Evolutionary Influences on Assistance to Kin: Evidence from the Panel Study of Income Dynamics

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Abstract: Amid the changes that have diversified family life, studies have shown the continuing importance of attachment to kin through established patterns such as ties among full siblings and newer patterns such as efforts by donor-conceived individuals to find their donor siblings. Sociologists have good explanations for the diversity of family forms but not for the persistence of kinship ties. This article argues that evolutionary processes focused on genetic relatedness can provide a partial explanation for both the persistence and expansion of kinship ties. It proposes that the easing of social constraints on family-related behaviors and the resulting expansion of choices may have increased the importance of genetic relatedness in producing the current patterns. To illustrate this perspective, this article examines the consistency between patterns of financial assistance to kin and Hamilton's rule, derived from the evolutionary theory of inclusive fitness, using the 1985 to 2019 waves of the Panel Study of Income Dynamics (PSID).

Keywords: inclusive fitness; kinship; family; transfers; financial assistance; PSID

OVER the past few decades, social and technological changes have diversified family life. Recent studies, however, have shown a persistence of conventional kinship patterns amid this diversity that various analysts have described as surprising. One such change is the increasing use of assisted reproductive technologies in the fertilization and gestation of fetuses, such as insemination from a donor. Open registries of donors, along with DNA-based genealogy services and social media searches, can allow donor-conceived children and their parents to identify half-siblings with the same donor, and sometimes the common donor himself, in a way that was not possible a generation ago.

Yet just because donor-conceived individuals and their parents now have the capacity to identify these genetically-related individuals, does not mean that large numbers would choose to do so. It seems, however, that a growing number do (Indekeu et al. 2021, Nordqvist 2017, Scheib and Ruby 2008). Hertz and Nelson (2019) reported on a study of 212 American parents and 154 of their donor-conceived children who sought out other families in which the children were conceived by the same donors. They wrote:

> Even in a world in which kinship has become more voluntary, this sequence of a random group of parents finding each other and telling their children about their genetic relatives, and then parents and children getting to know one another on the basis of shared genes is a startlingly new occurrence (Hertz and Nelson 2019:3).

Even in more established family forms, we see extensions of emotional closeness and assistance to kin outside of the parent-child line. In two articles that reviewed

contemporary kinship practices, Furstenberg and his colleagues (Furstenberg 2020, Furstenberg et al. 2020) argued that kin outside of the parent-child line play an important role. In particular, sibling ties are prominent:

> It appears that ties among collateral relatives – adult siblings and their children – are much more important than is commonly acknowledged by family sociologists (Furstenberg et al. 2020:1404).

Siblings have frequent contact and close relationships into adulthood, these reviews uncovered, so much so that "a surprisingly strong bond exists among siblings even in adulthood" (Furstenberg 2020:374). These conclusions echo older studies such as Rossi and Rossi (1990), in which siblings were identified as just outside the innermost parent-child ring of kinship, when individuals were asked about their sense of obligation to aid relatives financially. Links to kin such as donor siblings and full siblings expand the boundaries of family life beyond the nuclear family but do so in ways that retain recognizable kinship ties.

The continuing presence of these two phenomena — a centrifugal expansion of the boundaries of families and personal relationships along with a centripetal retention of a core based on kinship – needs a unified, theoretical explanation. A great deal of sociological research has been devoted to explaining the expansion, usually referred to as an increase in family diversity. Much less effort has been devoted to explaining the persistence of conventional forms because these forms have been seen as receding in importance and therefore not in need of theoretical justification. Scholars seem only to posit a diffuse force that propels individuals outward from the normatively-dominant nuclear family of the 1950s to evermore complex forms without addressing the question of whether there may be forces that constrain this outward movement from losing its core entirely. In this article, I will argue that evolutionary theories based on the propensity of individuals to seek ties with genetic relatives, and to act in ways that promote the intergenerational transmission of their genetic makeup, provide a unified, albeit partial, explanation for the patterns that have emerged in recent decades: they are consistent with the emergence of new aspects (as in donor sibling networks) and the continuation of older aspects (as in ties among full siblings).

Although it is challenging to find empirical evidence of evolutionary influences on kinship, a promising path is to study patterns of assistance among kin. In doing so, sociologists can draw upon "inclusive fitness," an influential evolutionary theory developed by the biologist W. D. Hamilton (1964). It predicts an ordering of amounts of assistance among kin according to the degree of shared genetic relatedness between the donor and the recipient, which has become known as Hamilton's rule. To test this theory, one needs enough data to have reliable reports on assistance not only to parents, children, and siblings but also on the less common instances of assistance to kin such as nieces, nephews, and cousins. In this article, I will present a test of the theory of inclusive fitness on assistance to kin using 35 years of pooled data from the Panel Study of Income Dynamics (PSID), which has been following a national sample of respondents and their descendants since 1968. My objective is to provide evidence that an evolutionary perspective may be a partial explanation for the persistence of kinship ties — sometimes in older, established

ways and sometimes in new ways — that we are seeing in contemporary family life.[1]

Evolutionary Influences and Social Choice

It might seem counterintuitive to invoke evolutionary theory at a time when such a wide variation in families and relationships has emerged. One might think that if evolutionary-based predispositions were important at all, they would *reduce* variation in kinship patterns. Yet social changes that ease the restraints that individuals face in constructing their lives, and consequently expand their choices, can paradoxically increase the relevance of their genetic predispositions. These predispositions may have developed in ways consistent with evolutionary theory. The restraints that prevent this freer expression may take many forms – discrimination, prejudice, laws, norms, messages from the media, or peer pressure. The easing of these restraints may make it possible for more people to express their evolutionary-influenced predispositions.

Consider women's genetic potential for educational attainment. Evolutionary influences work through genes, and there is substantial variation among individuals in the makeup of the genes that influence their social traits. A complex social trait such as educational potential may by influenced by hundreds, if not thousands, of genes (Conley and Fletcher 2017). One would therefore expect variation from person to person in genetically-based potential for achieving a high level of education. In the early-to-mid-twentieth century, women were heavily discouraged from pursuing a college education and often faced discrimination if they tried. Under those circumstances, women with a high genetic potential for educational attainment had their potential suppressed; and the correlation between genetic potential and attainment was low. In the mid-to-late twentieth century, as opportunities for women in higher education improved, more women could express their full educational potential; and the correlation between genetic potential and educational attainment rose. This historical progression was shown in a study of the changing relationship between genetic predictors of educational attainment and the actual attainment of women in the large Health and Retirement Study who were born in different birth cohorts. In that study, the correlation between educational attainment polygenic scores, a measure of genetic influences on the potential for educational attainment, and the actual attainment of women was larger for women born in the 1950s than for women born in the 1930s. By the time that the more-recently-born, 1950s group had reached young adulthood, opportunities for higher education had increased, with the result that the association between their genetic potential and their educational attainment was higher than among the earlier-born, 1930s group (Herd et al. 2019).

The more general proposition is that the more open and egalitarian a society is, the freer behavioral choices will become, and the greater the genetic contribution to behavior will be – not because of any genetic changes but rather because the weakening of social restraints allows individuals to express their full range of genetic predispositions more easily (Adkins and Guo 2008, Nielsen 2018). Thus, evolutionary influences on behavior could become more visible. This principle

could extend to relations with kin. Udry (1996) argued that when individuals have more choice in their sexual and family behaviors, biological factors will account for a greater share of the variation in their behaviors. Other researchers, using studies of the childbearing behaviors of twins, have found evidence of an increased role of genetic influences in the fertility of more recent cohorts compared to older cohorts (Kohler et al. 2006). Correspondingly, the profound weakening of restraints on kinship, such as the ending of the restriction of fertility and parenthood to unassisted biological means of reproduction, may have made genetic predispositions more visible. Individuals can now employ a higher degree of choice in the creation of their family and relationship ties; and those choices may reflect, in part, evolutionary influences on their actions.

