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Fathers' care in context: 'facultative,' flexible fathers respond to work demands and child age, but not to alloparental help, in Cebu, Philippines

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ABSTRACT

Current evolutionary theory conceptualizes fathers' childcare as highly facultative and likely contingent on a variety of local socioecological predictors. Much of the evolutionarily-motivated work on the predictors of paternal care has focused on smaller-scale societies, while similar, potentially complementary research in larger-scale societies has focused on theoretical frameworks from (e.g.) economics and developmental psychology. Due to the different emphases, relatively few studies have incorporated information on variables known to predict paternal care in one context with those known to predict it in the other. Here, we assess whether paternal care conforms to predictions derived from the facultative fathering hypothesis and life history theory in Cebu, the Philippines. We evaluated which of 6 variables—hours worked outside the home, age and number of children, number of other caregivers, family residence pattern, and fathers' educational attainment—predicted the number of hours fathers reported spending on 12 common caregiving tasks. Consistent with the basic premise of facultative fathering, men who worked more spent less time on childcare. Additionally, the time fathers spent on different types of caregiving reflected changes in demand as children age. However, alloparental care appears to be a complement to, rather than a substitute for, paternal care in this context, in contrast to the predictions of the facultative fathering hypothesis. We also found that men with more education reported spending more time on childcare, consistent with a caregiving strategy that emphasizes heavy investment in embodied capital across generations. Our data illustrate the context-specific nature of 'facultative' caregiving in humans, and highlight the importance of considering locally-relevant predictors when testing predictions derived from evolutionary theory.

1. Introduction

Cooperative caregiving is considered critical to the evolution of human life history patterns (Kramer, 2010; van Schaik & Burkart, 2010). This has led to extensive theorizing about the importance and expression of paternal caregiving in our evolutionary past (reviewed in Gettler, Boyette, & Rosenbaum, 2020; Gray & Anderson, 2010). Various theoretical frameworks and empirical research have emphasized fathers' provisioning (Kaplan, Hill, Lancaster, & Hurtado, 2000; Kramer, 2009;

Wood & Marlowe, 2013), direct care (Gettler, 2010; Winking, Gurven, Kaplan, & Stieglitz, 2009), and social capital cultivation (Gettler et al., 2021; Scelza, 2010; von Rueden, Gurven, & Kaplan, 2011), while others have questioned the evolutionary significance of fathers' contributions (Hawkes, O'Connell, & Blurton Jones, 2001; Leonetti, Nath, Hemam, & Neill, 2004; Sear & Mace, 2008; Sherk, Starkweather, Kress, & Alam, 2013). Though some aspects of these debates are difficult or impossible to resolve *vis a vis* our evolutionary past, collectively, they have led to conceptual framing of paternal roles as highly facultative, and likely

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contingent on a variety of local socioecological predictors.

This body of research allows us to draw on evolutionarily grounded hypotheses about the nature of paternal care in contemporary cultures. Anthropological scholarship on the patterns and predictors of paternal care has disproportionately focused on smaller-scale societies, often those where hunting and gathering is an important mode of subsistence (Fouts, 2008; Hewlett, 1993; Ivey, 2000; Konner, 2016; Marlowe, 2005; Meehan, 2005; Muller, Marlowe, Bugumba, & Ellison, 2009; Quinlan & Quinlan, 2007; Winking et al., 2009; Winking & Koster, 2015; but see also Anderson, Kaplan, Lam, & Lancaster, 1999; Flinn, 1992; Gray et al., 2017). Such studies have provided critical information about the relationships among residence patterns, subsistence mode, opportunity costs, environmental risks, and cultural norms, and the types and amounts of care that fathers provide (residence patterns: e.g. Fouts, 2008; Hewlett, 1993; Meehan, 2005; Perry, 2017; subsistence mode: e.g. Hewlett, 2004; Hewlett & Macfarlan, 2010; Marlowe, 2000; Muller et al., 2009; opportunity costs: e.g. Hewlett, 1993; Schacht, Davis, & Kramer, 2018; environmental risks: e.g. Martin, Ringen, Duda, & Jaeggi, 2020; Quinlan, 2007; cultural norms: e.g. Boyette, Lew-Levy, Sarma, Miegakanda, & Gettler, 2019; Gettler, 2016; Gettler, Kuo, Bas, & Borja, 2019; Hewlett, 2004; Shwalb, Shwalb, & Lamb, 2013).

These studies have shaped our understanding of paternal care in socioecological contexts that include various combinations of small community sizes, extensive extended social networks, and cultural values that prioritize egalitarianism and cooperation, including in childcare (Bird-David, 1990; Boyette & Hewlett, 2018; Dyble et al., 2015; Hill et al., 2011; Migliano et al., 2017). Data from these settings have been used to highlight the facultative nature of human fathering. The facultative fathering hypothesis predicts that fathers will reduce their caregiving—especially direct forms—when alloparents are present to take their place (Hrdy, 2009, 2012; reviewed in Marlowe, 2000). There is empirical support for this hypothesis. Among Aka and Bofi foragers living in the Congo Basin, fathers held children less when their children's maternal grandmother was present (Fouts, 2008), and Aka fathers' direct caregiving increased when families lived patrilocally, in part because there were fewer participating alloparental caregivers than when families were matrilocal (Meehan, 2005). Similarly, among Hadza foragers in Tanzania, as the amount of time maternal grandmothers spent holding children rose, the amount of time fathers spent holding them fell (Marlowe, 2005). While the facultative fathering hypothesis is often discussed in the context of tradeoffs against alloparental care, it can also more generally be conceptualized as a framework to understand the extreme variability observed in paternal care worldwide—i.e., the 'flexibility' of human fatherhood (Hrdy, 2012).

1.1. The context of larger-scale societies

While studies from smaller-scale societies are very informative, the vast majority of families today live in larger-scale societies. These have particular socioecological dynamics that are different from the contexts in which human paternal care probably evolved, even if some similarities remain. This confluence may create new biocultural landscapes for childcare (Nelson, 2020), including care by fathers (Gettler, 2016). In these landscapes, some ecological features that evolutionary theory predicts might be important predictors of inter-(cultural)group variation in paternal care (e.g. starvation risk and pathogen loads: Martin et al., 2020; Quinlan, 2007) are of less relevance. This occurs due to dramatically decreased variation (e.g., few children face starvation in many Global North settings), and/or decreased fitness relevance (e.g., pathogen load may not be an important fitness predictor when calories are abundant).

While variation on some factors has largely dissipated in these contexts, however, variation on other dimensions—in particular, intragroup variation—may be magnified. For example, while labor/caregiving tradeoffs are not unique to any particular economic or subsistence regime (Gettler, 2010; Hewlett, 1993; Hurtado, Hill, Hurtado, & Kaplan,

1992; Marlowe, 2000; Meehan, 2009), in larger-scale societies some parents are unemployed, while others work many hours outside the home (Brayfield, 1995; Nelson, 2020; Norman, Elliot, & Fagan, 2014). This results in substantial inter-family variability in time allocation. Additionally, formal employment can introduce constraints that could magnify the trade-offs between labor and caregiving (e.g. Han, 2004; Short, Chen, Entwisle, & Fengying, 2002). Most wage labor jobs have strict schedules over which workers have little or no control. They are generally totally incompatible with childcare of any kind, because of the nature of the work and/or rules imposed by employers. In communities where subsistence regimes allow greater opportunities for apprenticeship, adult skills are taught to children from young ages via active participation (Kline, Boyd, & Henrich, 2013; Lew-Levy et al., 2019; Lew-Levy & Boyette, 2018). This means that childcare and labor are at least sometimes occurring simultaneously.

1.2. Parental investment and life history tradeoffs in the context of larger-scale societies

The facultative nature of paternal care highlights the life history tradeoff fathers are making between fertility and parental investment (Lawson & Mace, 2011). One of the most important forms that parental investment takes in humans is assisting their offspring with embodied capital acquisition. Vertical transfer of skills and knowledge is critical in all human societies, and in larger-scale societies, formal education is a particularly lucrative embodied capital investment (Hewlett, Fouts, Boyette, & Hewlett, 2011; Kaplan, Lancaster, & Robson, 2003). While formal education may differ in important ways from vertical (or oblique) knowledge transmission in other contexts, it nonetheless provides opportunities to investigate parental investment strategies and life history tradeoffs (Hrdy, 2000; Lawson & Mace, 2009).

While parents may not be individually educating their children, the long-term support they provide is essential for success as a student. Even when education is free, it carries substantial opportunity costs (Kaplan et al., 2003). Across societies, more years of education predicts longer lifespans and better health in adulthood (e.g. Li & Powdthavee, 2015; van Raalte et al., 2011), and is so closely tied to higher socioeconomic status (SES) that years of education is commonly used as an SES proxy (Grzywacz, Almeida, Neupert, & Ettner, 2004). While the connection between SES and fitness is complex in post-fertility transition societies, there is little doubt that the substantial parental investment required to formally educate children requires a tradeoff against fertility (Huber, Bookstein, & Fieder, 2010).

The health and monetary returns of formal education have risen dramatically in recent decades (Long, 2010; Sakellariou, 2006), which presumably incentivizes continuation of this strategy across generations. Parents who pursued this strategy may be more likely to encourage their children pursue the same one, and thus invest more heavily in the kinds of care that produce successful students (Kaplan, Lancaster, Johnson, & Bock, 1995). More years of formal education predicts greater levels of paternal involvement in many cultures (Fouts, Roopnarine, Lamb, & Evans, 2012; Liu, Wu, & Zou, 2016; Macon, Tamis-LeMonda, Cabrera, & McFadden, 2017; Saraff & Srivastava, 2010), and parental investment is an important influence on children's school achievement (e.g. Checa & Abundis-Gutierrez, 2017; Milliotis, Sesma, & Masten, 1999; Zahedani, Rezaee, Yazdani, Bagheri, & Nabeiei, 2016).

1.3. Bridging research gaps across contexts

A disproportionate number of studies on paternal behavior in larger-scale societies have focused on theoretical frameworks from the (e.g.) sociology, economics, developmental and social psychology, and policy literatures (Amodia-Bidakowska, Lavery, & Ramchandani, 2020; Averett, Gennetian, & Peters, 2000; Cabrera, Fitzgerald, Bradley, & Roggman, 2014; Eydal & Rostgaard, 2016; Raley, Bianchi, & Wang, 2012; Saraff & Srivastava, 2010). Due to the different focuses of these

fields, relatively few have integrated information on educational attainment and employment with the set of predictors that have been of primary interest in the anthropological literature—in particular, family residence patterns, caregiving demand (e.g. number and ages of children), and the presence and assistance of alloparental helpers (e.g. Fouts, 2008; Hames, 1992; Meehan, 2005). We do not know if the effects of these variables are systematically smaller than the substantial influences of education and employment, or whether they continue to play an important role in determining how much and what kinds of care men offer.

