively associated with nonheterosexual orientation (Table 1, Fig. 2, Table S3).

Maternal Investment

Both paternal and maternal namesakes had a positive but nonsignificant effect on mother's protection. However, we did find a significant positive effect of primogeniture on mother's protection. Regarding mother's rejection, there was a significant interaction effect between paternal namesakes and the sex of the participant, showing that mother's rejection increased only for female paternal namesakes, whereas it decreased for male paternal namesakes. Firstborns also showed increased rejection by the mother. The strongest predictor of mother's emotional warmth was maternal namesakes. However, a strong interaction effect with the sex of the participant showed that this effect holds only for female maternal namesakes; it sharply decreased for male maternal namesakes. Paternal namesakes also showed a negative but nonsignificant effect on mother's emotional warmth. On the other hand, paternal namesakes were strongly associated with overall quality of the relationship with the mother. Again, however, we found a significant interaction with the sex of the participant, which revealed that the odds of having a better relationship with the mother increased for male paternal namesakes, whereas the opposite was true for female paternal namesakes. Similarly, we found significant interaction effect between maternal namesakes and primogeniture. That is, the odds of having a better relationship with the mother increased for firstborn maternal namesakes, whereas it decreased for later-born maternal namesakes. Regarding financial support, as in the case of the father, there was no effect of paternal or maternal namesakes on mother's financial support. Instead, we found that the only significant predictor of mother's financial support was number of children in the family, whereby mother's financial support per child decreased with increasing number of children in the family. Lastly, mother's time allocation does not seem to be influenced by either paternal or maternal namesakes (Table 2, Fig. 2, Table S4).

Discussion

Our study investigated whether there is a direct association between the cultural practice of namesaking and parental investment whilst controlling for the possible covariate effects of sex, primogeniture, number of children in the family, sexual

Table 1 Estimated regression effects of namesaking, sex, primogeniture, number of children, and sexual orientation on paternal investment

	Protection	Rejection	Emotional warmth	Relationship quality	Financial investment	Time investment
Paternal namesake	2.32** [0.59, 4.05]	−0.20 [−1.20, 0.79]	0.26 [−1.27, 1.80]	0.61 [−0.43, 1.67]	−0.19 [−0.81, 0.42]	−0.07 [−0.67, 0.52]
Maternal namesake	0.73 [−0.79, 2.25]	1.39** [0.39, 2.39]	−0.19 [−1.55, 1.16]	−0.31 [−0.86, 0.22]	−0.45 [−0.98, 0.06]	−0.22 [−0.75, 0.30]
Sex	0.05 [−1.19, 1.31]	0.45 [−0.29, 1.20]	−0.29 [−1.41, 0.81]	−0.30 [−0.75, 0.13]	0.28 [−0.16, 0.73]	0.14 [−0.27, 0.57]
Firstborn	1.05* [0.17, 1.93]	0.48 [−0.02, 1.00]	0.15 [−0.61, 0.94]	0.09 [−0.21, 0.39]	−0.03 [−0.34, 0.27]	−0.06 [−0.36, 0.23]
Number of children in the family	−0.18 [−0.60, 0.23]	0.03 [−0.23, 0.30]	0.12 [−0.25, 0.50]	0.07 [−0.06, 0.21]	−0.10 [−0.25, 0.03]	0.00 [−0.13, 0.14]
Sexual orientation	−1.22 [−2.86, 0.41]	1.52** [0.43, 2.62]	−2.13** [−3.59, −0.67]	−1.16** [−1.71, −0.61]	−0.22 [−0.81, 0.35]	−0.83** [−1.39, −0.28]
Paternal namesake: sex				1.30* [0.11, 2.49]		
Paternal namesake: firstborn				−1.63* [−2.77, −0.50]		

For full model summaries, see Table S3 and for coding of the variables, see Table S1