Nevertheless, I do not claim that evolutionary influences on family and kinship ties are more important than cultural influences – or even that that evolutionary influences are equally important. I claim only that evolutionary influences *are* important and, further, that their importance may be more visible now than in the recent past due to the easing of social restraints. Although sociological studies of family and kinship that are influenced by evolutionary theory are becoming more common (Hopcroft and Martin 2014, Rotkirch 2018), some sociologists are reluctant to consider genetic influences on family life at all, either because of the history of the misuse of genetics to imply racial or ethnic inequalities in characteristics such as intelligence, or because of the potential use of genetic theories to justify hegemonic social arrangements such as the nuclear family. Theories centered on the degree of genetic relatedness such as Hamilton's rule, however, do not suggest any genetically-based differences in kinship behavior among racial and ethnic groups in the population. The emphasis is not on the content of a person's DNA but rather on how much of it is shared with others. Nothing in the biological literature implies variation in how basic human genetic relationships are produced – in all such groups, children receive half their genes from one biological parent and half from the second biological parent. In all such groups, siblings share half their genes, on average. Any observed racial-ethnic differences in assistance to kin (and I will present evidence of differences) would likely be due to social factors.

Still, the claim that evolutionary influences on social behavior, working through the genetic makeup of individuals, will increase when opportunities for personal choice increase must remain tentative until more studies support it. Many, perhaps most, sociologists will remain skeptical of evolutionary arguments for behaviors such as assistance to kin as long as social structural and cultural explanations exist — at least until the evidence for evolutionary influences is very strong. That is an understandable position, and perhaps a wise one, for a discipline whose raison d'être is to argue for the importance of social forces in influencing individual behavior. Yet it may be a mistake to ignore the importance of evolutionary influences entirely if the kinds of large-scale survey data that sociologists routinely analyze can be shown to be consistent with them in ways that are not obvious from a typical sociological perspective. It is in that spirit that I will turn to a consideration of both social scientific and evolutionary theories of assistance to kin, followed by an analysis of the detailed information on assistance provided to kin that is available in the longitudinal PSID.

Social Scientific Theories of Assistance to Kin

A large, long-established sociological literature on assistance to kin addresses cultural and social structural reasons for assistance, most notably altruistic behavior and reciprocal exchange. The literature is almost entirely focused on assistance up and down the vertical intergenerational line of grandparents, parents, and children; Furstenberg's (2020) review of research on kinship found little written about siblings and almost nothing on cousins. Altruism, the provision of assistance with no thought of the gain to oneself, is sometimes seen as arising from the close emotional relationships that develop during childhood; alternatively, it is seen as emerging from strong social norms that parents and children should support each other (Swartz 2009). Reciprocal exchanges are seen as something that people engage in because it is mutually beneficial. Parents may assist their children not because they expect their children to immediately reciprocate but rather because they expect that eventually, when they are in need, their children will assist them (Seltzer and Bianchi 2013). Studies also suggest that there are fewer intergenerational transfers of assistance between stepparents and stepchildren than between biologically-related parents and children (Raley and Sweeney 2020, Wiemers et al. 2019). Apart from a few studies of exchanges among older people and their adult children and grandchildren (Rotkirch 2018), however, there is little consideration in the sociological literature about whether evolutionary influences are important in understanding patterns of assistance among relatives.[2]

Outside of sociology, some economists have suggested that evolutionary motives could be useful in understanding the basis of altruism; and Cox (2007) has argued for the relevance of Hamilton's rule. A small number of economic studies have employed Hamilton's rule in developing societies (Case, Paxson and Ableidinger 2004), and game theoretic treatments exist (Iyer and Killingback 2020); but I can find no empirical economic research on Hamilton's rule in advanced societies. A few anthropological studies of remote or preindustrial societies (Betzig and Turke 1986, Hames 1987, Ivey 2000) examine the salience of genetic relatedness. Two historical studies of Vikings in the Orkney Islands and in Iceland (Dunbar, Clark and Hurst 1995) and of English royal families during the War of the Roses (McCullough, Heath and Fields 2006) show that the propensity of rivals to murder their kin was inversely proportional to genetic relatedness: they rarely murdered lineal kin but were more likely to murder cousins, especially distant cousins.

But the only sizeable body of research on genetic relatedness and assistance to kin has been produced by evolutionary psychologists. Their methodology mostly involves presenting hypothetical situations involving various kinship and friendship linkages to samples of individuals and asking them how they think that they or, depending on the study, their kin and friends would respond (Burton-Chellew and Dunbar 2015, Schriver et al. 2019); furthermore, their samples are almost always nonrandom and often consist of college students (Curry, Roberts and Dunbar 2013, Hackman, Danvers and Hruschka 2015).[3] One study involved participants who were told that the longer they could hold a difficult physical position, the greater the reward that would be sent to a relative; and the investigators found that the closer the genetic relatedness of the relative, the longer the participant held the position

(Madsen et al. 2007). Another study found that individuals were willing to travel farther to see parents, children, and siblings than to see less-closely-related kin, even after controlling for emotional closeness (Pollet, Roberts and Dunbar 2013). No social scientific evidence of evolutionary influences on assistance to kin, however, has been produced using large national samples in which people are asked about assistance they actually gave or received.

Evolutionary Theories of Assistance to Kin

Evolutionary theory suggests that people may act in ways that privilege genetic relationships without being consciously aware of what they are doing. They do so to maximize their reproductive fitness: their ability to pass their genetic makeup to subsequent generations. The claim that individuals may not be fully aware of their motives is consistent with what cultural sociologists call nondeclarative culture: dispositions and schemata that do not involve conscious awareness (Cerulo, Leschziner and Shepherd 2021). The sociology of culture has embraced cognitive psychology and its view that neural processes are involved in how people learn and use culture (Smith et al. 2020), with the result that people have neurologically-rooted schemata for common courses of action. The argument of evolutionary theory is essentially that, amid these multiple neural circuits attuned to culture, there may also be some circuits preprogrammed to encourage action that is advantageous in terms of reproductive fitness – either through hard-wired knowledge or through hard-wired receptivity to acquiring that knowledge.

From an evolutionary perspective, the parent-child relationship is the strongest kinship bond.[4] For parents it provides *direct* fitness: the opportunity to pass their genes to the next generation through the procreation and rearing of children. But how can we account for the tendency of individuals to provide support to relatives outside of the vertical parent-child line, considering that these actions cannot advance the direct reproduction of their own genetic material? Hamilton (1964) introduced the concept of inclusive fitness to answer this question. His focus was on social behavior among non-human animals, but it has since been applied to human societies (Rotkirch 2018). In order to consider it, let us first distinguish between two types of kinship. The first is lineal kinship, by which I mean the relationship that exists among people who are directly descended from one another, such as parents, their children, and their grandchildren. In the Western nations, lineal kinship lies at the center of a bilateral kinship system in which neither the father's nor mother's relatives take precedence and in which property passes from both parents to their children and then to the children's children. Assistance to lineal kin is strongly normative in the West: one is supposed to help one's parents and one's children. But precisely because actions that reinforce lineal kinship are so strongly normative, genetic influences may remain unnoticed. The second type is collateral kinship, by which I mean relationships among people who are descended from a third person and are not related lineally, such as full siblings, half-siblings, nephews and nieces, and cousins. In Western kinship, assistance to collateral relatives is less normative than is assistance to lineal relatives; it is therefore more a matter of choice. One is supposed to assist one's children, but one may choose not to assist one's brothers

and sisters or one's cousins. Because normative pressure is weaker, assistance to collateral relatives may reveal genetic influences more than does assistance to lineal relatives.