Understanding these dynamics is important because of the opportunities it provides to test evolutionary predictions across contexts (Gettler et al., 2020; Gurven, 2020). For example, while paternal/alloparental care tradeoffs have received outsized attention in the evolutionary social sciences literature (e.g. Hrdy, 2009; Hrdy, 2012; Kokko, Johnstone, & Wright, 2002; Meehan, 2005), there is little reason to believe that alloparents are the sole area in which this facultative tendency should be expressed. Recent work with Maya families has demonstrated the flexibility of paternal behavior in response to employment opportunities (or lack thereof) and novel chances to invest in offspring quality (Schacht et al., 2018). Families in all types of societies are making complex tradeoffs as they balance demands on their time and energy, and understanding what inputs fathers respond to provides important information about men's parenting strategies across socioecological contexts.

In this study, we use data collected as part of the Cebu Longitudinal Health and Nutrition Survey (CLHNS), a large longitudinal birth cohort study started in 1983 in metropolitan Cebu in the Philippines (Adair et al., 2011). The original male cohort members have been followed during many survey waves, including a 2014 survey in early mid-adulthood (age 29–31) that focused intensively on family life and fathering. The Philippines has a population 107 million (2018), and Cebu is its second largest metropolitan area after Manila (Philippine Statistics Authority (PSA), 2020). The CLHNS represents a large (~3 million people) urban setting in a middle-income country. It has considerable variation in education levels and employment patterns, and thus allows insights that complement past work conducted in the US, Western Europe, and similar contexts. However, multi-generational households have historically been common, and alloparental care by extended kin is culturally valued and more often relied upon than paid care from non-kin (Agree, Biddlecom, & Valente, 2005). This makes Cebu well-suited to determining whether differences in paternal care are linked to differences in familial caregiving dynamics and demographics, education, and employment.

1.4. Aims and predictions

Building on extensive past research on the biology of fatherhood (e.g. Gettler et al., 2017; Gettler, McDade, Agustin, Feranil, & Kuzawa, 2014; Kuzawa, Gettler, Muller, McDade, & Feranil, 2009; Rosenbaum, Gettler, McDade, Bechayda, & Kuzawa, 2018; Sarma, Kuo, Bechayda, Kuzawa, & Gettler, 2018), we address two broad aims. The first is to describe the general pattern of family demographics and childcare in CLHNS households. We provide detailed information on the composition and structure of households, and describe which caregivers—including parents, grandparents, aunts, uncles, siblings, cousins, and paid helpers—perform common caregiving behaviors. This helps contextualize the environment in which paternal care is occurring, and facilitates comparison with the rich ethnographic work that has taken place in many small-scale societies (e.g. Crittenden & Marlowe, 2008; Fouts, 2008; Hewlett, 1993; Konner, 2010; Marlowe, 2005).

Our second aim is to test predictions derived from evolutionarily grounded frameworks about the nature of paternal care. We predict that, consistent with the facultative fathering hypothesis, fathers in Cebu will spend more time on paternal care when 1) they work fewer hours outside the home; 2) their families receive less assistance from

alloparents; 3) they do not live in close proximity to their wife's family, and 4) they have more children. In other words, we expect that fathers will do less care when they have less available time, more help (which should be disproportionately likely to come from their wives' families), and there are fewer childcare demands to be fulfilled.

We also predict that fathers will do more routine caregiving (e.g. bathing, putting to bed) when their children are younger, but more 'recreational' care (e.g. telling stories, taking children on outings) and educational care (e.g. helping with homework) when they are older, reflecting changing demands as children age. While this is not 'facultative' per se (because rather than substituting caregivers, the demand for a particular type of care disappears), it does reflect fathers' caregiving flexibility: instead of limiting their involvement to tasks required during specific developmental windows, they update as children age. Studies in different contexts have found different relationships between children's ages and fathers' care (Bailey, 1994; Bruce & Fox, 1999; Morelli & Tronick, 1992; Wood & Repetti, 2004), but given the nature of these activities (i.e., children get better at doing their own bodily care as they get older, but also begin formal education), we feel this is the most ecologically valid prediction.

Finally, we predict that fathers with more education will do more caregiving than fathers with less, and that this effect will be particularly pronounced with education-related caregiving. This is consistent with the hypothesis that fathers who have invested in their own education are pursuing a caregiving strategy that prioritizes investment in embodied capital.

2. Methods

2.1. Study population

This study was conducted using data from the CLHNS, a population-based birth cohort study of infants born in 1983 and 1984 in randomly selected rural and urban neighborhoods in and around metropolitan Cebu, Philippines (Adair et al., 2011). Data were collected in 2014, when the household fathers (i.e. the birth cohort subjects) were an average of 30.5 years old (range = 29–31), and their children's mothers were an average of 28.09 years old (SD = 3.87). All research was conducted with written informed consent, with Institutional Review Board oversight by Northwestern University.

2.2. Demographic and behavioral data collection

Cebuano-speaking interviewers collected questionnaire data about caregiving behavior in the participants' homes. We used behavioral data from 430 households that met three criteria: first, a mother and a father resided in the household; second, the father's main workplace was in the same province as his residence; and third, the household contained at least one of the parents' biological children who was less than 10 years old. This age cutoff has been used in previous CLHNS analyses to define childhood, when interactive care is most relevant and most time-intensive (Schmeer, 2009). Including school-aged children also let us evaluate fathers' roles in education-related caregiving. Information on household composition (including child age) came from interviews with fathers.

Both mothers and fathers were asked about the 12 caregiving tasks we address (Table 1). Fathers were asked how many hours they spent on each of the tasks in the seven days preceding the interview. Mothers were asked to name all of the people who participate in a given caregiving task (in general, not within a specific time frame), up to a maximum of five people. Both parents had the option of stating that the activity was not done in the household, or that the children do it themselves, so the sample sizes for each task vary (Table 1). Questions were worded as across children generally, not individual children specifically. For this reason, our analysis does not distinguish between families who had only biological children, and the small number that

Table 1

Basic description of caregiving tasks.

Task	Households where mother reported at least one caregiver did task (possible $n = 430$)	Mean number of caregivers mothers reported did task ²	Percent households in which mother reported she did task ²	Percent households in which mother reported father did task ²	Correlation between mother and father (r_1) ³
Routine caregiving tasks ¹					
Bathing	395	1.86 (SD = 0.81, range = 1–5)	95.70	57.47	–0.16
Grooming	398	1.78 (SD = 0.86, range = 1–5)	96.48	47.74	–0.12
Helping with toilet	376	1.87 (SD = 0.88, range = 1–5)	94.15	55.85	–0.16
Feeding	374	2.00 (SD = 0.91, range = 1–5)	95.72	60.16	–0.03
Putting to bed	379	1.88 (SD = 0.86, range = 1–5)	93.14	61.21	–0.35*
Recreational caregiving tasks ¹					
Playing	393	2.18 (SD = 0.93, range = 1–5)	87.53	83.97	0.10
Going for walks/outings	406	2.08 (SD = 0.70, range = 1–5)	97.04	84.73	0.16
Singing or dancing	343	1.86 (SD = 0.81, range = 1–5)	84.26	70.55	–0.22
Exchanging stories	411	2.24 (SD = 0.93, range = 1–5)	97.08	84.18	0.15
Educational caregiving tasks ¹					
Taking to/from school	266	1.56 (SD = 0.67, range = 1–5)	69.92	53.01	–0.31*
Helping with homework	300	1.52 (SD = 0.63, range = 1–4)	86.00	47.00	–0.46*
Reading to child (ren)	260	1.56 (SD = 0.71, range = 1–5)	89.62	49.23	–0.42*

¹ Spaces separate the three categories of tasks: the top five are the tasks included in our routine caregiving category; the middle four are the tasks included in our recreational caregiving category; and the final three are the tasks included in our educational caregiving category.

² Contingent upon task being done in the household.

³ Tetrachoric correlations, for use with binary variables.

* Statistically significant correlation ($p < 0.05$).

also had adopted children ($n = 5$ families) or stepchildren ($n = 11$ families). It also does not distinguish between care given to girls versus boys, so we were not able to test predictions about differential investment in the two. However, in Cebu there also are not clear *a priori* bases for making sex-specific predictions. Cebu lacks institutions such as dowries, bride price, or gender-specific inheritance practices (Bereczkei & Dunbar, 2002; Hassan, Schaffnit, Sear, Urassa, & Lawson, 2019; Mace, 1996) that would make greater investment in one over the other clearly advantageous.

We refer to each class of caregiver by their relationship to the children of the focal father. We focus on grandparents (including greats), aunts/uncles (including greats), siblings, cousins, and hired household help. Other potential non-kin helpers (e.g. neighbors, friends) were so rarely reported as caregivers that they were excluded from our analyses. For example, only four families reported that any non-kin, non-hired helper assisted with any of our five routine caregiving tasks (described below in section 2.3, and in Table 1).

We further broke related caregivers down into maternal and paternal relatives, for grandparents and aunts/uncles. While this is not a central focus of our analysis, we include specific, individual task-level information on the contributions of each type of caregiver (e.g. paternal and maternal grandmothers, paternal and maternal uncles) in supplementary tables S1–S6, due to the widespread interest in this topic in the broader body of literature that this study draws from (Crittenden & Marlowe, 2008; Daly & Perry, 2017; Fox et al., 2010; e.g. Hawkes, O'Connell, Jones, Alvarez, & Charnov, 1998; Sear & Mace, 2008).

One limitation of these CLHNS data is that they do not contain

complete information on family members other than the male participants. For example, they do not have information about time allocation or education level of the male participants' wives (i.e. the mothers in our study), or on household income. Time and resource limitations, combined with the difficulty of administering detailed surveys to multiple adult household members, mean that we know much more about fathers than we do about other caregivers in the households. Data collection (on e.g. household income or number of hours worked by other adults) that would be straightforward in settings like middle or upper-SES homes in the United States, are considerably more challenging in an environment where people have inconsistent, varied, and/or multiple sources of income, as is often the case among Cebuano families.

2.3. Behavioral categorizations and validation of paternal self-reports

While we provide descriptive data on the allocation of individual caregiving tasks in supplementary tables S1–S6, for our primary analysis, we grouped the 12 behaviors into three categories. We refer to these as routine caregiving tasks (bathing, grooming, helping with toilet needs, putting to bed, and feeding children); recreational tasks (playing, singing or dancing, exchanging stories, and going for walks or outings with children); and educational tasks (taking children to or from school, helping with homework, and reading to children) (Table 1). We summed the number of hours fathers said they spent on all of the tasks in a given category. For example, the number of hours fathers said they spent on educational tasks was the sum of the hours they reported spending taking their children to school, reading to them, and helping them with

their homework, in the prior seven days. These sums were rounded to the nearest whole number for analysis. These whole numbers were used as the outcome variable in our models that evaluated what variable(s) predict the amount care fathers reported providing.

