

Direct paternal care and aggression: an empirical exploration using the Standard Cross-Cultural Sample

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Abstract

Purpose – *The rates of direct paternal care vary greatly across human cultures and primate species. Prior research reveals important hormonal differences between average fathers and non-fathers in the same population, such as higher levels of prolactin and oxytocin and lower levels of testosterone. This evidence raises the question of whether rates of aggression would be lower in populations with higher paternal care. This study aims to test this hypothesis.*

Design/methodology/approach – *Analyses of correlation and χ^2 -tests were applied to data from the Standard Cross-Cultural Sample, a database of 186 pre-industrial societies chosen for their independence for cross-cultural research, to test the hypothesized relationship between paternal care and societal aggression.*

Findings – *High infant-father closeness was found to be significantly associated with low levels of aggression towards other societies (external war), as predicted. There was not a statistically significant finding between infant-father closeness and aggression inside a given society.*

Research limitations/implications – *This study only reports a correlational effect owing to the nature of the data. More research is needed to determine causality and to better understand the mechanisms underlying the found association. One future direction of research is to examine a similar question across difference nonhuman primate species.*

Originality/value – *This paper reports a previously unknown association between father closeness and low external warfare. It might inspire future research that could lead to interventions intended to reduce aggression.*

Keywords *Fatherhood, Aggression, Warfare, Gender, Cross-cultural research*

Paper type *Research paper*

Human infants are born developmentally immature and in need of constant care. This secondary altriciality, or being born developmentally immature (altricial) but being complicated and slow to develop (precocial) is a result of the phylogenetic compromise between the development of bipedality, and thus a differently shaped, smaller pelvis, and our immense encephalization. The evolutionary adaptation to solve the paradox of smaller birth canals and larger adult brains was that gestation became truncated: infants' brains and bodies must be born small and underdeveloped so that their heads can fit through the birth canal. In fact, the first year of life is largely a continuation of the brain development started in the womb, such as in synaptogenesis and overall brain size (Eliot, 2000). Infancy is a time of very rapid brain growth, which makes the neonate's development both vulnerable and impressionable. Human offspring furthermore develop very slowly, with considerable dependence for a number of years (Bogin, 2002). In many societies, dependence continues for a decade or more after that.

There are various ways that humans meet the physical and mental needs of their immature babies and dependent children, in order that the infants mature into healthy children and, ultimately, successful adults (Brown and Pollitt, 1996). The environment in which a human child is raised greatly affects its biological, social and psychological development (Bogin, 1999; Eliot, 2000). The role of the mother is obviously important; her breast feeding and subsequent

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emotional connection to the infant is vital for normal development. However, we see variation in the type of parenting provided to infants; for example, some babies are bottle fed, or largely cared for by people other than the mother. One common additional caregiver for human offspring is the father, and the value of a good father-child relationship has been shown in several recent studies (Pleck, 2010a, b; Lamb and Lewis, 2010).

Paternal care is common to humans as a species; however, there is great variation in and among societies (Coltrane, 1988). Where we see perhaps the most variation is in direct paternal care, which is defined as childcare by a father that consists of holding the infant or child. Although fathers may care for their child indirectly, such as by babysitting, guarding or providing food and other resources, direct care can only happen when the father is actively caring for his offspring. The variation in rates of direct paternal care is substantial: in some societies such as the Aché in Paraguay, males spend little or no time holding children (Hill and Hurtado, 1996); however, Aka Pygmy males in central Africa hold their offspring for 22 per cent of the time in camp (Hewlett, 1987).

There is even greater variation in amounts of direct paternal care among nonhuman primate species. All primate species are K-selected: parents have a role in their offspring's upbringing and life (as opposed to R-selected species such as salmon and sea turtles, whose offspring are left to their own devices after birth). Although there is wide variation in levels of altriciality and high dependence at birth, no primate species give birth to offspring as immature as the human neonate. Along with this variation in altriciality is variation in parental care and sociality among nonhuman primates. For some species (especially those whose social structure consists of monogamous pairs), direct paternal care is widespread. However, in other species (mostly the solitary, nocturnal prosimians) fathers are not involved at all in their offsprings' upbringing, while in others (as in the case of gorillas and other one-male-multi-female populations) fathers leave all the direct caregiving to the mothers. The only species that utilize direct paternal care are polyandrous species (e.g. marmosets and tamarins) and monogamous species (e.g. gibbons and siamangs) (Ziegler and Snowdon, 2009; Buchan *et al.*, 2003). Wright (1990) argues that the likelihood of direct paternal care in a primate species is related to the energetics of reproduction, with small-bodied primates less likely to employ father caregiving. So there is a great diversity of paternal care in human and nonhuman primates. But does that change anything for the population?