Hamilton (1964) argued that individuals can enhance their reproductive fitness indirectly by contributing to the survival and reproductive success of collateral kin with whom they share a fraction of their genes, provided that the cost of doing so is not overly high.[5] Hamilton's rule can be written as:

$rB > C$

where B is the benefit of assisting a kinship group member in terms of indirect fitness and C is the cost to the individual, in terms of foregone direct fitness, of providing that assistance. The coefficient r measures the degree of genetic relatedness: the probability that two individuals have genes in common as a result of genetic descent. The greater the value of r, the greater is the genetic relatedness of the kinship group member to whom an individual would be providing assistance, and therefore the more likely is the overall contribution to fitness ($r \times B$) to exceed the cost C. From the standpoint of an individual in human society, the coefficient r has a value of 0.50 for one's parents, because individuals inherit half of their genes from each parent. The coefficient also has a value of 0.50 for one's children and for full siblings, with whom individuals share, on average, half of their genes. Correspondingly, the coefficient is 0.25 for half-siblings (a category that includes donor siblings), uncles, aunts, grandchildren, and nephews and nieces through biological siblings, with whom individuals share one-fourth of their genes, on average; and it is 0.125 for first cousins and great-grandchildren, with whom the share is, on average, one-eighth. The theory of inclusive fitness predicts, therefore, a hierarchy of assistance based on the degree of genetic relatedness, which can be tested with data on patterns of assistance to kin.

Propositions and Data

The social structural and cultural emphases on lineal kinship in Western society, which have been long-noted in sociology and anthropology (Parsons 1943, Schneider 1980), imply that assistance will be more prevalent among lineal kin, and particularly among parents and children, than among other relatives. From an evolutionary perspective, the direct fitness that parents can obtain through their children predicts a strong pattern of parent-child assistance. Moreover, parents may assist children in anticipation of future help from them, such as when the parents reach older ages. This leads to a first proposition about assistance to kin that is drawn from both social scientific and evolutionary theory:

> *Proposition 1.* Assistance to lineal kin will exceed assistance to collateral kin.

Although assistance to collateral kin will be lesser, the weaker social structural and cultural emphases will allow the influence of genetic relatedness to appear. Individuals may contribute to the survival and reproductive success of siblings, nieces and nephews and cousins; but they will do so in proportion to the degree of

genetic relatedness. Therefore, we can test a two-part second proposition, drawn from Hamilton's rule:

> *Proposition 2(a).* Individuals will be more likely to provide assistance to full siblings (r= 0.50) than to nieces and nephews (r = 0.25).

> *Proposition 2(b).* Individuals will be more likely to provide assistance to nieces and nephews (r = 0.25) than to cousins (r = 0.125).

The social scientific literature on kinship, reviewed earlier, would suggest that assistance to siblings would be greater than assistance to other collateral relatives. Siblings have a shared history of co-residence and often have strong social bonds. Therefore, Proposition 2(a), that individuals would be more likely to assist siblings than nieces or nephews or cousins, would not be surprising to social scientists. However, Proposition 2(b), that assistance to nieces and nephews would exceed assistance to cousins, has not been remarked upon in any social scientific literature that I have been able to find. There appears to be, consequently, no social scientific explanation for why it may hold. If Proposition 2(b) can be confirmed in the PSID data, therefore, it would be more consistent with an evolutionary explanation based on Hamilton's rule.

Because assistance to nieces, nephews, and cousins is infrequent, a test of Proposition 2(b) necessitates a large data set that follows people over time and repeatedly asks respondents detailed questions about assistance to kin. The PSID provides the only satisfactory source of data. It began with approximately 5,000 American families in 1968 and has followed these families and their descendants ever since. Interviews were conducted annually through 1997 and have been conducted biennially since then with family units formed by individuals in the PSID sample as they age, marry, and have children. The PSID interviewed one person per family unit, typically either the "head" of the family unit (renamed the "reference person" after 2015) or that person's spouse or partner. The person who was interviewed was expected to report on all members of the family unit (Johnson et al. 2018). Starting in 1985, and continuing through 23 survey waves conducted between 1985 to 2019, respondents were asked the following question:

> In [previous year], did you give any money toward the support of anyone who was not living with you at the time?

Beginning in 2009, the word "you" was replaced by the phrase, "(you/head) or anyone else living in (your/his) family at the time," which made explicit the expectation that the respondent would report on the family unit. In all years, if the answer was yes, the interviewer first asked, "How many people was that?" and then inquired about the relationships of the recipients to the respondent and spouse or partner, for up to three recipients through the 1993 wave, and up to five recipients starting in the 1994 wave.[6] No attempt was made, however, to ask how many times the respondent or spouse/partner had given money to each type of relative in the past year nor the amount of money involved in each instance of giving in the past year.

The detailed relationship list comprised 36 categories of relationships, including relatives of spouses or partners. I examined responses for all individuals who

were ever observed to be a household head (reference person), spouse of head, or cohabiting partner of head, starting with the first year in which they were observed to be a household head/spouse/partner (they may have begun participation in the study as a child, grandchild, or great-grandchild of a household head who was enrolled in the original PSID sample), and continuing until either the 2019 wave or the wave at which they dropped out of the study, if prior to 2019. The median period of observation was eight years; the first quartile was three years, and the third quartile was 18 years. These relatively long periods of observation allow the analyst to ascertain whether the respondents ever gave assistance to types of relatives for whom annual rates of giving money are low. As with any correlational analyses, studies of the influence of genetic relationships cannot establish a cause-and-effect pattern with certainty, but they can generate evidence that could be deemed consistent or inconsistent with a genetic relatedness perspective.

Along with the detailed kinship categories, the longitudinal design of the PSID and its repeated questions about financial assistance to kin are what makes it by far the best data source on monetary transfers to collateral kin. I focused on the following categories, based on definitions in the questionnaire:

> *Parents (r = 0.50)*: Father or mother; father-in-law or mother-in-law.
>
> *Children (r = 0.50)*: Son or daughter; son-in law or daughter-in-law.
>
> *Siblings (r = 0.50)*: Brother or sister; brother-in-law or sister-in-law.
>
> *Nieces and nephews (r = 0.25)*: Niece or nephew; niece or nephew of spouse.
>
> *Cousins (r = 0.125)*: Cousin; cousin of spouse.

In calculating the proportion of households that reported giving money to children, I omitted households in which neither the individual nor spouse/partner had living children during the first year that the individual was observed to be a head, spouse, or partner of head. I also omitted households in which either the individual or spouse/partner reported making child support payments because such payments are, in most cases, legally mandated and therefore do not involve voluntaristic transfers to children. In addition, in calculating assistance to siblings and assistance to nieces and nephews, I omitted households in which neither the individual nor spouse/partner had living siblings during the first year the individual was observed to be a head, spouse, or partner of head.