The nature of self-report is a limitation of any study that uses this type of data. Fathers may be inclined to under or over-report their participation, and it may be challenging to assign an hour estimate to tasks that are highly variable. It is likely harder to give an accurate estimate of the amount of time spent on less structured activities like playing, than to give an accurate estimate of the time spent on more structured, predictable activities like bathing (Wijndaele et al., 2014). However, our study relies on a relatively short recall duration (the last 7 days), which increases the accuracy of self-reported time allocation data (Tarrant, Manfredo, Bayley, & Hess, 1993).

Most importantly, our interest here is less in the absolute values that fathers report, than in which variables predict greater or lesser amounts of self-reported care. We proceed on the assumption that fathers who do more care are likely to report spending more hours engaged in care. Many studies have found positive correlations between self-reported time spent on activities (e.g. exercise, work activities) and other objective measures of these activities (e.g. Burke et al., 2000; Foley, Maddison, Olds, & Ridley, 2012; Wijndaele et al., 2014). To further validate our assumption, we confirmed that mothers were more likely to report fathers as one of the caregivers who did a given task, as the number of hours fathers said they spent on a task rose. The results of this validation are reported in the supplementary materials, including Fig. S1.

2.4. Data summary and analysis

2.4.1. Aim 1: Describe the family and caregiving environment

For each household, we counted the number of co-resident children the focal father had who were < 10 years old, as well as the number of potential caregivers in the household, both overall and within categories (e.g. maternal aunts, hired caregivers, etc.; Table 2). For descriptive purposes, we also categorized households into the types defined in Table 3. Using binary yes/no variables (did the caregiver do the task or not, as reported by mothers) for each caregiver type, we calculated the proportion of households in which mothers said a given caregiver type did a given task, both overall and contingent on co-residence of that type of caregiver (Table 1; supplementary tables S1-S6). A more detailed description and basic analysis of differences between maternal and paternal kin is provided in the supplementary materials (Tables S1-S6), though we provide summaries of key takeaways in the main results.

Additionally, we created a 'total task count' variable for each of our three task categories, which was the number of tasks in a given category that were performed in the household (e.g. if a mother reported that helping with homework and taking children to school were done in the household, but not reading to children, then the task count for the

Table 2
Relatives in focal family homes.

Relative type	Count of households containing relative	Percent of households containing relative
Maternal grandmother/grandfather	34/22	7.9 / 5.1
Paternal grandmother/grandfather	75/55	17.4 / 12.8
*Maternal aunts/uncles	30/40	7.0 / 9.3
*Paternal aunts/uncles	42/43	9.8 / 10.0
*Cousins	42	9.8
*Older siblings (over age 10)	51	11.9

* Percent of households that contained one or more of the given category of relative.

educational caregiving category was two). While this is not a focus of our analysis, we reference this variable in the discussion due to its potential relevance for understanding how well fathers' reported time spent on care might reflect overall household time spent on care.

2.4.2. Aim 2: Test predictions derived from evolutionary theory about the nature of paternal care

We evaluated the relationship between fathers' self-reports of number of hours they spent on routine caregiving tasks, recreational tasks, and educational tasks (as described above under Behavioral Categorizations), and the six predictor variables described in Table 4. We tested three other variables (two that measured within-household variation in child age, and one that measured household wealth) in our models, but ultimately excluded them because of their low explanatory power and because they did not change the conclusions. A more detailed description of these variables can be found in the supplementary materials.

Checks of the variance inflation factor (VIF) indicated low to moderate collinearity between the included variables (mean VIF = 2.14, range = 1.01–4.57). We also treated a dummy variable for urban/rural as a fixed effect, since there are likely to be other, unobserved sources of variation between these two subsets of the sample (e.g., differences in the nature or timing of paternal work). To analyze our data, we used pseudo-Poisson regressions with robust variance estimators, which relax the homoskedasticity assumptions of Poisson regression (Stata package `ppmlhdfc`, with `vce` specification robust). Using Poisson rather than (e.g.) negative binomial models, a common choice with over-dispersed count data, allows us to include fixed effects, since the inclusion of fixed effects in negative binomial models may introduce incidental parameters bias (e.g. Allison & Waterman, 2002).

Results are reported as incidence rate ratios, where a one-unit change in the variable of interest predicts an x-factor change in the rate of caregiving (measured as hours of care per week). A factor change of less than one indicates that a variable predicts lower rates of caregiving, while a factor change of greater than one indicates a variable predicts higher rates of caregiving. All analyses were performed using Stata 16 (StataCorp, College Station, TX).

3. Results

3.1. Aim 1: Describe the family and caregiving environment

3.1.1. Summary of the household environment

Summaries of living arrangements and household composition are provided in Tables 2 and 3. At least one grandparent lived in 27.2% of the total households, though no household reported having >2 grandparents co-resident, and only one contained both a maternal and a paternal grandparent. A similar percentage (23.3%) reported living with one or more aunts or uncles (for households with >0 aunts/uncles, mean = 2.02, SD = 1.4, range = 1–7). In the households that contained cousins, the mean number was 1.8 (SD = 1.2, range = 1–6). In the households that contained older siblings (i.e., children of the focal father >10 years old), the mean number was 1.2 (SD = 0.5, range = 1–3). The average age of these older siblings was 11.3 (SD = 1.2, range = 10.0–14.3).

Slightly more households lived with paternal relatives ($n = 97$, 22.6%) than maternal ($n = 75$, 17.44%). Only 4.9% ($n = 21$) lived with both paternal and maternal relatives. 55.1% ($n = 237$) lived in the neighborhood of the father's extended family, 15.8% ($n = 68$) lived in the neighborhood of the mother's extended family, 23.0% ($n = 99$) lived in a neighborhood that contained both extended families, and 6.0% ($n = 26$) lived in a neighborhood that did not contain either the mother or father's family.

3.1.2. Distribution of parental caregiving

Mothers were very likely to report themselves as participants in all 12 direct caregiving tasks (Table 1, Fig. 1). Contingent on the task being

Table 3

Summary residence statistics for households included in the analyses.

Household type	Description	Number of households	Number of adult caregivers ¹	Number of children < 10 yo ²	Age of children < 10 yo
Nuclear family	Focal father, his spouse or unmarried partner, and their child (ren)	279	Mean = 2.03 ³ SD = 0.24 Range = 2–5	Mean = 1.98 SD = 0.96 Range = 1–5	Mean = 4.58 SD = 2.02 Range = 0–9.5
Horizontal extended family	Any configuration of one nuclear family unit with one or more other relative(s) belonging to the same generation as the household head	16	Mean = 3.25 SD = 0.45 Range = 3–4	Mean = 2.19 SD = 0.83 Range = 1–4	Mean = 4.45 SD = 2.03, Range = 1.5–7.71
Vertically extended family	Any configuration of one nuclear family unit with one or more other relative(s) belonging to a generation other than that of the household head	25	Mean = 2.96 SD = 0.61 Range = 2 ⁴ –4	Mean = 2.28 SD = 1.14 Range = 1–6	Mean = 4.45 SD = 1.85 Range = 0.17–8.33
Horizontally and vertically extended family	Any configuration of one nuclear family unit with other relative (s) belonging to generations both the same as, and different from, the household head	3	Mean = 3.67 SD = 0.58 Range = 3–4	Mean = 1.67 SD = 0.58 Range = 1–2	Mean = 5.24 SD = 2.53 Range = 2.5–7.5
Multi-nuclear family	Household consisting of two or more nuclear units, whether of the same or different generations	107	Mean = 5.51 SD = 2.05 Range = 3–16	Mean = 1.81 SD = 0.78 Range = 1–4	Mean = 3.96 SD = 2.04 Range = 0–8.58
Total sample		430	Mean = 3.01 SD = 1.82 Range = 2–16	Mean = 1.97 SD = 0.93 Range = 1–6	Mean = 4.42 SD = 2.03 Range = 0–9.5

¹ Number of adult caregivers refers to the sum of parents, grandparents, aunts and uncles, and live-in hired helpers residing in each household.² Inclusive of biological, adopted, and stepchildren.³ Nuclear family households with >2 caregivers had live-in hired help.⁴ Vertically extended families with only 2 adult caregivers lived with minor-age cousins of the focal father's children.**Table 4**

Variables used in models evaluating predictors of fathers' self-reported care.

Variable	Description	Prediction	Theory
Hours worked	Number of hours per week that fathers reported working outside the home	Fathers who work more outside the home will do less caregiving	Facultative fathering hypothesis
Number of alloparental caregivers	Count of the number of non-father caregivers that mothers reported do the caregiving task, including mothers themselves	Fathers will do less caregiving when more alloparents participate	Facultative fathering hypothesis
Live near	Categorical variable denoting whether the mother's family, father's family, neither, or both lived in the neighborhood of the focal family	Fathers will do less caregiving when maternal relatives are readily available	Facultative fathering hypothesis
Number of children	Count of the number of co-resident children a father had who were under 10 years old	Fathers will do more caregiving when there is greater caregiving demand	Facultative fathering hypothesis
Age of children	Mean age of the father's child(ren) who were under 10 years old	Fathers will do more routine caregiving when children are younger, and more recreational and educational caregiving when they are older	
Education level	Number of years of education completed by the father	Fathers with more education will do more caregiving, and in particular, more education-related caregiving	Embodied capital theory

done in the household, mothers were involved in all five routine caregiving tasks in >90% of families. Qualitatively, they were least involved in educational tasks (Table 1). Paternal involvement was lower than

maternal, though for nine of the 12 tasks, mothers reported that fathers helped in >50% of households (Table 1), and fathers did at least 1 task in 96.3% of the households (Fig. 1). Qualitatively, their overall rates of participation were highest for recreational tasks, and similar for routine caregiving and educational tasks (Table 1).

No task was reported done in all 430 households (Table 1). While this is unsurprising for 'optional' activities such as reading, it is more surprising for essential daily caregiving such as bathing and feeding. Some of it may reflect sampling error, but we believe it is primarily a byproduct of child age; as children get older, they need less help with bodily caregiving, to the point that mothers may not perceive any particular adult as being responsible for that type of care. For example, in the 35 families who did not report that a caregiver helped with bathing, the mean age of the *youngest* child in the household was 6.4 (SD = 1.7, range = 3–9.5), while in the 395 that did, it was 2.8 (SD = 2.0, range = 0–9). This pattern was similar for other caregiving tasks.

3.1.3. Distribution of caregiving by alloparents

Across all households, mothers reported that at least one alloparental caregiver helped with at least one routine caregiving task in 42.3% of households, at least one recreational task in 41.6% of households, and at least one educational task in 29.2% of households (Fig. 2). These percentages were higher among families who had at least one potential non-sibling alloparent living with them (60.6%, 57.4%, and 39.1%, respectively; Fig. 2), and lower in those that did not (31.7%, 32.6%, and 23.6%, respectively). No mothers reported that children were cared for outside the home (e.g. in institutional settings such as paid daycare), and authors JA and SAB confirm that this is uncommon among Cebu families.