[95% CI]; significant values at * < 0.05; ** < 0.01; *** < 0.001

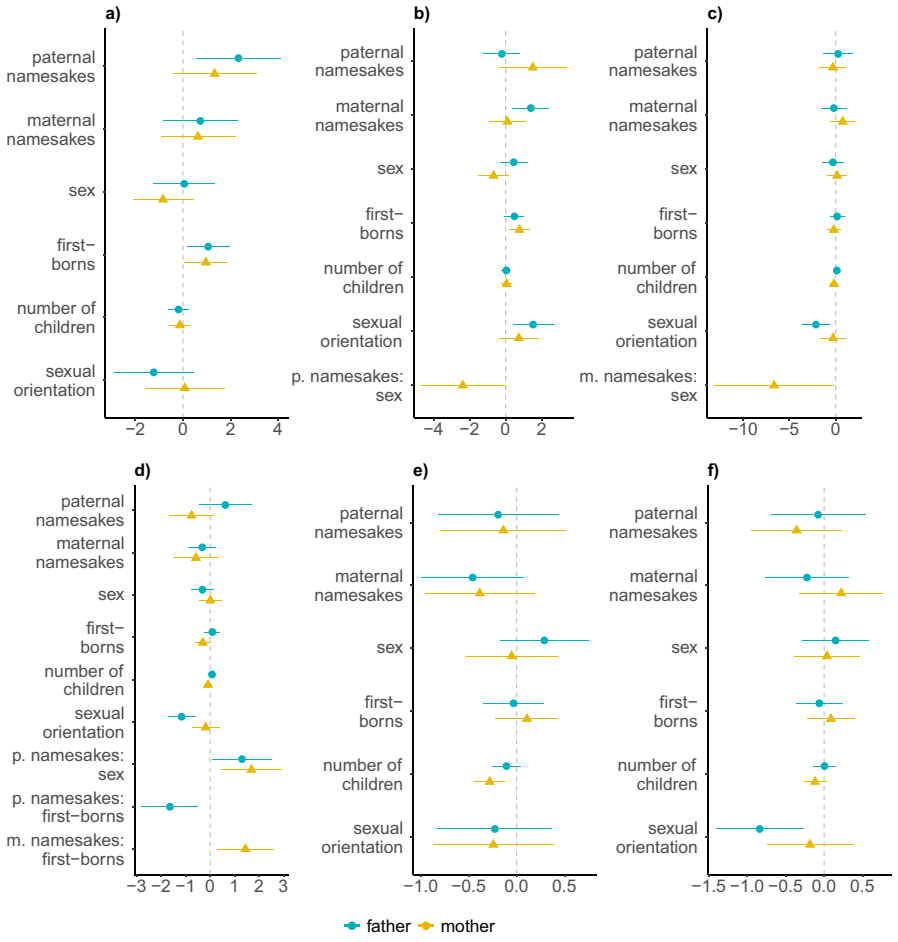

Fig. 2 Coefficient plots for the regression models. From the top left, LMM/GLMM for the s-EMBU: **a** protection, **b** rejection, and **c** emotional warmth. From the bottom left, CLMM: **d** relationship quality, **e** financial investment, and **f** time investment. Estimates for the s-EMBU models are in units of predictors. Estimates for the relationship quality, financial investment and time investment models are on the logit scale. Error bars represent 95% CI. Predictor has a significant effect when its confidence intervals (CI) do not include zero (vertical dashed line)

orientation, and socioeconomic status. Our results indeed revealed an association between namesaking and parental investment. However, the effect of namesaking often appeared significant only in interaction with sex and primogeniture. We also found evidence for the name similarity bias among both parents, though mainly among fathers, and support for the paternity uncertainty hypothesis. Also, namesaking influences only certain types of parental investment—namely those at the level of relationship quality during childhood; in contrast, time and financial investment showed no influence of namesaking.