Nevertheless, the PSID data do not allow the analyst to determine whether or not all individuals had living nephews, nieces, or cousins.[7] We can assume, however, that the expected number of nieces and nephews that an individual has is greater than the expected number of siblings and that, furthermore, the expected number of cousins is greater than the expected number of nieces and nephews. For instance, in the simplest case of an unchanging total fertility rate of two children per woman, and in which all women have two children in every generation, each person would have one sibling who has two children, yielding two nieces and nephews; and two uncles and aunts (one from the sole sibling of each parent), each of whom would have two children, yielding four cousins. Schoen (2019) shows that in the more realistic situation in which there is variation in the number of

children that women have, the number of extended kin can be readily computed by assuming that the variation in the number of births per woman follows the Poisson distribution. With that assumption, a total fertility rate of 2.0 (which would include women who have no children and therefore some who have more than two) implies that the expected number of siblings that an individual will have is two, the expected number of nieces and nephews is four, and the expected number of first cousins is eight. Thus, the expected number of cousins that an individual has exceeds the expected number of nieces and nephews, which exceeds the expected number of siblings. This ordering holds even if the total fertility rate is somewhat less than 2.0, as is the case currently. Therefore, if individuals were to provide assistance to kin based solely on the number of kin available, and independently of the genetic coefficient of relatedness r, we might expect that more assistance would be provided to cousins than to nieces and nephews, and more to nieces and nephews than to siblings. Thus, the relative numbers of expected collateral kin bias the analyses against confirming Propositions 2(a) and 2(b) because the expected size of each group of kin is inversely proportional to r, whereas the propositions assert that assistance is directly proportional to r.

A further complexity is that stepmothers and stepfathers were included in the category of parents, whereas stepchildren were excluded from the category of children. Because assistance to lineal kin is not the main focus of this analysis, the inclusion of stepparents is not a substantial concern. More problematic is the treatment of half- and step-siblings. From 1985 through 1993, the interviewer was instructed to "include step and half-sisters and brothers" in the sibling category. From 1995 onward, this instruction did not appear, but there was never a separate category for step- or half-siblings. I will assume that half- and step-siblings were included in the sibling category in all years. Therefore, the PSID data do not allow analysts to distinguish among financial assistance to full siblings, half-siblings, and step-siblings. This is a limitation because $r = 0.50$ for full siblings, $r = 0.25$ for half-siblings, and $r = 0.00$ for step-siblings. One can obtain an estimate, however, of the average relatedness of sibling pairs in the PSID from the Family Information Mapping System (FIMS) files, which provide detailed relatedness information on 12,650 sibling pairs that could be identified. The FIMS files distinguish among full-sibling pairs, half-sibling pairs, and an "other" category that includes step-sibling pairs. In some cases, however, the FIMS file cannot specify whether two siblings who are raised by a common single parent are full siblings or half-siblings because information on their outside parent or parents was not collected. With this limitation in mind, the FIMS file can be used to establish approximate upper and lower bounds for the overall relatedness of the sibling pairs. If all the indeterminant at-least-half sibling pairs are counted as full siblings, the average r of the sibling pairs 0.47. If all of the indeterminate at-least-half pairs are counted as half-siblings, the average r of the sibling pairs is 0.43.[8] The estimate of r for all sibling pairs, therefore, is between 0.43 and 0.47.

In addition, the average relatedness of respondents to nieces and nephews in the PSID is likely to be somewhat below the expected 0.25 because some respondents would be related to nieces and nephews through their half-siblings rather than through their full siblings and because some would be related to nieces and nephews

through their spouses. If we assume that the relatedness of respondents to nieces and nephews through full and half-siblings follows the observed distribution of all sibling pairs in the FIMS files, then, by a similar computation, the estimated r for nieces and nephews would be between 0.21 and 0.23. Moreover, the average relatedness of cousins in the PSID is likely to be somewhat below the expected 0.125 due to a mixture of full and half-siblings in the respondents' parents' generation. Yet because we have no information on the full versus half sibling distribution among the respondents' parents, we cannot calculate bounds on relatedness to cousins; all we can say is that relatedness is no more than 0.125. Overall, then, an individual's estimated degree of relatedness to siblings is 0.43 to 0.47, to nieces and nephews is 0.21 to 0.23, and to cousins is 0.125 or lower. Although not in the ideal ratio of 0.50 to 0.25 to 0.125, these estimates suggest that the PSID data is sufficient to test the propositions.

Results

Between 1985 and 2019, there were up to 37,925 individuals who met the above criteria (with the number in some categories reduced by the absence of siblings or children); they reported 17,954 instances of ever giving money to people in the categories described above, including 2,907 instances of ever providing assistance to siblings, 836 instances of ever providing assistance to nieces and nephews, and 320 instances of ever providing assistance to cousins. Figure 1 shows the percentage of individuals who ever gave money (or whose spouses or partners ever gave money) to particular relatives, along with the 95 percent confidence intervals for each percentage. Figure 1 displays the results for two groups of relatives of interest. Among lineal relatives, it shows assistance to parents and children. Among collateral relatives, it shows assistance to siblings, nieces and nephews, and cousins.

Looking first at lineal relatives, we see that ever giving money to children not living in the home is substantially more common than is ever giving money to any other type of relative not living in the home. About one-third reported that they or their spouse/partner ever gave financial assistance to their children. In addition, assistance to parents is common. That assistance from parents to children is greater than assistance from children to parents is consistent with the literature on intergenerational relations, which shows that assistance flows downward from parents until late in the parents' lives (Agree and Glaser 2009). Nevertheless, that 18 percent of respondents or their partners gave money to their parents shows the strength of feelings of obligation, or of compliance with social norms, in providing assistance up the lineal intergenerational line. Overall, the PSID results for lineal relatives show the continuing strength of the socially-structured parent-child dyad that is at the heart of the Western kinship system. They also demonstrate that support to collateral kin is less common than support to parents and children, consistent with Proposition 1: No collateral kin received nearly as much assistance as children and parents did.

Among collateral relatives, Figure 1 shows the percentage of individuals who ever gave money (or whose spouses or partners ever gave money) to siblings, nieces and nephews, and cousins. Consistent with Proposition 2(a), the percentage who
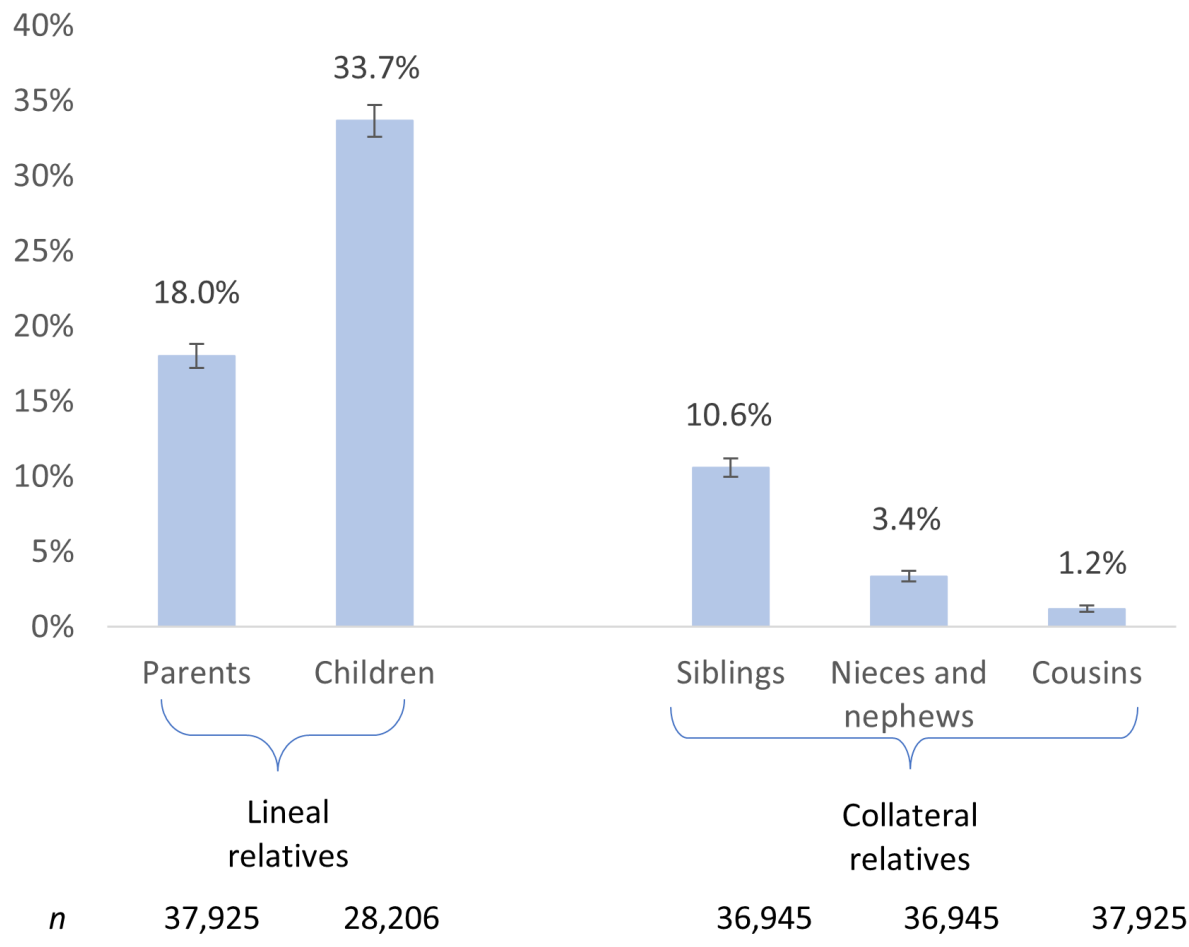
Figure 1: Percentage of households that ever reported giving money to relatives not living with them, by type of relative, Panel Study of Income Dynamics, 1985-2019. (95 percent confidence intervals shown.)