3.1.3.1. Grandparents. Grandmothers were the most commonly reported alloparental caregivers (Fig. 1, supplementary Table S1). Qualitatively, both maternal and paternal grandmothers were most likely to participate in routine caregiving tasks (Fig. 1, Table S1). Participation in recreational tasks was highly variable, while very few participated in educational tasks (Table S1). In households that had a grandmother living with them, paternal and maternal grandmothers were equally

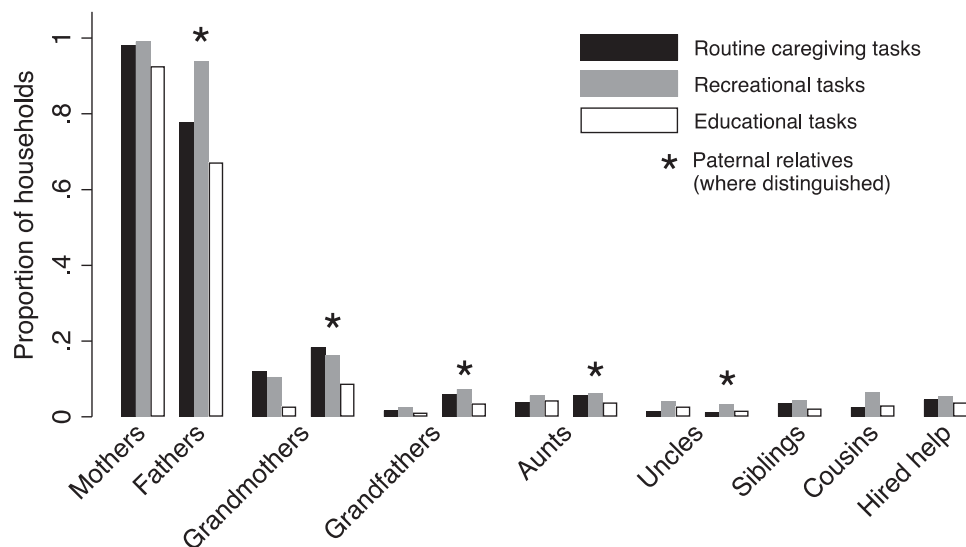


Fig. 1. Proportion of households where mothers reported that a given caregiver type did at least one of the tasks included in our three categories (routine, recreational, and educational tasks; see Table 1 for a complete list of tasks in each category). Stars denote the group of bars that is paternal relatives, for categories where the survey distinguished between paternal and maternal.

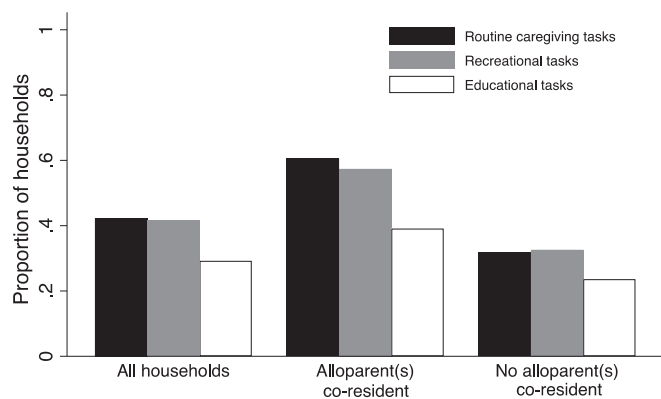


Fig. 2. Proportion of households where mothers reported that at least one alloparental caregiver did at least one task, in each of our three caregiving categories. See Table 1 for a complete list of tasks in each category.

likely to help (Table S1).

Patterns for grandfathers were similar, but they helped much less overall (Fig. 1, Table S2), particularly maternal grandfathers. Co-resident grandfathers only helped with five of the 12 tasks in any household, while co-resident paternal grandfathers performed all 12 tasks (Table S2). Overall, however, paternal and maternal grandfathers were equally likely to help if they lived in the household (Table S2).

3.1.3.2. Aunts and uncles. In households with co-resident aunts, a maximum of 14.6% of families reported that either maternal or paternal aunts helped with any task (supplementary Table S3). Across all households, there was little variability in reported helping; maternal and paternal aunts helped in 1.3–3.4% of households. There were no statistically significant differences in the proportion of households in which maternal versus paternal aunts helped (Table S3). Uncles helped quite little (Table S4, Fig. 1), though among families that had paternal uncles living with them, >10% of households reported that they did three of the four recreational care tasks (Table S4). There were no statistically significant differences in the proportion of households in which maternal versus paternal uncles helped, when co-residency was accounted for (Table S4).

3.1.3.3. Siblings and cousins. Sibling care can only occur if there is a sibling in the household. Just over half (53.5%) of households had at least two children where at least one of the children was ≥ 5 years old. In these families a sibling was reported to help in anywhere from 0.4 to 7.0% of households (supplementary Table S5). 11.9% of households had at least two children where at least one of the children was ≥ 10 years old; in these, the range was 0–13.7%. Overall, siblings were not a commonly reported source of care (Table S5). Care provided by cousins was similar to care provided by siblings, i.e., rare (Fig. 1, Table S5). In the overall sample, cousins were reported to help in anywhere from 0.5% to 5.9% of households, while in those that had cousins living with them, the range was 0% to 7.1%.

3.1.3.4. Unrelated helpers. Hired helpers participated in all tasks and did at least 1 task in 8.5% of households (Fig. 1, supplementary Table S6). For the small number of families who had live-in hired help ($n = 12$), these helpers were an important source of childcare. For example, they took children to school in 25.0% of these households, and helped with bathing, grooming, and feeding in more than half of them (Table S6). In the overall sample, hired helpers performed caregiving tasks in anywhere from 0.33% to 3.5% of households.

3.2. Aim 2: Test predictions derived from evolutionary theory about the nature of paternal care

3.2.1. Facultative, flexible fathering

We found strong support for our first prediction: fathers who worked more reported doing fewer hours of routine, recreational, and educational caregiving than fathers who worked less (Tables 5a–c; for routine caregiving, see Fig. 3). To translate the incidence rate ratios (IRRs) given in Table 5 into hours, in Table 6 we present the number of hours per week a father at a given end of the variable distribution is expected to report spending on childcare, when all other variables are held at their means. For example, unemployed men are predicted to report spending 8.36 (SE = 0.78) hours per week on routine caregiving, while those who work 80+ hours per week are expected to report spending 4.16 h (SE = 0.43) (Table 6). We found no support for any of the other three predictions related to facultative fathering. Having greater numbers of alloparents helping, living near maternal relatives, and having more children did not predict the number of hours that fathers said they spent on any of our three caregiving task categories (Tables 5a–c).

Table 5

Results of models evaluating predictors of fathers' self-reported hours per week spent on caregiving tasks ($n = 430$ households).

Predictor	Incidence rate ratio	SE	p^2	Lower CI	Upper CI
(a) Routine caregiving					
Hours worked	0.991	0.002	<0.001	0.987	0.995
Number of allopaternal caregivers	1.018	0.025	0.474	0.970	1.067
Live near ¹					
Both families	1.084	0.289	0.761	0.643	1.829
Father's family	1.146	0.282	0.579	0.708	1.855
Mother's family	1.228	0.332	0.448	0.723	2.086
Number of children	1.062	0.060	0.292	0.950	1.187
Age of children	0.897	0.026	<0.001	0.848	0.949
Education level	1.058	0.019	0.002	1.021	1.096
Constant	5.206	1.916	<0.001	2.531	10.711
(b) Recreational caregiving					
Hours worked	0.997	0.002	0.043	0.993	1.000
Number of allopaternal caregivers	0.989	0.026	0.678	0.939	1.042
Live near ¹					
Both families	1.191	0.218	0.338	0.833	1.704
Father's family	1.154	0.187	0.376	0.840	1.584
Mother's family	1.323	0.244	0.129	0.922	1.900
Number of children	0.946	0.043	0.229	0.865	1.035
Age of children	0.964	0.019	<i>0.057</i>	0.928	1.001
Education level	1.066	0.016	<0.001	1.036	1.098
Constant	9.700	2.545	<0.001	5.800	16.223
(c) Educational caregiving					
Hours worked	0.989	0.004	0.002	0.982	0.996
Number of allopaternal caregivers	1.120	0.080	0.111	0.974	1.288
Live near ¹					
Both families	0.797	0.303	0.550	0.378	1.678
Father's family	0.725	0.244	0.340	0.375	1.402
Mother's family	1.230	0.465	0.583	0.587	2.581
Number of children	1.065	0.096	0.486	0.892	1.272
Age of children	1.224	0.060	<0.001	1.112	1.347
Education level	1.065	0.033	0.039	1.003	1.132
Constant	0.407	0.225	0.104	0.138	1.204

¹ Reference group is families who reported they did not live near either parent's family.

² **Bold** = $p < 0.05$; *italics* = $p < 0.10$.

We found support for the prediction that the amount of time fathers spent on different types of care would change as children aged. They spent more time on routine caregiving when children were younger, and more time on educational caregiving when children were older (Tables 5a & c; Table 6). There was a statistical trend ($p = 0.057$) for fathers to spend more time on recreational care when children were younger (Table 5b, Table 6).

3.2.2. Embodied capital theory predictions

Fathers with more years of education reported spending more time on all three types of care. The magnitude of the effect size was very similar for all three care types (IRR = 1.058, 1.066, and 1.065 for routine, recreational, and educational caregiving, respectively: Tables 5a-c). These effect sizes are translated to hours in Table 6. Figure 4 provides a visualization of the relationship between paternal education and hours spent on educational care.

4. Discussion

Our data indicate that fathers are an important source of childcare in Cebuano families. Educational attainment and the number of hours fathers worked outside the home were the most important predictors of

self-reported paternal care in our study. Consistent with predictions derived from the facultative fathering hypothesis and life history theory, fathers who worked more parented less, and fathers with more education parented more. Additionally, the time fathers spent on different types of care changed as children aged, underscoring their flexible responses to the shifting needs of their families. However, we found little evidence that in Cebu, paternal care is sensitive to family residence patterns, the participation of alloparents, or the number of children men had, predictors that have been shown to be important in some other socioecological contexts.

4.1. The caregiving environment in CLHNS households

Fathers in Cebu are active participants in multiple forms of childcare that require direct interaction with children. Mothers were far more likely to report that fathers performed a given caregiving task than any other category of caregiver, besides mothers themselves. The percentage of households where fathers did their least-performed task—helping with homework—was equivalent to the percentage of households in which co-resident grandmothers did their most-performed tasks (feeding and exchanging stories), highlighting how involved fathers are compared to other classes of caregivers in our data.