It does seem to change something in the father. One line of research has shown that fathers tend to have lower testosterone levels than non-fathers in the same society. This has been found in humans (Gray and Campbell, 2009; Gray *et al.*, 2007), primates (Berg and Wynne-Edwards, 2003; Fleming *et al.*, 2002) and other mammals, such as the California mouse (Becker *et al.*, 2010). Similar effects have been found with other hormones. For example, prolactin, a hormone involved in milk production and regulation of maternal behavior, is at higher levels in primate fathers during infant interaction (Ziegler and Snowdon, 2009). The amount of vasopressin and oxytocin have also been found to vary with human fatherhood (Fernandez-Duque *et al.*, 2009; Gordon *et al.*, 2010). Testosterone in particular is interesting because higher testosterone levels are associated with aggression in individuals.

There are five primary classifications for primate mating and social grouping: one-male-multi-female; multi-male-multi-female; monogamous pairs (nuclear families living completely separately); polyandry; and solitary (Jurmain *et al.*, 2010). Groups of primates with one male and multiple females or groups with multiple males and multiple females have the most extensive dominance hierarchies, which are normally enforced through aggression. These two types of primate social groupings are also associated with low father involvement in childrearing. Monogamous pairs and polyandrous species each typically display high levels of direct paternal care of offspring. Although monogamous pairs can be territorial, they are not as aggressive on a day-to-day basis; polyandrous species are not highly aggressive (Jurmain *et al.*, 2010). Thus, it appears that the types of social groups associated with the most direct paternal care are also those associated with lower aggression.

Silverstein and Auerbach (2002) and Blossfeld (1995) show that in more egalitarian human societies, and, in particular, societies where women have significant resources, rates of

direct paternal care are higher than in societies with dominance hierarchies and inequality. This difference can be explained by the reciprocity hypothesis, which predicts that couples take care of children when their parental care creates benefits for themselves in the relationship (Silverstein and Auerbach, 2002). In societies where women have more resources, men have more to gain from helping their female mates. Furthermore, in societies where women have significant power in society, men are less likely to dominate their wives and display aggression in general (Coltrane, 1992). Heaney (2009) suggests that societies valuing equity often translate their egalitarian practices to foreign policy. In societies with higher levels of male participation in child rearing, the political and social status of women is increased (Coltrane, 1988). Furthermore, because of a lack of authority or rank and the more equal status of men and women, rates of aggression are lower in egalitarian societies (Lepowsky, 1999; Coltrane, 1992). Inequality breeds aggression by creating a venue for prejudices to develop. In less equal societies, people objectify and label different groups as "others", which can facilitate and justify aggression. Moreover, power divisions in societies can motivate people to aggress because of the desire for more power. The link between, for example, income inequality and violence is well established (Hipp, 2007; Muller, 1985). Using empirical investigations, Divale and Harris (1976) identified that, more generally, warfare and male supremacy often go together, identifying warfare as causing male supremacy. Thus, warfare and inequality are complexly connected with cyclic causality. So egalitarian societies (and those with a high status of women) tend to have high levels of paternal care and low levels of aggression, and societies with more male supremacy (and, therefore, less expected direct paternal care) tend to have higher warfare.

This evidence suggests the following hypothesis: higher levels of direct paternal care predict lower levels of societal aggression.

It is possible that the paternal care/aggression relationship might go in the opposite direction, in that more father closeness could predict higher societal aggression because of the link in most primate species between gender and aggression. This link is not necessarily inherent in biology (and is one of the more disputed points in all of psychology), but is evident in many species and human societies in that aggression is typically associated with males. The empirical link has been found by countless researchers – however, the reason for the sex difference is hotly disputed. Archer (2009) and others have argued that sexual selection is the cause for such dimorphism; Wood and Eagly (2002) believe the biosocial theory provides a better explanation by emphasizing social roles. For the purposes of my research, it is not necessary to take a position in this debate. What is important is the well-established empirical relationship that males show higher rates of aggression than females do. This means that one could argue that offspring exposed to more paternal care are consequently exposed to more aggression and, therefore, become more aggressive themselves either in imitation or self-defense. Thus, counter to my hypothesis, it is possible that higher father (male) involvement would predict more aggressive offspring and hence more societal aggression. Because there is a viable prediction that is in the opposite direction of my hypothesis, all statistical tests will be two-tailed.