gave money to siblings was greater than the percentage who ever gave money to nieces or nephews, as predicted by both social scientific and evolutionary theories. Consistent with Proposition 2(b), the percentage who ever gave money to nieces or nephews was greater than the percentage who ever gave assistance to cousins, a difference that is predicted by the evolutionary theory of inclusive fitness but has not been addressed in the social scientific literature. These differences in the percentages are statistically significant at the p < .0001 level.[9] If we could measure and hold constant the reproductive benefit (*B*) and the cost (*C*) of the assistance precisely, we would expect assistance to the three categories of collateral kin to be

in a ratio 0.50 to 0.25 to 0.125, or four to two to one, per unit of benefit and cost, as predicted by Hamilton's rule. Because we cannot do so with the PSID data, we can only expect the distribution of assistance to approximate that ratio. The percentages displayed in Figure 1 show a level of assistance to siblings that is elevated above this expected distribution. This elevated ratio may reflect our inability to precisely measure benefits and costs, but it could also reflect social norms that privilege assistance to siblings over assistance to kin of lesser genetic relatedness. With this qualification, the results are consistent with Propositions 2(a) and 2(b).

Still, the estimates of assistance to collateral kin in Figure 1 have limitations. They ignore constraints due to racial-ethnic group membership or due to a lack of resources; and they may reflect different experiences of birth cohorts over time or compositional differences such as numbers of siblings. Figure 2 shows adjusted predicted probabilities of giving money to siblings, nieces and nephews, and cousins based on three logistic regression models presented in online supplement Table 1a. The adjusted predicted probabilities were created by first calculating the predicted probability of giving money for each individual, using their observed characteristics and the coefficients in the appropriate logistic regression equation (Williams 2012). Then the mean of these predicted probabilities across all individuals was calculated. The average predicted probability for assistance to siblings exceeds the probability for nieces and nephews, which in turn exceeds the probability of assistance to cousins, consistent with Propositions 2(a) and 2(b). The differences are significant at the p < .0001 level.[10] To test for the possibility that the error terms in the three equations for each individual were correlated, I also estimated three separate ordinary least squares (OLS) regressions for the three categories of collateral kin and then a seemingly-unrelated-regressions model (Zellner 1962, see online supplement Table 1b) in which all three were estimated jointly. The adjusted predicted probabilities from the separate and joint OLS estimates were nearly identical.

Robustness

The design and implementation of the PSID is complex enough that further analyses are warranted. The descendants of the original 1968 householders are said to have the PSID "gene" (Pfeffer, Fomby and Insolera 2019), and they have been followed ever since. They therefore stem from a survey sample with a known probability distribution. During the study, the "gened" individuals have partnered with non-sample individuals who are sometimes the respondents in the household. The representativeness of these non-sample individuals is unknown. Therefore, in Figure 3, which is based on the logistic regression models presented online supplement Table 2, I present the results of restricting the analysis of assistance to collateral kin to individuals who are gened descendants of the original sample. The results, which are significant at the p < .0001 level, are very similar to Figure 2; and they once again support Propositions 2(a) and 2(b): assistance to siblings exceeds assistance to nieces and nephews which exceeds assistance to cousins.[11]