Unsurprisingly, given the ubiquity of grandmaternal care around the world (Hawkes et al., 1998; Sear & Mace, 2008), grandmothers were the category of caregiver that mothers were next-most-likely to report helped with childcare. Paternal grandmothers had more opportunities to help than maternal, since 78% of families resided in the same neighborhood as the focal father's family, while only 38% lived in the same neighborhood as the mother's family. In contrast to research in several other contexts, where there is evidence of maternal kin being more likely to help with care (e.g. Hawkes, O'Connell, & Jones, 1997; Meehan, 2005; Michalski & Shackelford, 2005; Pollet, Nettle, & Nelissen, 2007), paternal and maternal grandmothers were equally likely to help if they lived with the family. This is counter to theoretical predictions that maternal grandmothers should be more likely to help due to greater certainty that they are related to their grandchildren (e.g. Fox et al., 2010; Perry & Daly, 2017; Strassmann & Garrard, 2011), further highlighting the well-documented flexibility of human childcare arrangements (e.g. Sear, 2016).

Overall, however, maternal reports suggest that alloparents are not a primary source of caregiving support for the majority of these Cebuano families. Even the most-performed category of tasks (routine caregiving) by the most-reported alloparents (grandmothers) occurred in <20% of households, while non-grandmother alloparents helped in well below 10% of households (Fig. 1). This is particularly interesting given that 36% of the households contained extended families, and thus had potential adult alloparents living with them. This means that there are a significant number of families who have potential alloparents close by, but that they are not substantially contributing to the types of childcare we examined here. It is possible they help with tasks (e.g. cooking, laundry) that are relevant to childcare but do not require direct interaction, though that is beyond the scope of our analysis.

This could reflect the outside responsibilities of potential alloparents. Aunts and uncles (and even grandparents (PSA, 2020)) are, like parents, often formally employed outside the home, and thus have limited time to help with childcare. As we discuss below in relation to fathers' labor demands, the industrial, service, and professional labor roles that are widely available for adults in metropolitan Cebu are usually incompatible with childcare. To test this assumption, it would be useful to have complementary data from larger-scale societies where multi-generational/multi-family residence is common, but where (for example) few women work outside the home. If alloparental care were more common in such contexts, it would suggest that work force participation is a potential reason we do not see more alloparental caregiving in Cebu. As discussed in the methods (see section 2.2, Demographic and Behavioral Data Collection), the CLHNS data do not

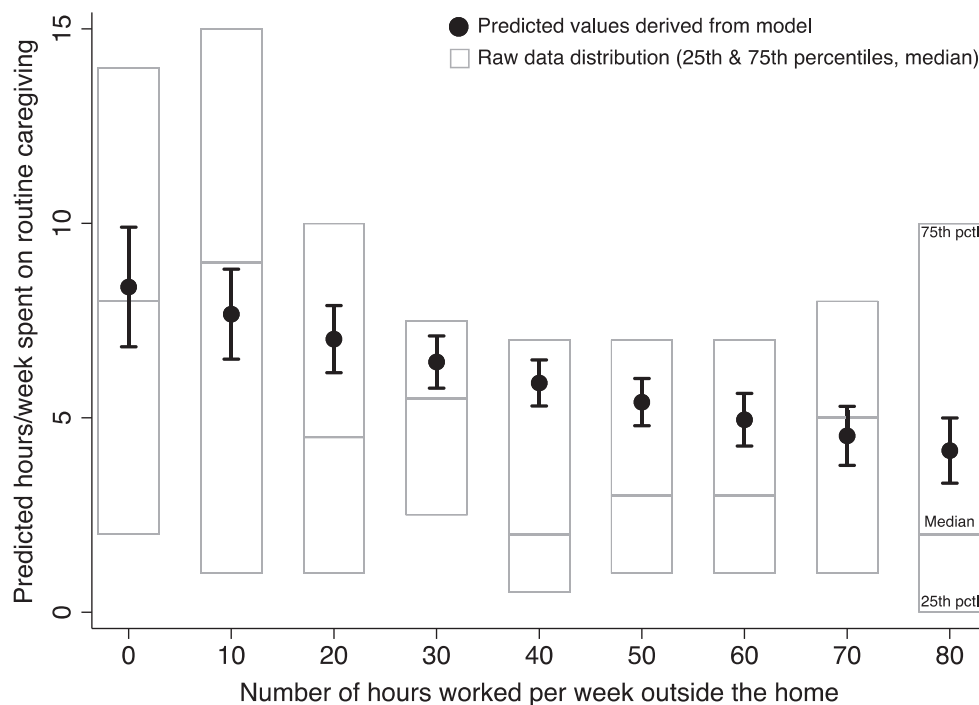


Fig. 3. Relationship between the number of hours per week fathers worked outside the home and number of hours per week fathers reported spending on routine caregiving tasks (see Table 1) in the seven days prior to the survey. The black circles and whiskers show the predicted hours per week and standard errors derived from the model reported in Table 5a for a given amount of work, when all other variables are held at their means. Gray boxes represent the 25th and 75th percentiles of the raw data, binned as 1 - 9, 10 - 19, 20 - 29 hours, etc. The middle gray line represents the median value of the raw data in a given bin.

Table 6

Predicted number of hours per week spent on different types of caregiving, when all other variables are held at their means.

	Hours worked outside home (week)		Average age of father's children		Years of schooling father completed	
	Unemployed	80	1 yr	9 yrs	1 yr	13 yrs.
Routine caregiving	8.36 (0.78) ¹	4.16 (0.43)	8.10 (0.81)	3.39 (0.52)	3.33 (0.61)	6.55 (0.43)
Recreational caregiving	16.68 (1.37)	12.74 (0.95)	16.20 ² (1.20)	12.06 ² (1.23)	7.70 (1.17)	16.68 (0.88)
Educational caregiving	2.52 (0.41)	1.05 (0.19)	0.64 (0.13)	4.37 (0.87)	0.83 (1.09)	1.88 (0.20)

¹ Standard error of the prediction is in parentheses.

² p value from model for this predictor = 0.057 (see Table 5b).

allow us to test this possibility.

Children (i.e. siblings and cousins) were also not reported to be a significant source of support, in contrast to some other populations where they are common caregivers for younger siblings (Henry, Morelli, & Tronick, 2005; Kramer, 2005; Kramer, 2009; Weisner et al., 1977). This could be at least in part a function of the age of the children in these households. Since the focal fathers were still in their early 30s, many of them did not have children who were old enough to competently perform many of our caregiving tasks. This does not apply to two of our three recreational tasks, namely playing and singing or dancing, which mothers reported children helped with in remarkably few households. Mothers may not interpret children playing with their siblings as 'caring for' the younger sibling, since it is a form of entertainment for both children, and/or mothers may not perceive the older sibling as being responsible for the younger child during play.

That said, it is also important to keep in mind that a major limitation of our data is the lack of information about time alloparents devote to caregiving. Even if alloparents do not help with childcare in ~60% of households (Fig. 2), this does not necessarily mean that they are not

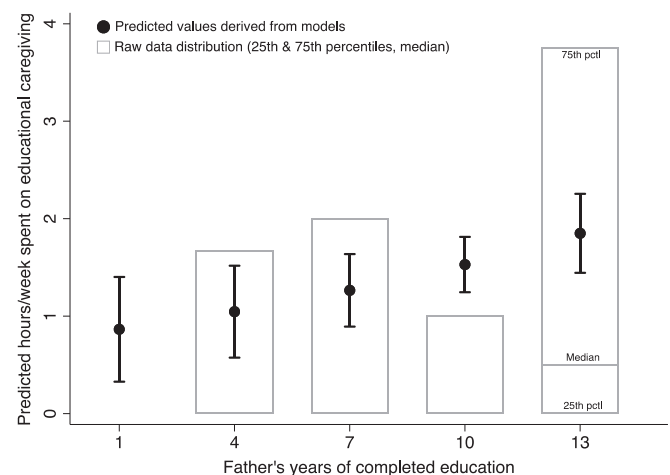


Fig. 4. Relationship between the number of years of schooling fathers completed and their reported hours per week spent on educational caregiving (see Table 1) in the seven days prior to the survey. The black circles and whiskers show the predicted hours per week and standard errors derived from the model reported in Table 5c at a given level of completed education, when all other variables are held at their means. Gray boxes represent the 25th and 75th percentiles of the raw data, binned as 1 - 3, 4 - 6, 7 - 9, 10 - 12, and 13+ years of education (where 13+ is equivalent to two or more years of college). The middle gray line represents the median value of the raw data, but is only visible in the 13+ category, because for all other categories the median = 0. For all categories 25th percentile = 0; for the 1 - 3 year bin, 75th percentile also = 0, so no box is visible.

investing heavily in the other ~40%. We would need more specific information about the degree of alloparental involvement before making strong assertions about the importance (or lack thereof) of alloparental care in this community. While it is an imperfect check at best, there was no correlation between the number of hours fathers reported spending on recreational caregiving and the number of recreational caregiving tasks mothers said were done in the household (correlation coefficient =

0.02), and only a weak one for daily caregiving and educational caregiving (0.19 and 0.28, respectively). This suggests that our data likely are not capturing total household time devoted to care, including the contributions of alloparents.

4.2. Facultative fathering?

Our data provide mixed support for the facultative fathering hypothesis in Cebu. Consistent with its basic premise that the time fathers devote to care will be a function (at least in part) of other competing demands, fathers who worked more reported spending less time on child care (a relationship that has not been reliably observed across cultures: Bianchi, Robinson, & Milke, 2006; Sayer & Gornick, 2011). However, other aspects of our data were not consistent with the idea that fathers are particularly facultative caregivers.

For example, the amount of time fathers said they spent on childcare was not predicted by the number of children they had. This is not without precedent. Fathers with more children did not spend more time on caregiving among Yanomamö households in the Amazon (Hames, 1992), nor did fathers in a large sample of Canadian families (Gauthier, Smeeding, & Furstenberg Jr., 2004). This suggests that in at least in some contexts, time devoted to paternal care is relatively constant, raising questions about a potential quality/quantity tradeoff fathers may be making as their families grow (Argyrous & Rahman, 2017; Lawson & Mace, 2009).

However, as we have argued elsewhere (Gettler et al., 2020), very little of the evolutionarily-focused literature has incorporated any meaningful measure of caregiving quality, much less linked such quality to particular child outcomes. Fathers with multiple children may do more ‘grouping’ of tasks as their families expand. For example, they may bathe children together, or if they are sharing a room, put them to bed at the same time. Recreational caregiving was the type of care fathers were most involved in, which may lend itself particularly well to simultaneous multi-child caregiving. But, without concrete information on the relationship between such task-grouping behavior and child outcomes, it is unclear whether we should conceptualize this as a quality/quantity tradeoff. Such tradeoffs are notoriously difficult to quantify in organisms with slow life histories (Bolund, 2020).

Also contrary to the primary predictions of the facultative fathering hypothesis, we found no evidence that paternal care in Cebu is responsive to alloparental support or family residence patterns. In most species, dispersal of one sex or the other is universal; in humans, patterns are much more mixed (Marlowe, 2004). This means there is considerable debate over the ‘default’ residence configuration—and associated available alloparents—that would have been most common in our evolutionary past. Evolutionary theory predicts greater care by maternal relatives (due to higher relatedness certainty), potentially leading to greater amounts of paternal care specifically in social contexts where maternal relatives are unavailable. While it is true that some research has documented this pattern (Fouts, 2008; Leonetti et al., 2004; Meehan, 2005), it is far from universal (Katz & Konner, 1981), and our data do not provide support for it.