I conducted the following study to test my hypothesis that direct paternal care is associated with lower aggression.

Methods

The Standard Cross-Cultural Sample (SCCS) is a database of variables measured across 186 societies created by Murdock and White (1969). Coded variables and data from more than 50 studies have been added to the SCCS by scientists since its initial creation. Each of the 186 societies was chosen as a representative of a larger cultural province in an attempt to solve Galton's problem, which identifies that we cannot treat all cultures as independent for the purpose of cross-cultural analyses. Galton realized that most cultures are derivatives of or greatly influenced by others, and so therefore cannot be treated as unique. The SCCS is one of the most widely used cross-cultural databases, and although it is not perfect, it is one of the best in maintaining a sample of independent cultures (Mace and Pagel, 1994).

The present research examined 12 variables from the Standard Cross-Cultural Sample to study, listed in Table I. For each variable, societies were categorized into anywhere from two to five classifications.

Variables 53 and 54 were coded by Barry and Paxson (1971) in a group of variables about infancy and early childhood. The ‘father’ was defined as either the biological father or an adult male with an equivalent role in the society. Each variable measures both father/child proximity and father/child relationship. In the published code descriptions, a code of 1 means no close proximity, a code of 2 means rare instances of close proximity, a code of 3 means occasional or irregular close proximity, a code of 4 means frequent close proximity, and a code of 5 means regular, close relationship or companionship.

Each of the aggression variables scored societies such that lower numbers refer to higher levels of aggression. Variables 773 and 774 are broken up into four categories to measure amount of war: frequent, occurring at least yearly; common, at least every five years; occasional, at least every generation; and rare or never. Variable 780 was divided into four categories: extensive – bitter feelings towards almost all outsiders; high – bitter feelings towards outsiders, but not always; moderate – sometimes bitter feelings, but much differentiation; and low – little hostility towards outsiders. Variables 781, 782 and 783 each measure the societies’ acceptance of violence towards a certain group of people: members of the local community; members of the same society, but outside the local community; and other societies, respectively. Variable 783, or aggression towards other societies, is best classified as ‘external,’ whereas Variables 781 and 782 are more concerned with ‘internal’ aggression. These three variables were each broken up into four categories: valued; accepted; tolerated or disapproved of. In Variables 891 and 892, war is defined as armed conflict between organizations or societies, and feuding is not included (Otterbein, 1970). They each have three categories: continual; frequent; and infrequent. Variable 906 is a yes/no question, simply asking about the expectations of violence’s success at solving problems. Variable 907 measures the value of external war, and is broken into three categories: enjoyed and considered to have high value; considered to be a necessary evil; and consistently avoided, denounced, not engaged in. Wheeler says that this variable is perhaps more reliable than 906 because it was easy to code based on art, writings and observations of the culture (Wheeler, 1974).

Results

Father/child closeness varied among societies. Table II shows the number of societies in each category for each of Variables 53 and 54.

Levels of aggression also varied among societies. Tables III and IV show the results for two specific measures of external aggression, Variables 774 and 892, respectively.

Table I Variables from the Standard Cross-Cultural Sample used in this investigation

	<i>Variable description</i>
53	Role of father, infancy
54	Role of father, early childhood
773	(No) internal warfare (between communities of same society)
774	(No) external warfare (with other societies)
780	(Low) hostility towards other societies
781	(Un)acceptability of violence towards members of the local community
782	(Un)acceptability of violence towards members of the same society, but outside the local community
783	(Un)acceptability of violence towards people in other societies
891	Frequency of internal war
892	Frequency of external war – attacking
906	Did members of the society expect violence to solve their problems?
907	Value of war: violence/war against non-members of the group