In addition, when the PSID began, it followed the Bureau of the Census rule at that time for assessing the household head: If a (different sex) married couple is present, the man is automatically the head. Even though the Census rules
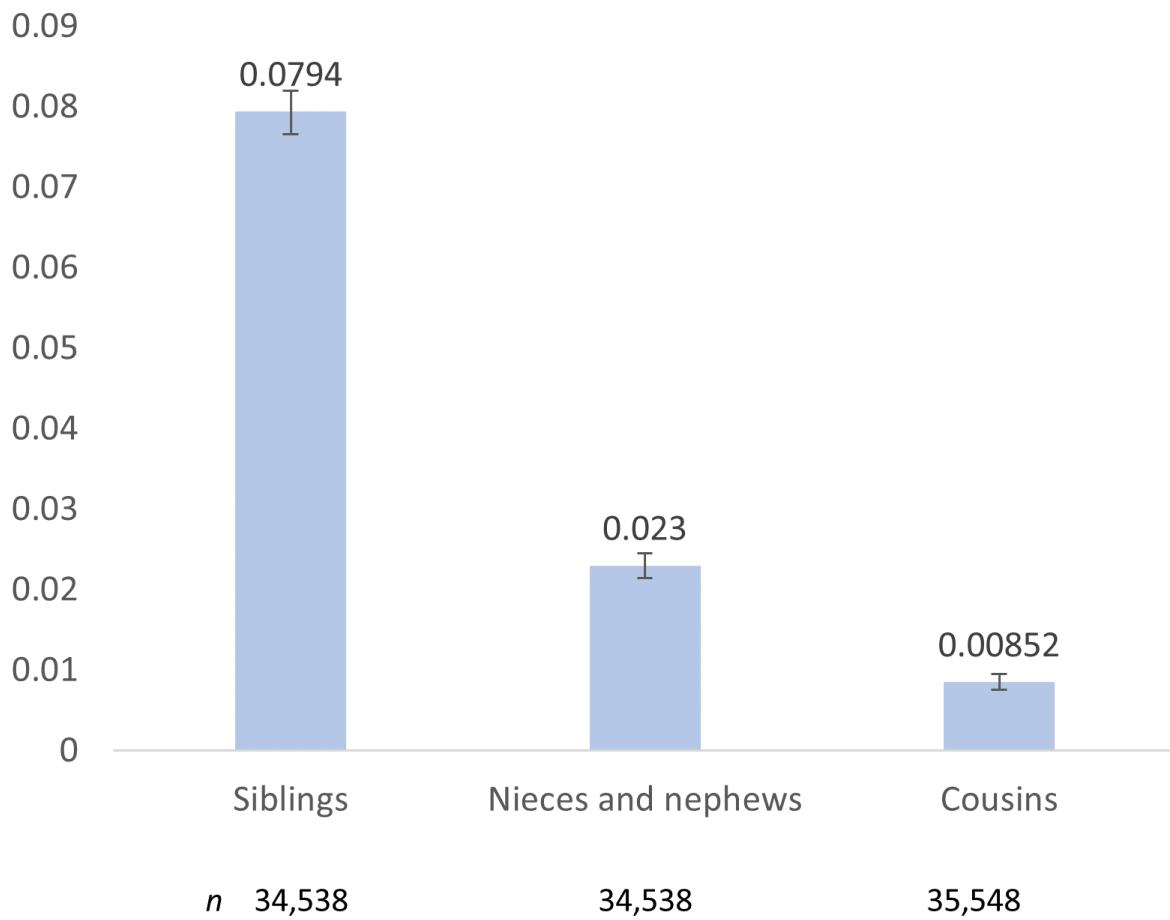
Figure 2: Average predicted probability of ever giving money to collateral relatives: (1) siblings; (2) nieces and nephews; (3) cousins. (See online supplement Table 1a.) (95 percent confidence intervals shown.)
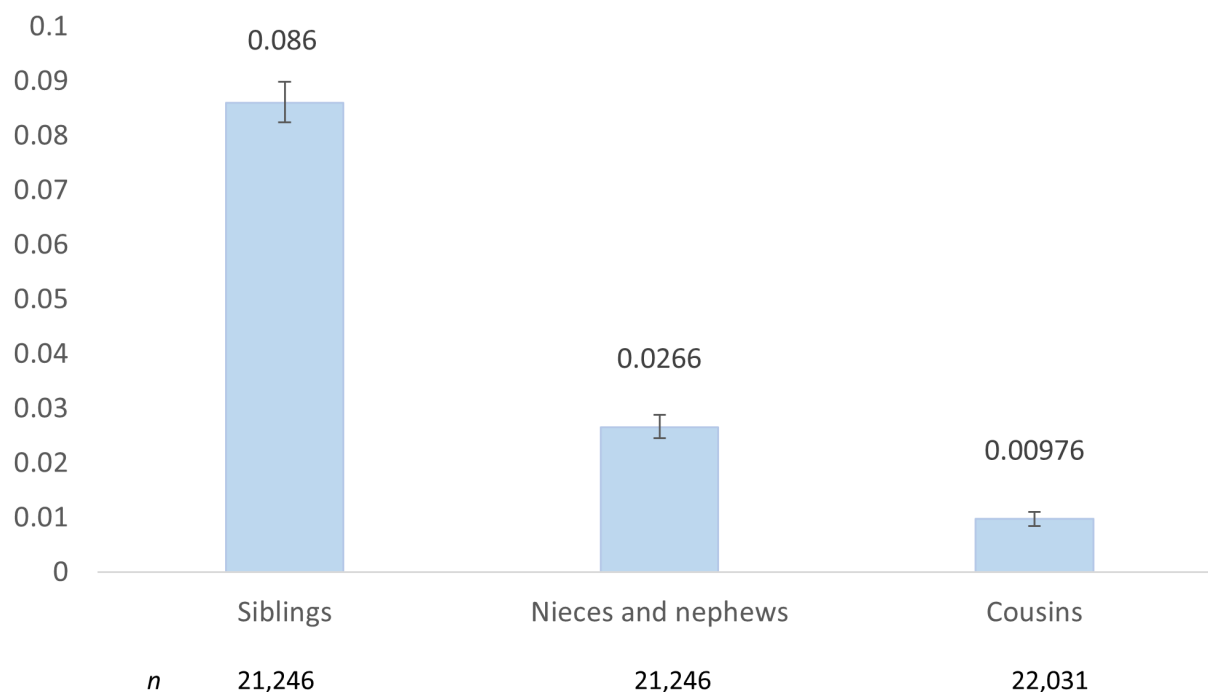
Figure 3: Average predicted probability of ever giving money to collateral relatives, for PSID-gened individuals only. (See online supplement, Table 2.) (95 percent confidence intervals shown.)

changed many years ago, the PSID has retained this rule in order to enhance the comparability of data collected over time. Consequently, a married woman sample member is never the head (now called the reference person) of her household if her husband is present, and her husband may be the person who provides responses when contacted by PSID staff. In the data files used in this analysis, only about one-third of the information was provided by women. Figure 4, which is based on the logistic regression models in online supplement Table 3, presents the results for assistance to collateral kin when the analytic sample is restricted to women who were observed to be household heads, nearly all of whom (by PSID rule) were either widowed, divorced, separated, or had never married. Virtually all of them had participated as the respondent when contacted by PSID staff. The results are once again very similar and follow the same pattern as in the Figures 2 and 3.[12]

It is also of interest to determine whether the same pattern of assistance to collateral kin holds for different racial-ethnic groups. The sociological literature has found that non-Hispanic black (hereafter "black") and Hispanic individuals are more likely to have contact with, and to provide support to, extended kin than are non-Hispanic white (hereafter, "white") individuals (Gerstel 2011, Taylor et al. 2013) A widely-cited study found that black families provide more frequent practical help
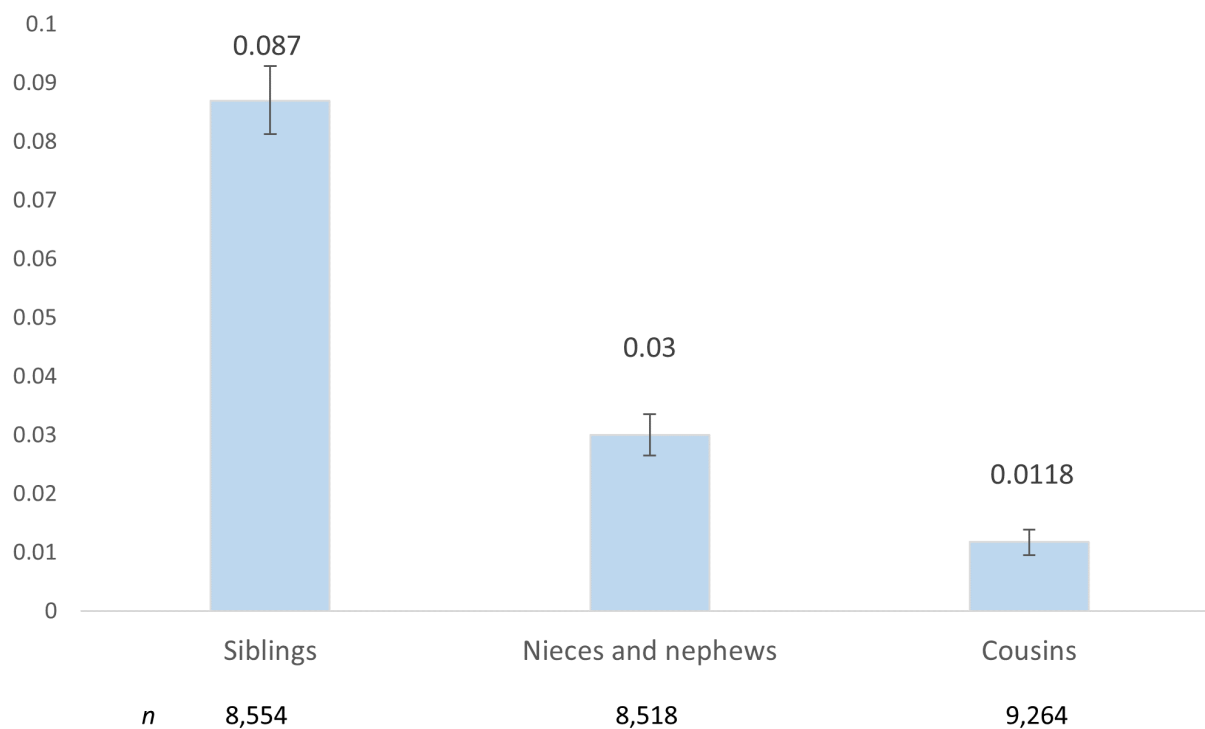
Figure 4: Average predicted probability of ever giving money to collateral relatives, for women household heads / reference persons only. (See online supplement, Table 3.) (95 percent confidence intervals shown.)