Despite the popularity of the paternal/alloparental tradeoff idea in the anthropological literature, recent cross-cultural analyses documented a positive association between paternal and alloparental care in a variety of cultures (Martin et al., 2020). Similarly, in our data alloparental care appears to be a complement to, instead of a substitute for, paternal care in Cebu. The number of other caregivers participating did not predict how much time fathers said they spent on care, and mothers were much more likely to report that fathers provided care than any other category of caregiver, even when other potential caregivers lived in the household.

In this respect, Cebu appears to be part of a larger trend toward heavier direct paternal care in many places in the world (Lamb, 2010; Levkov, Van Der Gaag, Greene, Kaufman, & Barker, 2015; Pattnaik & Srirarm, 2010). In a range of societies, fathers’ involvement appears to

be becoming more normative over time. This is particularly interesting in Cebu because of the many extended family (including intergenerational) households that still exist. Something beyond the simple removal of convenient, readily available alloparents accounts for this change. Fathers’ involvement has increased as women take on more work outside the home (Raley et al., 2012), a trend that may be especially pronounced in the Philippines due to labor force dynamics (Gettler, 2016; Gettler et al., 2019; Medina, 2001; Tiefenthaler, 1997). Our data suggest that Cebuano fathers are embracing roles that have traditionally been ascribed to mothers (Medina, 2001), and alloparents as well, since women—in this society and most others—do far more alloparental care than men (Hrdy, 2009).

One important limitation of our study is that we do not have information on work outside the home for caregivers other than fathers. We cannot test the idea that fathers are stepping in when female caregivers—mothers and potential alloparents—work more, with the existing data. We hope that future research will be able to address this question, either in Cebu or in other populations where both female labor force participation and multi-family households are common.

4.3. Paternal education and parental embodied capital investment

Tradeoffs between fertility and parental investment are apparent in a wide variety of cultures (Lawson & Mace, 2011), and empirical work has demonstrated the importance of education in these calculations in many contemporary contexts (Gibson & Lawson, 2011; Lawson & Mace, 2009). We predicted that men who invested in this type of human capital (via their own education, likely with the influence of parents who themselves supported such investments) would do more caregiving overall, but in particular more educational caregiving, which may lead to greater student success. Our predictions were partially supported: fathers with more years of education reported doing more caregiving, but the effect size was very similar across all three task categories. This is consistent with the relationship between paternal education levels and paternal caregiving patterns in some studies of other cultures (e.g. Korea: Cha & Song, 2017; Portugal: Monteiro, Fernandes, Torres, & Santos, 2017), though the connection has been called into question in others (e.g. United States: Vinopal & Gershenson, 2017).

Fathers should provide more care in socioecological contexts where their care provides a meaningful benefit. If the services they can offer do not improve child outcomes, then investment should tilt toward fertility rather than parenting (Quinlan, 2007). In larger-scale societies, education is a primary predictor of a variety of fitness-relevant outcomes, especially SES and health. Facilitating educational achievement (e.g. helping with homework, ensuring consistent school attendance, making sure children show up to school well-fed and well-rested) may be a key way in which fathers can contribute to their offspring’s long-term success (Benner, Boyle, & Sadler, 2016), helping to explain the widespread association between education levels and caregiving.

There are multiple potential proximate drivers of the education-paternal care connection. For example, higher levels of education tend to reflect more egalitarian norms about division of labor between the sexes (Van Bavel, Schwartz, & Esteve, 2018), which could help explain why more educated fathers report spending more time on childcare. Alternatively, if more educated women are partnered with more educated men, and more educated women are more likely to work outside the home, then higher rates of paternal care among these men may simply reflect a greater need for allomaternal care. Such a mediating variable would be consistent with the premise of facultative fatherhood, with fathers filling in for mothers whose work demands are incompatible with childcare. As discussed above, currently available data do not allow us to test this idea in these Cebuano families, but it is an area which should be explored in data sets that contain the appropriate information.

4.4. Summary

Our results suggest that paternal care is facultative in contemporary Cebu, but that the specific predictors of the amount of caregiving fathers do are somewhat different in this context than in some others where it has been investigated. In particular, men who work more outside the home do less childcare. Furthermore, the types of childcare they spend time on changes as children's needs change. However, we found no evidence of a facultative caregiving response to number of children, family residence patterns, or alloparental help. Fathers with more education reported spending more time on childcare, consistent with a caregiving strategy that emphasizes investment in embodied capital. These results highlight the importance of considering the many variables that may impact caregiving dynamics in a given setting, when testing evolutionary models of behavior. They underscore the contextual responsiveness that is one of the hallmarks of human behavior, and a likely key to our success at raising our costly offspring in a wide variety of socioecologies.

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Data availability statement

CLHNS data are all eventually publicly available at <https://dataverse.unc.edu/dataverse/cebu>. The data used here are not yet available as of the time of writing, but the corresponding author is happy to provide them upon reasonable written request.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.evolhumbehav.2021.05.003>.

References

- Adair, L. S., Popkin, B. M., Akin, J. S., Guilkey, D. K., Gultiano, S., Borja, J., ... Hindin, M. J. (2011). Cohort profile: The Cebu longitudinal health and nutrition survey. *International Journal of Epidemiology*, 40(3), 619–625.
- Agree, E. M., Biddlecom, A. E., & Valente, T. W. (2005). Intergenerational transfers of resources between older persons and extended kin in Taiwan and the Philippines. *Population Studies*, 59(2), 181–195.
- Allison, P. D., & Waterman, R. P. (2002). Fixed-effects negative binomial regression models. *Sociological Methodology*, 32(1), 247–265.
- Amodia-Bidakowska, A., Laverty, C., & Ramchandani, P. G. (2020). Father-child play: A systematic review of its frequency, characteristics and potential impact on children's development. *Developmental Review*, 57, 100924.
- Anderson, K. G., Kaplan, H., Lam, D., & Lancaster, J. (1999). Paternal care by genetic fathers and stepfathers II: Reports by Xhosa high school students. *Evolution and Human Behavior*, 20(6), 433–451.
- Argyrous, G., & Rahman, S. (2017). How does paid work affect who does the childcare? An analysis of the time use of Australian couples. *Review of Economics of the Household*, 15(2), 383–398.
- Averett, S. L., Gennetian, L. A., & Peters, H. E. (2000). Patterns and determinants of paternal child care during a child's first three years of life. *Marriage & Family Review*, 29(2–3), 115–136.
- Bailey, W. T. (1994). A longitudinal study of fathers' involvement with young children: Infancy to age 5 years. *The Journal of Genetic Psychology*, 155(3), 331–339.
- Benner, A. D., Boyle, A. E., & Sadler, S. (2016). Parental involvement and adolescents' educational success: The roles of prior achievement and socioeconomic status. *Journal of Youth and Adolescence*, 45(6), 1053–1064.
- Bereczkei, T., & Dunbar, R. I. M. (2002). Helping-at-the-nest and sex-biased parental investment in a Hungarian Gypsy population. *Current Anthropology*, 43(5), 804–809.
- Bianchi, S. M., Robinson, J. P., & Milke, M. A. (2006). *The changing rhythms of American family life*. New York: Russell Sage Foundation.
- Bird-David, N. (1990). The giving environment: Another perspective on the economic system of gatherer-hunters. *Current Anthropology*, 31(2), 189–196.
- Bolund, E. (2020). The challenge of measuring trade-offs in human life history research. *Evolution and Human Behavior*, 41(6), 502–512.
- Boyette, A. H., & Hewlett, B. S. (2018). Teaching in hunter-gatherers. *Review of Philosophy and Psychology*, 9(4), 771–797.
- Boyette, A. H., Lew-Levy, S., Sarma, M. S., Miegakanda, V., & Gettler, L. T. (2019). Fatherhood, egalitarianism, and child health in two small-scale societies in the Republic of the Congo. *American Journal of Human Biology*, e23342.
- Brayfield, A. (1995). Juggling jobs and kids: The impact of employment schedules on fathers' caring for children. *Journal of Marriage and Family*, 57(2), 321–332.
- Bruce, C., & Fox, G. L. (1999). Accounting for patterns of father involvement: Age of child, father-child coresidence, and father role salience. *Sociological Inquiry*, 69(3), 458–476.
- Burke, T. A., McKee, J. R., Wilson, H. C., Donahue, R. M. J., Batenhorst, A. S., & Pathak, D. S. (2000). A comparison of time-and-motion and self-reporting methods of work measurement. *JONA: The Journal of Nursing Administration*, 30(3), 118–125.
- Cabrera, N. J., Fitzgerald, H. E., Bradley, R. H., & Roggman, L. (2014). The ecology of father-child relationships: An expanded model. *Journal of Family Theory & Review*, 6(4), 336–354.
- Cha, S.-E., & Song, Y.-J. (2017). Time or money: The relationship between educational attainment, income contribution, and time with children among Korean fathers. *Social Indicators Research*, 134(1), 195–218.
- Checa, P., & Abundis-Gutierrez, A. (2017). Parenting and temperament influence on school success in 9–13 year olds. *Frontiers in Psychology*, 8(543).
- Crittenden, A. N., & Marlowe, F. W. (2008). Allomaternal care among the Hadza of Tanzania. *Human Nature*, 19(3), 249.
- Daly, M., & Perry, G. (2017). Matrilateral bias in human grandmothering. *Frontiers in Sociology*, 2(11).
- Dyble, M., Salali, G. D., Chaudhary, N., Page, A., Smith, D., Thompson, J., ... Migliano, A. B. (2015). Sex equality can explain the unique social structure of hunter-gatherer bands. *Science*, 348(6236), 796–798.
- Eydal, G. B., & Rostgaard, T. (2016). *Fatherhood in the Nordic welfare states: Comparing care policies and practice*. Policy press.
- Flinn, M. V. (1992). Paternal care in a Caribbean village. In B. Hewlett (Ed.), *Father-child relations: Cultural and biosocial contexts* (pp. 57–84). New York: Aldine de Gruyter.
- Foley, L., Maddison, R., Olds, T., & Ridley, K. (2012). Self-report use-of-time tools for the assessment of physical activity and sedentary behaviour in young people: Systematic review. *Obesity Reviews*, 13(8), 711–722.
- Fouts, H. N. (2008). Father involvement with young children among the Aka and Bofi foragers. *Cross-Cultural Research*, 42(3), 290–312.
- Fouts, H. N., Roopnarine, J. L., Lamb, M. E., & Evans, M. (2012). Infant social interactions with multiple caregivers: The importance of ethnicity and socioeconomic status. *Journal of Cross-Cultural Psychology*, 43(2), 328–348.
- Fox, M., Sear, R., Beise, J., Ragsdale, G., Voland, E., & Knapp, L. A. (2010). Grandma plays favourites: X-chromosome relatedness and sex-specific childhood mortality. *Proceedings of the Royal Society B: Biological Sciences*, 277(1681), 567–573.
- Gauthier, A. H., Smeeding, T. M., & Furstenberg, F. F., Jr. (2004). Are parents investing less time in children? Trends in selected industrialized countries. *Population and Development Review*, 30(4), 647–672.
- Gettler, L. T. (2010). Direct male care and hominin evolution: Why male-child interaction is more than a nice social idea. *American Anthropologist*, 112(1), 7–21.
- Gettler, L. T. (2016). Becoming DADS: Considering the role of cultural context and developmental plasticity for paternal socioendocrinology. *Current Anthropology*, 57(S13), S38–S51.
- Gettler, L. T., Boyette, A. H., & Rosenbaum, S. (2020). Broadening perspectives on the evolution of human paternal care and fathers' effects on children. *Annual Review of Anthropology*, 49(1), null.
- Gettler, L. T., Kuo, P. X., Bas, A., & Borja, J. B. (2019). The roles of parents in shaping fathering across generations in Cebu, Philippines. *Journal of Marriage and Family*, 81(3), 662–678.
- Gettler, L. T., Lew-Levy, S., Sarma, M. S., Miegakanda, V., Doxsey, M., Meyer, J. S., & Boyette, A. H. (2021). Children's fingernail cortisol among BaYaka foragers of the Congo Basin: associations with fathers' roles. *Philosophical Transactions of the Royal Society B*, 376(1827), Article 20200031.
- Gettler, L. T., McDade, T. W., Agustín, S. S., Feranil, A. B., & Kuzawa, C. W. (2014). Testosterone, immune function, and life history transitions in Filipino males (*Homo sapiens*). *International Journal of Primatology*, 35(3), 787–804.
- Gettler, L. T., Ryan, C. P., Eisenberg, D. T. A., Rzhetskaya, M., Hayes, M. G., Feranil, A. B., ... Kuzawa, C. W. (2017). The role of testosterone in coordinating male life history strategies: The moderating effects of the androgen receptor CAG repeat polymorphism. *Hormones and Behavior*, 87, 164–175.
- Gibson, M. A., & Lawson, D. W. (2011). "Modernization" increases parental investment and sibling resource competition: Evidence from a rural development initiative in Ethiopia. *Evolution and Human Behavior*, 32(2), 97–105.
- Gray, P. B., & Anderson, K. G. (2010). *Fatherhood: Evolution and human paternal behavior*. Cambridge, MA: Harvard University Press.
- Gray, P. B., Reece, J., Coore-Desai, C., Dinall, T., Pellington, S., & Samms-Vaughan, M. (2017). Testosterone and Jamaican fathers. *Human Nature*, 28(2), 201–218.
- Grzywacz, J. G., Almeida, D. M., Neupert, S. D., & Ettner, S. L. (2004). Socioeconomic status and health: A micro-level analysis of exposure and vulnerability to daily stressors. *Journal of Health and Social Behavior*, 45(1), 1–16.
- Gurven, M. D. (2020). Greater humility can help expand evolutionary social science. *Evolution and Human Behavior*, 41(5), 456–457.
- Hames, R. (1992). Variation in paternal care among the Yanomamö. In B. Hewlett (Ed.), *Father-child relations: Cultural and biosocial contexts* (pp. 85–110). New York: Aldine de Gruyter.