Table 2 Estimated regression effects of namesaking, sex, primogeniture, number of children, and sexual orientation on maternal investment

	Protection	Rejection	Emotional warmth	Relationship quality	Financial investment	Time investment
Paternal namesake	1.32 [−0.39, 3.04]	1.51 [−0.32, 3.34]	−0.29 [−1.70, 1.12]	−0.75 [−1.64, 0.13]	−0.13 [−0.77, 0.50]	−0.35 [−0.93, 0.22]
Maternal namesake	0.63 [−0.88, 2.15]	0.10 [−0.90, 1.10]	0.76 [−0.52, 2.03]	−0.57 [−1.47, 0.32]	−0.38 [−0.94, 0.17]	0.22 [−0.31, 0.75]
Sex	−0.83 [−2.08, 0.41]	−0.66 [−1.50, 0.17]	0.15 [−0.88, 1.17]	0.01 [−0.43, 0.46]	−0.05 [−0.51, 0.41]	0.03 [−0.37, 0.45]
Firstborn	0.96* [0.08, 1.83]	0.77** [0.22, 1.31]	−0.19 [−0.90, 0.53]	−0.29 [−0.61, 0.01]	0.10 [−0.21, 0.42]	0.08 [−0.21, 0.38]
Number of children in the family	−0.13 [−0.55, 0.28]	0.05 [−0.23, 0.33]	−0.18 [−0.54, 0.15]	−0.08 [−0.23, 0.05]	−0.28*** [−0.43, −0.12]	−0.11 [−0.26, 0.02]
Sexual orientation	0.07 [−1.55, 1.70]	0.73 [−0.35, 1.82]	−0.26 [−1.63, 1.08]	−0.17 [−0.73, 0.37]	−0.24 [−0.85, 0.37]	−0.18 [−0.73, 0.37]
Paternal namesake: sex		−2.37* [−4.64, −0.10]		1.68** [0.46, 2.90]		
Maternal namesake: sex			−6.65* [−12.91, −0.30]			
Maternal namesake: firstborn				1.43* [0.30, 2.57]		

For full model summaries, see Table S4 and for coding of the variables, see Table S1

[95% CI]; significant values at * < 0.05; ** < 0.01; *** < 0.001

Our first prediction, that the associations of namesaking will be stronger with sex than with primogeniture, was supported. Specifically, we found that males were namesakes three times more often than females (Fig. 1a), which is in line with previous studies (Bird & McAndrew, 2019; Furstenberg & Talvitie, 1980; Johnson et al., 1991; McAndrew et al., 2002; Obasi, 2016; Rabinovich et al., 1994; Rossi, 1965; Smith, 1977). We also found evidence of the same-sex namesaking bias in our sample (McAndrew et al., 2002; Rossi, 1965); that is, males were more often paternal namesakes than females (Fig. 1b), while females were more often maternal namesakes than males (Fig. 1c). On the other hand, we found no evidence for the association between namesaking and primogeniture (Fig. 1d); neither paternal nor maternal namesakes were more often firstborns than later-borns (Fig. 1e and f; Table S2). This result is in line with previous findings (McAndrew et al., 2002; Obasi, 2016; Rossi, 1965) showing that when it comes to the decision about whom to name after a relative, sex plays a more important role than being a firstborn.