to kin (e.g., transportation, child care) than do white families, whereas, conversely, white families provide more frequent financial support (Sarkisian and Gerstel 2004). With respect to Hispanics, an older literature points to the importance of ritualized co-parenthood, known as *compadrazgo*, among Latin American immigrants to the United States (Ebaugh and Curry 2000), but more recent studies are scarce. Very little is known about transfers among American Indian or Asian families, and sample sizes in the PSID are insufficient to pursue detailed analyses of assistance to kin. Theories of genetic relatedness do not suggest any evolutionary-based differences in assistance to kin among racial-ethnic groups; consequently, any differences are likely to be caused by social structure and culture.

Figure 5, which is based on the logistic regression models in online supplement Tables 4, 5, and 6, shows the average predicted probabilities of ever giving money to collateral kin for black, Hispanic, and white individuals. It should be noted, however, that the main PSID sample does not represent people who immigrated to the United States after 1968, except for a supplementary immigrant sample that was added in 1997 to 1999 and a more recent immigrant sample that was added in 2017
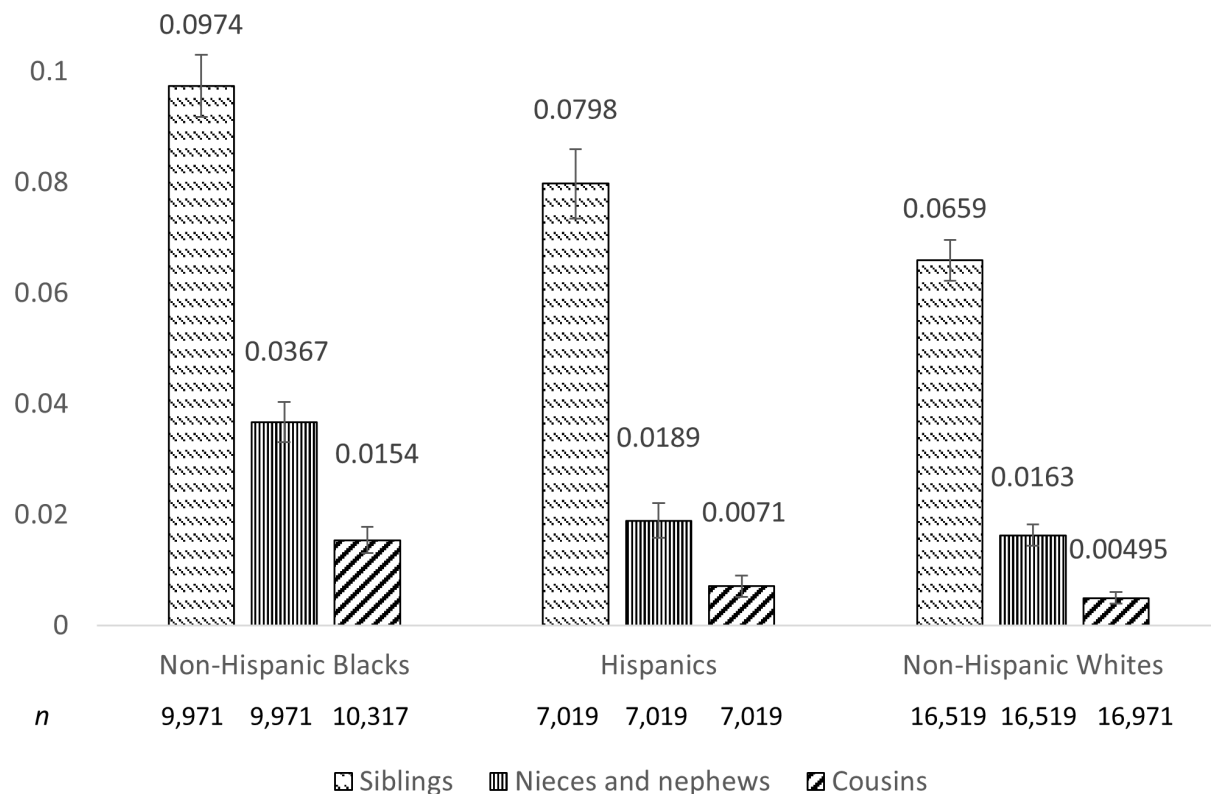
Figure 5: Average predicted probability of ever giving money to collateral relatives, for Non-Hispanic black, Hispanic, and Non-Hispanic white individuals. (See online supplement, Tables 4, 5, and 6.) (95 percent confidence intervals shown.)

to 2019. It is therefore not fully representative of the current Hispanic population of the United States, nor does it fully represent recent black immigrants from the Caribbean or Africa. With these caveats, Figure 5 shows that, within each of the three racial-ethnic groups, the patterns of assistance are consistent with earlier figures. Within each group, assistance to siblings is more common than is assistance to nieces and nephews, and assistance to nieces and nephews is more common than assistance to cousins, with all differences significant at the p < .0001 level.[13] These results show that Propositions 1, 2(a), and 2(b) hold for all three groups. In addition, the figure also shows a racial-ethnic hierarchy of assistance. Even though the literature would suggest that white individuals are more likely to provide financial assistance to kin, the PSID data show that black individuals are more likely to report financial assistance to collateral kin. Black individuals reported giving money more

frequently to siblings, nieces and nephews, and cousins than did Hispanics or whites, with all differences significant at the p < .0001 level. Hispanics were more likely to report giving assistance to siblings than were whites, but differences in Hispanic versus white reports of assistance to nieces and nephews and to cousins were not statistically significant.[14]

Discussion

The argument in this article is that evolutionary processes rooted in the drive to pass on one's genetic legacy play a role in, and can help to explain, contemporary patterns of family and personal life. Furthermore, the growth of personal choice in family relationships may enhance the visibility of genetic influences. Using the PSID, I have shown that assistance to collateral relatives, which is less normative than assistance to lineal relationships, displays an ordering that would be predicted by the evolutionary theory of inclusive fitness – the first time that this ordering has been demonstrated based on actual behavior from a large, systematic sample. The ordering includes a difference between assistance to nieces and nephews versus assistance to cousins that does not appear to have a social scientific explanation. To be sure, the greater amount of assistance to siblings is consistent with social scientific findings; still, an evolutionary perspective may help to explain the persistence of interactions among siblings and half-siblings that can be seen in old and new family circumstances. I have shown that this ordering of financial assistance holds for blacks, Hispanics, and whites. Nevertheless, social structural or cultural influences in assistance to kin are suggested by the higher overall levels of assistance among black families, and secondarily among Hispanic families, relative to white families.

There are limits, nonetheless, to what we can learn from the PSID data. The single question about giving money toward the support of anyone not living in the household cannot provide the rich source of information we would need to contextualize and fully understand this assistance. It does not provide answers to questions such as: Was the assistance reciprocal – did the respondents receive assistance back? Were there a series of small gifts or one or two large ones? Does the provision of assistance depend on the geographic distance between the donor and the recipient? A more significant limitation is that the PSID tells us nothing about non-monetary support. Did the respondents provide instrumental support such as helping with child care, providing transportation, or assisting with work around the house? Did they provide emotional support? Unfortunately, the only source of detailed information on instrumental and emotional support to kin in a national sample, as Furstenberg (2020) has noted, is still the first two waves of the National Survey of Families and Households, which were completed by 1994. Current data on kinship ties are lacking.