- Han, W.-J. (2004). Nonstandard work schedules and child care decisions: Evidence from the NICHD study of early child care. *Early Childhood Research Quarterly*, 19(2), 231–256.
- Hassan, A., Schaffnit, S. B., Sear, R., Urassa, M., & Lawson, D. W. (2019). Fathers favour sons, mothers don't discriminate: Sex-biased parental care in northwestern Tanzania. *Evolutionary Human Sciences*, 1, e13.
- Hawkes, K., O'Connell, J. F., & Blurton Jones, N. G. (2001). Hunting and nuclear families: Some lessons from the Hadza about Men's work. *Current Anthropology*, 42(5), 681–709.
- Hawkes, K., O'Connell, J. F., & Jones, N. G. B. (1997). Hadza women's time allocation, offspring provisioning, and the evolution of long postmenopausal life spans. *Current Anthropology*, 38(4), 551–577.
- Hawkes, K., O'Connell, J. F., Jones, N. G. B., Alvarez, H., & Charnov, E. L. (1998). Grandmothering, menopause, and the evolution of human life histories. *Proceedings of the National Academy of Sciences*, 95(3), 1336–1339.
- Henry, P. I., Morelli, G. A., & Tronick, E. Z. (2005). Child caretakers among Efe foragers of the Ituri forest. *Hunter gatherer childhoods: evolutionary, developmental, and cultural perspectives*, 191–213.
- Hewlett, B. S. (1993). *Intimate fathers: The nature and context of Aka Pygmy paternal infant care*. Ann Arbor, MI: University of Michigan Press.
- Hewlett, B. S. (2004). Fathers in forager, farmer, and pastoral cultures. In M. E. Lamb (Ed.), *The role of the father in child development* (pp. 182–195). John Wiley & Sons Inc.
- Hewlett, B. S., Fouts, H. N., Boyette, A. H., & Hewlett, B. L. (2011). Social learning among Congo Basin hunter-gatherers. *Philosophical Transactions of the Royal Society, B: Biological Sciences*, 366(1567), 1168–1178.
- Hewlett, B. S., & Macfarlan, S. J. (2010). Fathers' roles in hunter-gatherer and other small-scale cultures. In M. E. Lamb (Ed.), *The role of the father in child development* (pp. 413–434). Hoboken, New Jersey: John Wiley & Sons, Inc.
- Hill, K. R., Walker, R. S., Božičević, M., Eder, J., Headland, T., Hewlett, B., ... Wood, B. (2011). Co-residence patterns in hunter-gatherer societies show unique human social structure. *Science*, 331(6022), 1286–1289.
- Hrdy, S. B. (2000). *Mother nature: Maternal instincts and how they shape the human species*. Ballantine books.
- Hrdy, S. B. (2009). *Mothers and others: The evolutionary origins of mutual understanding*. Cambridge, MA: Harvard University Press.
- Hrdy, S. B. (2012). Cooperative breeding and the paradox of facultative fathering. In H. Bertram, & N. Ehler (Eds.), *Family, ties, and care: Family transformation in a plural modernity* (pp. 207–222). Farmington Hills, MI: Barbara Budrich Publishers.
- Huber, S., Bookstein, F. L., & Fieder, M. (2010). Socioeconomic status, education, and reproduction in modern women: An evolutionary perspective. *American Journal of Human Biology*, 22(5), 578–587.
- Hurtado, A. M., Hill, K., Hurtado, L., & Kaplan, H. (1992). Trade-offs between female food acquisition and child care among Hiwi and ache foragers. *Human Nature*, 3(3), 185–216.
- Ivey, P. K. (2000). Cooperative reproduction in Ituri Forest hunter-gatherers: Who cares for Efe infants? *Current Anthropology*, 41(5), 856–866.
- Kaplan, H., Hill, K., Lancaster, J., & Hurtado, A. M. (2000). A theory of human life history evolution: Diet, intelligence, and longevity. *Evolutionary Anthropology: Issues, News, and Reviews*, 9(4), 156–185.
- Kaplan, H., Lancaster, J., & Robson, A. (2003). Embodied capital and the evolutionary economics of the human life span. *Population and Development Review*, 29, 152–182.
- Kaplan, H. S., Lancaster, J. B., Johnson, S. E., & Bock, J. A. (1995). Does observed fertility maximize fitness among new Mexican men? *Human Nature*, 6(4), 325–360.
- Katz, M. M., & Konner, M. J. (1981). The role of the father: An anthropological perspective. *The role of the father in child development*, 155–185.
- Kline, M. A., Boyd, R., & Henrich, J. (2013). Teaching and the life history of cultural transmission in Fijian villages. *Human Nature*, 24(4), 351–374.
- Kokko, H., Johnstone, R. A., & Wright, J. (2002). The evolution of parental and alloparental effort in cooperatively breeding groups: When should helpers pay to stay? *Behavioral Ecology*, 13(3), 291–300.
- Konner, M. (2010). *The evolution of childhood: Relationships, emotion, mind*. Harvard University Press.
- Konner, M. (2016). Hunter-gatherer infancy and childhood in the context of human evolution. In C. L. Meehan, & A. N. Crittenden (Eds.), *Childhood: Origins, evolution, and implications* (pp. 123–154). Santa Fe, NM: School for Advanced Research Press.
- Kramer, K. (2009). Does it take a family to raise a child? In G. Bentley, & R. Mace (Eds.), *Substitute parents: Biological and social perspectives on alloparenting in human societies* (pp. 77–99). New York: Berghahn.
- Kramer, K. L. (2005). Children's help and the pace of reproduction: Cooperative breeding in humans. *Evolutionary Anthropology: Issues, News, and Reviews*, 14(6), 224–237.
- Kramer, K. L. (2010). Cooperative breeding and its significance to the demographic success of humans. *Annual Review of Anthropology*, 39, 417–436.
- Kuzawa, C. W., Gettler, L. T., Muller, M. N., McDade, T. W., & Feranil, A. B. (2009). Fatherhood, pairbonding and testosterone in the Philippines. *Hormones and Behavior*, 56(4), 429–435.
- Lamb, M. E. (2010). How do fathers influence children's development? Let me count the ways. In M. E. Lamb (Ed.), *The role of the father in child development* (pp. 1–26). Hoboken, New Jersey: John Wiley & Sons, Inc.
- Lawson, D. W., & Mace, R. (2009). Trade-offs in modern parenting: A longitudinal study of sibling competition for parental care. *Evolution and Human Behavior*, 30(3), 170–183.
- Lawson, D. W., & Mace, R. (2011). Parental investment and the optimization of human family size. *Philosophical Transactions of the Royal Society, B: Biological Sciences*, 366(1563), 333–343.
- Leonetti, D. L., Nath, D. C., Hemam, N. S., & Neill, D. B. (2004). Do women really need marital partners for support of their reproductive success? The case of the matrilineal Khasi of NE India. In *Socioeconomic aspects of human behavioral ecology*. Emerald Group Publishing Limited.
- Levtov, R., Van Der Gaag, N., Greene, M., Kaufman, M., & Barker, G. (2015). *State of the world's fathers: A men's care advocacy publication*. Washington, DC: Promundo, Rutgers, save the children, Sonke gender justice, and the Menengage Alliance.
- Lew-Levy, S., & Boyette, A. H. (2018). Evidence for the adaptive learning function of work and work-themed play among Aka forager and Ngandu farmer children from the Congo Basin. *Human Nature*, 29(2), 157–185.
- Lew-Levy, S., Crittenden, A. N., Boyette, A. H., Mabulla, I. A., Hewlett, B. S., & Lamb, M. E. (2019). Inter- and intra-cultural variation in learning-through-participation among Hadza and BaYaka forager children and adolescents from Tanzania and the republic of Congo. *Journal of Psychology in Africa*, 29(4), 309–318.
- Li, J., & Powdthavee, N. (2015). Does more education lead to better health habits? Evidence from the school reforms in Australia. *Social Science & Medicine*, 127, 83–91.
- Liu, C., Wu, X., & Zou, S. (2016). Parents' relative socioeconomic status and paternal involvement in Chinese families: The mediating role of coparenting. *Frontiers in Psychology*, 7(940).
- Long, M. C. (2010). Changes in the returns to education and college quality. *Economics of Education Review*, 29(3), 338–347.
- Mace, R. (1996). Biased parental investment and reproductive success in Gabbra pastoralists. *Behavioral Ecology and Sociobiology*, 38(2), 75–81.
- Macon, T. A., Tamis-LeMonda, C. S., Cabrera, N. J., & McFadden, K. E. (2017). Predictors of father investment of time and finances: The specificity of resources, relationships, and parenting beliefs. *Journal of Family Issues*, 38(18), 2642–2662.
- Marlowe, F. (2000). Paternal investment and the human mating system. *Behavioural Processes*, 51(1), 45–61.
- Marlowe, F. W. (2005). Who tends Hadza children? In B. S. Hewlett, & M. E. Lamb (Eds.), *Hunter-gatherer childhoods: Evolutionary, developmental and cultural perspectives* (pp. 177–190). New Brunswick: AldineTransaction.
- Marlowe, F. W. (2004). Marital residence among foragers. *Current Anthropology*, 45(2), 277–284.
- Martin, J. S., Ringen, E. J., Duda, P., & Jaeggi, A. V. (2020). Harsh environments promote alloparental care across human societies. *Proceedings of the Royal Society B: Biological Sciences*, 287(1933), 20200758.
- Medina, B. T.-G. (2001). *The Filipino family*. University of the Philippines Press.
- Meehan, C. L. (2005). The effects of residential locality on parental and alloparental investment among the Aka foragers of the central African Republic. *Human Nature*, 16(1), 58–80.
- Meehan, C. L. (2009). Maternal time allocation in two cooperative childrearing societies. *Human Nature*, 20(4), 375.
- Michalski, R. L., & Shackelford, T. K. (2005). Grandparental investment as a function of relational uncertainty and emotional closeness with parents. *Human Nature*, 16(3), 293–305.
- Migliano, A. B., Page, A. E., Gómez-Gardeñes, J., Salali, G. D., Viguier, S., Dyble, M., ... Vinicius, L. (2017). Characterization of hunter-gatherer networks and implications for cumulative culture. *Nature Human Behaviour*, 1(2), 0043.
- Milliotis, D., Sesma, J. A., & Masten, A. S. (1999). Parenting as a protective process for school success in children from homeless families. *Early Education and Development*, 10(2), 111–133.
- Monteiro, L., Fernandes, M., Torres, N., & Santos, C. (2017). Father's involvement and parenting styles in Portuguese families: The role of education and working hours. *Análise Psicológica*, 35(4), 513–528.
- Morelli, G. A., & Tronick, E. Z. (1992). Efe fathers: One among many? A comparison of forager children's involvement with fathers and other males. *Social Development*, 1(1), 36–54.
- Muller, M. N., Marlowe, F. W., Bugumba, R., & Ellison, P. T. (2009). Testosterone and paternal care in East African foragers and pastoralists. *Proceedings of the Royal Society of London B: Biological Sciences*, 276(1655), 347–354.
- Nelson, R. G. (2020). Beyond the household: Caribbean families and bicultural models of alloparenting. *Annual Review of Anthropology*, 49(1), 355–372.
- Norman, H., Elliot, M., & Fagan, C. (2014). Which fathers are the most involved in taking care of their toddlers in the UK? An investigation of the predictors of paternal involvement. *Community, Work & Family*, 17(2), 163–180.
- Pattnaik, J., & Srirarm, R. (2010). Father/male involvement in the care and education of children: History, trends, research, policies, and programs around the world. *Childhood Education*, 86(6), 354–359.
- Perry, G. (2017). Alloparental care and assistance in a normatively patrilocal society. *Current Anthropology*, 58(1), 114–123.
- Perry, G., & Daly, M. (2017). A model explaining the matrilineal bias in alloparental investment. *Proceedings of the National Academy of Sciences*, 114(35), 9290–9295.
- Philippine Statistics Authority (PSA). (2020). Macroeconomic labor and employment statistics. Retrieved from <https://psa.gov.ph/current-labor-statistics/statistical-tables> Accessed August 18th, 2020.
- Pollet, T. V., Nettle, D., & Nelissen, M. (2007). Maternal grandmothers do go the extra mile: Factoring distance and lineage into differential contact with grandchildren. *Evolutionary Psychology*, 5(4), 147470490700500412.
- Quinlan, R. J. (2007). Human parental effort and environmental risk. *Proceedings of the Royal Society B: Biological Sciences*, 274(1606), 121–125.
- Quinlan, R. J., & Quinlan, M. B. (2007). Evolutionary ecology of human pair-bonds: Cross-cultural tests of alternative hypotheses. *Cross-Cultural Research*, 41(2), 149–169.
- van Raalte, A. A., Kunst, A. E., Deboosere, P., Leinsalu, M., Lundberg, O., Martikainen, P., ... Mackenbach, J. P. (2011). More variation in lifespan in lower educated groups: Evidence from 10 European countries. *International Journal of Epidemiology*, 40(6), 1703–1714.