Our second prediction, that namesaking would remain significant even after controlling for the effects of sex, primogeniture, number of children in the family, sexual orientation, and socioeconomic status, was supported. However, namesaking alone rarely predicted some measure of parental investment; paternal namesakes received the greatest protection from their fathers (Fig. 2a), while maternal namesakes reported significantly higher rejection from their fathers (Fig. 2a and b). Instead, both paternal and maternal namesakes often appeared significant only in interaction with sex and primogeniture. For example, male paternal namesakes reported better overall relationship quality with both father and mother compared with female paternal namesakes (Fig. S1c and S1e). Similarly, mothers were less rejecting towards male paternal namesakes and more rejecting toward female paternal namesakes (Fig. S1a). Furstenberg and Talvitie (1980) also reported that male paternal namesakes enjoyed more interaction with their fathers than female paternal namesakes. On the other hand, female maternal namesakes received greater emotional support from their mothers than male maternal namesakes (Fig. S1b). In contrast, firstborn paternal namesakes reported having a lower-quality relationship with their fathers than later-born paternal namesakes, whereas female maternal namesakes reported a better relationship quality with their mothers than later-born maternal namesakes (Fig. S1d and S1f). At the proximate level, it is possible that the patterns observed here can be attributed to general perception mechanisms, such as name similarity bias (Howard & Kerin, 2011). That is, parents could express more positive or negative attitudes toward their children depending on the similarity of their names. On the other hand, it is known that sex and birth order of children are predictors of parental investment. Across human societies, parents, and predominantly fathers, often show stronger preferences for and invest more in sons than daughters (Puri et al., 2011; Raley & Blanchi, 2006; Stinner & Mader, 1975), while mothers tend to favor firstborn children more than fathers (Salmon et al., 2012). Moreover, firstborn children often reported to be closest to their mothers (Salmon & Daly, 1998). The fact that namesaking is significant mostly when interacting with sex and primogeniture suggests that namesaking plays an additive role—it enhances the effect of the biological factors, which have the primary influence on parental investment.

Our third prediction, that namesaking has a greater influence on paternal than maternal investment, was also supported. Based on the number of significant findings, namesaking seems to have comparable effects on investment from both parents (Fig. 2, Tables 1 and 2). However, while mothers' investment was influenced by maternal as well as paternal namesakes, fathers invested almost exclusively in (male) paternal namesakes. It has been shown that mothers and other maternal relatives are more concerned with emphasizing paternal resemblance as well as choosing the name of a child (Daly & Wilson, 1982; Furstenberg & Talvitie, 1980; Levine & Willis, 1994). Also, fathers, but not mothers, were found to express higher emotional closeness to a child with greater facial similarity to themselves (Alvergne et al., 2010). Namesaking can also provide a cue that biases perception of paternity uncertainty in a desired direction in order to ensure paternal investment (Daly & Wilson, 1982; Henrich, 2016). Similarly, our results show that investment of fathers was indeed more biased than that of mothers toward children with names identical to their own. In this sense, namesaking may be a female parenting tactic to promote paternal investment in her offspring (Daly & Wilson, 1982; Furstenberg & Talvitie, 1980; Jankowiak & Woodman, 2001; Regalski & Gaulin, 1993). More broadly, namesaking is a cultural mechanism that could increase perception of father-child similarity, supporting the paternity uncertainty hypothesis (Goetz & Shackelford, 2009). However, namesaking is one among many mechanisms of paternity reassurance (see, e.g., Daly & Wilson, 1982), and it is highly possible that, at least in Western industrialized societies, paternity is primarily reassured by family names (i.e., surnames) that are mostly paternally inherited. In addition, in societies that have a functional social system (including those of the present study), there is some reassurance for the parent that child support can be provided by the state in lieu of sufficient paternal investment. Thus, additional mechanisms, such as namesaking, likely play only a secondary role (i.e., enhancing paternity confidence), and we can therefore expect first names to have a rather mild effect on parental investment. Still, our study shows that namesaking, as a cultural mechanism, can exert some influence on parental investment, and in fact the persistence of this practice suggests that namesaking is an important component of human parental care in the studied population.