If there are indeed genetically-based influences on behavior with respect to family and personal life, individuals would show a range of predispositions on these matters from weak to strong. By no means would genetic predispositions be uniform across individuals. What the growth of choice would do is to provide a means for individuals to act according to their predispositions. A few decades ago, when donor insemination was seen as confidential and the identities of the

donors were not disclosed and were not traceable, donor-conceived individuals with a strong desire to bond with their donor siblings were not able to act upon their predispositions; now they are. Their deep interest in connecting with close kin is more visible than in the past even though the nature of genetic relatedness has not changed.

The genetic relatedness perspective could be expanded to other facets of contemporary family life. Consider, for instance, parent-child bonds in conflictual families. One study found a surprising persistence of relationships between sexual and gender minority individuals and their parents even when the relationships were strained or painful (Reczek and Bosley-Smith 2022). The authors, having observed these strained relationships, wrote, "Despite this, remarkably, the vast majority of relationships between LGBTQ adults and their parents remain intact" (p. 4). The authors minimize the role that genetic relatedness may play in the persistence of intergenerational ties. Yet for children, the parent-child bond provides resources and protection and therefore increases the chances of survival and successful reproduction. Therefore, breaking the bond with one's parents would be more difficult than breaking other, less direct, less intense, kinship bonds. Among evolutionary theorists, parent-child conflict is seen as endemic to the relationship as a result of the competing interests of the generations: If parents have more than one child, their typical strategy would be to spread their resources among the children; each child, however, would seek to maximize the parental resources flowing to her- or himself at the expense of her or his siblings (Trivers 1974).[15] We can expect, then, that cognitive mechanisms may have evolved that make individuals predisposed to maintaining the parent-child relationship even when in conflict.

The larger point is that, even as family diversity increases, we are seeing an unforeseen prevalence, or even expansion, of recognizable kinship patterns among individuals who have more choices in family and personal life than they had in the past. The social forces that have diversified family life – such as the greater social acceptance of non-traditional families; changes in the law with respect to who can marry, what the acceptable grounds for divorce are, and how children born outside of marriage are treated; as well as the greater economic independence of women – have increased personal freedom. For some individuals that has meant a rejection of conventional family patterns, but for others it has meant the continuation of family patterns, sometimes in new forms. When the great changes in family life began in the 1960s and 1970s, some observers feared that it augured the end families as we knew them. That has not happened; within the diversity, one can see persistence. Sociologists have good explanations for the diversity but not for the persistence. They have expressed surprise about phenomena such the continued importance of siblings. Yet by and large they have been unwilling to consider evolutionary influences. Their reluctance is understandable given the misuse of genetic theory in the past. Yet it is time to rethink this stance. The incorporation of an evolutionary perspective into the sociology of family, kinship, and personal life, without relinquishing a central focus on social structure and culture, could provide an important part of the missing explanation for the surprising patterns we are now seeing.

Notes

1 Individuals, of course, also provide assistance to people they are not related to. Inclusive fitness does not directly address assistance to non-kin, but it is possible to identify conditions under which fitness can be reinforced by assistance to non-kin (Axelrod and Hamilton 1981, Davis and Daly 1997). But the PSID does not provide information on relevant factors such as whether assistance to non-kin is reciprocal and whether it results from continued, frequent interactions.

2 Piliavin and Charng (1990) suggested that altruism may be, in part, an inherited genetic characteristic, although they elaborated no further and suggested no testable hypotheses.

3 But see small surveys such as Essock-Vitale and McGuire (1980) and studies of bequests such as Judge and Hrdy (1992) and Smith, Kish, and Crawford (1987).

4 Strict evolutionary theorists would maintain that the mother-child bond is the strongest, with the father-child bond more variable due to paternal uncertainty (Daly, Salmon, and Wilson 1997).

5 I am following the common language by referring to the overall percentage of a person's genes that are shared with kin; but this is not technically correct. It is the sharing of genes that are relevant for reproductive success that matters, not the sharing of all of one's genetic material (Park 2007).

6 There are two exceptions: In the 1988 wave, questions about giving money had a different form and did not probe for detailed relationship categories such as siblings, aunts, uncles, nieces, nephews or cousins. In the 1996 wave, the "did you give any money" question was asked, but detailed relationships were not coded. I have excluded data from those years.

7 For a study that estimates the presence of extended kin for a subset of the PSID respondents, see Daw, Verdery and Margolis (2016).

8 The weighted distribution of the 12,650 sibling pairs is 73.7 percent full siblings ($r = 0.50$), 6.9 percent half-siblings ($r = 0.25$), 16.3 percent at-least-half-siblings (children raised by a common single parent with no information on the outside parent or parents, for whom $r = 0.50$ if the pair are full siblings and 0.25 if the pair are half-siblings), and 3.1 percent for step and other unrelated siblings ($r = 0.00$).

9 The the null hypothesis that assistance to siblings does not exceed assistance to nieces and nephews can be rejected at the p < .0001 level, $t = 23.03$, $d.f. = 36,944$. The null hypothesis that assistance to nieces and nephews does not exceeds assistance to cousins can also be rejected at the p < .0001 level, $t = 11.85$, $d.f. = 36,944$.

10 From the logistic regressions, the null hypothesis that the average predicted probability of assistance to siblings does not exceed the average predicted probability of assistance to nieces and nephews can be rejected at the p < .0001 level, $t = 39.72$, $d.f. = 34,537$. The null hypothesis that the average predicted probability of assistance to nieces and nephews does not exceed the average predicted probability of assistance to cousins can also be rejected at the p < .0001 level, $t = 18.28$, $d.f. = 34,537$.

11 The null hypothesis that the average predicted probability of assistance to siblings does not exceed the average predicted probability of assistance to nieces and nephews can be rejected at the p < .0001 level, $t = 31.6$, $d.f. = 21.245$. The null hypothesis that the average predicted probability of assistance to nieces and nephews does not exceed the average predicted probability of assistance to cousins can also be rejected at the p < .0001 level, $t = 8.96$, $d.f. = 21,245$.

12 The null hypothesis that the average predicted probability of assistance to siblings does not exceed the average predicted probability of assistance to nieces and nephews can be rejected at the p < .0001 level, t = 19.2, $d.f.$ = 8,553. The null hypothesis that the average predicted probability of assistance to nieces and nephews does not exceed the average predicted probability of assistance to cousins can also be rejected at the p < .0001 level, t = 10.1, $d.f.$ = 8,517.

13 For blacks: siblings versus nephews and nieces, t = 21.15, $d.f.$ = 9,970; nieces and nephews versus cousins, t = 11.58, $d.f.$ = 9,970. For Hispanics:, siblings versus nephews and nieces, t = 19.15, $d.f.$ = 7,018; nieces and nephews versus cousins, t = 7.38, $d.f.$ = 7.018. For whites: siblings versus nephews and nieces, t = 26.11, $d.f.$ = 16,518; for nieces and nephews versus cousins, t = 11.13, $d.f.$ = 16,518.

14 The results of two-sample t-tests of racial-ethnic differences, with Bonferroni adjustments for multiple tests, are presented in the online supplement, Table 7. All differences except two Hispanic versus white comparisons are significant at the p < .001 level.

15 Work on parent-child conflict in sociology dates from the article by Davis (1940) on the topic.

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