- Raley, S., Bianchi, S. M., & Wang, W. (2012). When do fathers care? Mothers' economic contribution and fathers' involvement in child care. *American Journal of Sociology*, 117(5), 1422–1459.
- Rosenbaum, S., Gettler, L. T., McDade, T. W., Bechayda, S. S., & Kuzawa, C. W. (2018). Does a man's testosterone "rebound" as dependent children grow up, or when pairbonds end? A test in Cebu, Philippines. *American Journal of Human Biology*, 30(6), Article e23180.
- von Rueden, C., Gurven, M., & Kaplan, H. (2011). Why do men seek status? Fitness payoffs to dominance and prestige. *Proceedings of the Royal Society B: Biological Sciences*, 278(1715), 2223–2232.
- Sakellariou, C. (2006). Education policy reform, local average treatment effect and returns to schooling from instrumental variables in the Philippines. *Applied Economics*, 38(4), 473–481.
- Saraff, A., & Srivastava, H. C. (2010). Pattern and determinants of paternal involvement in childcare: An empirical investigation in a metropolis of India. *Population Research and Policy Review*, 29(2), 249–273.
- Sarma, M. S., Kuo, P. X., Bechayda, S. A., Kuzawa, C. W., & Gettler, L. T. (2018). Exploring the links between early life and young adulthood social experiences and men's later life psychobiology as fathers. *Physiology & Behavior*, 193, 82–89.
- Sayer, L. C., & Gornick, J. C. (2011). Cross-national variation in the influence of employment hours on child care time. *European Sociological Review*, 28(4), 421–442.
- Scelza, B. A. (2010). Fathers' presence speeds the social and reproductive careers of sons. *Current Anthropology*, 51(2), 295–303.
- Schacht, R., Davis, H. E., & Kramer, K. L. (2018). Patterning of paternal investment in response to socioecological change. *Frontiers in Ecology and Evolution*, 6(142).
- van Schaik, C. P., & Burkart, J. M. (2010). Mind the gap: Cooperative breeding and the evolution of our unique features. In P. M. Kappeler, & J. Silk (Eds.), *Mind the gap: Tracing the origins of human universals* (pp. 477–496). Berlin, Heidelberg: Springer Berlin Heidelberg.
- Schmeer, K. K. (2009). Changing sibship size and educational progress during childhood: Evidence from the Philippines. *Journal of Marriage and Family*, 71(3), 787–801.
- Sear, R. (2016). Beyond the nuclear family: An evolutionary perspective on parenting. *Current Opinion in Psychology*, 7, 98–103.
- Sear, R., & Mace, R. (2008). Who keeps children alive? A review of the effects of kin on child survival. *Evolution and Human Behavior*, 29(1), 1–18.
- Shenk, M. K., Starkweather, K., Kress, H. C., & Alam, N. (2013). Does absence matter? *Human Nature*, 24(1), 76–110.
- Short, S. E., Chen, F., Entwisle, B., & Fengying, Z. (2002). Maternal work and child care in China: A multi-method analysis. *Population and Development Review*, 28(1), 31–57.
- Shwalb, D. W., Shwalb, B. J., & Lamb, M. E. (2013). *Fathers in cultural context*. Routledge.
- Strassmann, B. I., & Garrard, W. M. (2011). Alternatives to the grandmother hypothesis. *Human Nature*, 22(1), 201.
- Tarrant, M. A., Manfredo, M. J., Bayley, P. B., & Hess, R. (1993). Effects of recall bias and nonresponse bias on self-report estimates of angling participation. *North American Journal of Fisheries Management*, 13(2), 217–222.
- Tiefenthaler, J. (1997). Fertility and family time allocation in the Philippines. *Population and Development Review*, 23(2), 377–397.
- Van Bavel, J., Schwartz, C. R., & Esteve, A. (2018). The reversal of the gender gap in education and its consequences for family life. *Annual Review of Sociology*, 44, 341–360.
- Vinopal, K., & Gershenson, S. (2017). Re-conceptualizing gaps by socioeconomic status in parental time with children. *Social Indicators Research*, 133(2), 623–643.
- Weisner, T. S., Gallimore, R., Bacon, M. K., Herbert Barry, I., Bell, C., Novaes, S. C., ... Williams, T. R. (1977). My brother's keeper: child and sibling caretaking [and comments and reply]. *Current Anthropology*, 18(2), 169–190.
- Wijndaele, K., De Bourdeaudhuij, I., Godino, J. G., Lynch, B. M., Griffin, S. J., Westgate, K., & Brage, S. (2014). Reliability and validity of a domain-specific last 7-d sedentary time questionnaire. *Medicine & Science in Sports & Exercise*, 46(6), 1248–1260.
- Winking, J., Gurven, M., Kaplan, H., & Stieglitz, J. (2009). The goals of direct paternal care among a South Amerindian population. *American Journal of Physical Anthropology*, 139(3), 295–304.
- Winking, J., & Koster, J. (2015). The fitness effects of men's family investments. *Human Nature*, 26(3), 292–312.
- Wood, B. M., & Marlowe, F. W. (2013). Household and kin provisioning by Hadza men. *Human Nature*, 24(3), 280–317.
- Wood, J. J., & Repetti, R. L. (2004). What gets dad involved? A longitudinal study of change in parental child caregiving involvement. *Journal of Family Psychology*, 18(1), 237–249.
- Zahedani, Z. Z., Rezaee, R., Yazdani, Z., Bagheri, S., & Nabeiei, P. (2016). The influence of parenting style on academic achievement and career path. *Journal of Advances in Medical Education & Professionalism*, 4(3), 130.