Regarding the financial and time investment of both parents, there was no effect of either paternal or maternal namesakes (Fig. 2e and f). On the other hand, we found that mothers provided less money as the number of children in the family increased, while fathers spent significantly less time with nonheterosexual children (see below). This seems to be in contrast to a study investigating the father's involvement in childrearing among single mothers, which found that children named after the father enjoyed more regular contact and received more economic support than children not carrying a father's name (Furstenberg & Talvitie, 1980). However, Furstenberg and Talvitie's conclusions are primarily based on a sample of unmarried parents and the relationship of fathers only with the mother's first child. In contrast, the participants in our study were raised biparentally and mostly in the presence of other siblings. Coupled with various measures of parental investment, it allowed us to gain more insight into the variability in parental investment influenced by the complexity of family environments. In this sense,

our results show that namesaking influences only certain types of parental investment. Specifically, although namesakes did not receive significantly more time and money from their parents, they did report having generally better relationships with them. Our results thus highlight the importance of considering various measures of parental investment simultaneously.

Interestingly, nonheterosexual orientation was the strongest negative predictor of paternal investment. Nonheterosexual individuals reported significantly higher rejection (Fig. 2b), lower emotional warmth (Fig. 2c), lower overall relationship quality (Fig. 2d), and lower time investment by the father than heterosexuals (Fig. 2f). In contrast, sexual orientation had no effect on the relationship with the mother (Fig. 2; Tables 1 and 2). Studies have also reported that fathers were more detached from and more rejecting of homosexual rather than heterosexual children (Bieber et al., 1962; Siegelman, 1974). From an evolutionary perspective, parents, and specifically fathers, should be inclined to invest less in homosexual children because their reproductive success tends to be lower than that of heterosexuals (Bell & Weinberg, 1978; Zietsch et al., 2008). On the other hand, homosexuality may confer a mating or reproductive advantage to heterosexual siblings or other, particularly maternal, relatives (Camperio-Ciani et al., 2004; King et al., 2005; Zietsch et al., 2008). Thus, the observed effect of nonheterosexuality on paternal investment can be attributed to negative perception bias among fathers. It is also possible that paternal investment into homosexual children can be modulated to some degree by the social acceptance and legality of homosexuality, which varies from country to country. Cross-cultural studies are needed to assess the relationship between parental investment and homosexuality acceptance across societies.

A potential limitation of our study is its retrospective design, considering only the perspective of children. There is also a strong sex bias with female overrepresentation in our sample, which unfortunately is a persistent problem in human behavioral research (Štěrbová et al., 2018). Thus, the reproducibility of our results can be evaluated in future studies by taking responses from both children and their parents and with more balanced samples. Moreover, it is likely that the observed patterns can also be affected by the specific features of the sampled countries, such as economic, social, or cultural environment. Such concerns might ideally be addressed in future studies working with samples from multiple countries where the potential confounding effects of contextual variables will be accounted for. A longitudinal design should also be used to avoid memory bias.

In conclusion, we showed that namesaking has a positive influence on parental investment though its effect is additive—it enhances the effect of biological factors, such as sex and primogeniture. Overall, we found evidence for name similarity bias influencing mainly paternal but also maternal investment. We also found that paternal namesaking can serve as a mechanism increasing the perception of similarity and thus paternity confidence, eventually securing paternal investment. Moreover, namesaking influences only certain types of parental investment, mostly those at the level of relationship quality. Finally, our study extends the research on parental investment by showing that cultural mechanisms also influence parental rearing behavior, which plays a critical role in children survival. We believe that our study will stimulate new research on this largely unexplored cultural phenomenon.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s12110-021-09396-7.

Acknowledgments The authors wish to thank to Martina Konečná and Petr Tureček for improving the statistical design and Alexander Barton and Carolina Hierro Yap for English proofreading. GŠ was supported by the University of South Bohemia Grant Agency (GAJU 04-048/2019/P); ZŠ was supported by the Czech Science Foundation project (GAČR 18-15168S) and by the Sustainability for the National Institute of Mental Health project (LO1611), with financial support from the Ministry of Education, Youth, and Sports of the Czech Republic under the NPU I program; PP was partly funded by the Scientific Grant Agency (VEGA 1/0286/20).

Data Availability https://github.com/gabrielsaffa/namesakes.git

Declarations

Conflict of Interest The authors declare that the present research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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