	<i>Distant</i>	<i>Rarely close</i>	<i>Occasionally close</i>	<i>Frequently close</i>	<i>Regularly close</i>	<i>Missing data</i>
Infancy (53)	8	27	72	44	3	32
Early childhood (54)	4	18	46	73	9	36

	<i>Frequent, occurring at least yearly</i>	<i>Common, at least every five years</i>	<i>Occasional, at least every generation</i>	<i>Rare or never</i>	<i>Missing data</i>
External war (774)	45	13	6	20	102

	<i>Continual</i>	<i>Frequent</i>	<i>Infrequent</i>	<i>Missing data</i>
Frequency external war (892)	31	61	65	29

Table V shows the correlation matrix for all 12 variables created for this study. Cases with missing data were excluded from the analysis using a pair-wise deletion, so a society had to have data on both of the variables in question in order to qualify for that particular correlation. Given that a large number of correlation coefficients (55) were calculated, Type I error is potentially of concern. However, at $p=0.05$, it would be expected by chance that 2.75 of the correlations would be significant, and at $p = 0.01$, we would expect at most one significant correlation by chance. As shown in Table V, there were 43 (35 of those at $p = 0.01$) significant correlations.

All significant correlations were in the predicted direction (i.e. more closeness correlated with less aggression). Variable 53 (role of father in infancy) was significantly correlated with multiple aggression measures, specifically 774 and 892, the most comprehensive external warfare measures. In fact, every variable measuring an aspect of external war (Variables 774, 780, 783, 892 and 907) was significantly correlated with Variable 53, while none of the variables measuring internal aggression were. R^2 values were 0.12 for Variable 774, and 0.05 for Variable 892. Thus, role of father in infancy predicted 12 per cent of the variance in

	53	54	773	774	780	781	782	783	891	892	906
54	0.76**										
773	0.16	0.10									
774	0.34**	0.20	0.29**								
780	0.29*	0.25	0.47**	0.75**							
781	-0.04	0.05	0.31**	0.17	0.30*						
782	0.06	0.05	0.84**	0.29*	0.46**	0.58**					
783	0.29*	0.16	0.37**	0.74**	0.64**	0.28*	0.44**				
891	-0.11	-0.11	0.57**	0.18	0.34**	0.26*	0.53**	0.28*			
892	0.23**	0.11	0.20	0.62**	0.44**	0.15	0.18	0.55**	0.16		
906	0.16	0.08	0.34**	0.36**	0.38**	0.39**	0.45**	0.60**	0.33**	0.46**	
907	0.17*	0.11	0.40**	0.51**	0.57**	0.29*	0.39**	0.70**	0.30**	0.57**	0.64**

Note: Correlation significance at: *0.05 and **0.01 levels (two-tailed)

levels of external war (Variable 774) and 5 per cent of the variance in frequency of external warfare (Variable 892). Although these R^2 levels are modest, that is to be expected given how complex are the roots of warfare (see Discussion). It is interesting to note that no aggression variables were significantly correlated with Variable 54 (role of father in early childhood) even though Variables 53 and 54 were themselves highly correlated. Variable 54 did not significantly correlate with any of the ten aggression measures, nor did Variable 53 with aggression measures about internal war. Variable 53 was significantly positively correlated at the 0.01 level with Variables 774 and 892, respectively (no) external war (with other societies) and frequency of external war – attacking (variable label reversed). In summary, it was found that closer roles of fathers with their infant are correlated with lower external warfare in society.

χ^2 -tests were run after collapsing some variables into smaller groups (e.g. Variable 53 into two categories, close (categories 1, 2 and 3) and not close (categories 4 and 5), rather than the original five categories) because without collapsing data some of the cell sizes were too small for the χ^2 -test to be considered valid. There was a significant relationship between Variables 53 and 774 (also collapsed into two categories) ($\chi^2(1, n = 73) = 5.37; p < 0.05$). χ^2 -tests measure the variance between the cross tabulations of the data and the expected outcome of the cross-tab if the null hypothesis were true and the two variables being tested were not statistically associated. Thus, the significance in the χ^2 -test between Variables 53 and 774 is a fairly robust find that the role of the father in infancy and the frequency of external war are negatively related (Figure 1).

Discussion

Through both correlation analyses and χ^2 -tests using data from the Standard Cross-Cultural Sample, this study found that father closeness in infancy is negatively associated with external warfare. However, although the remaining correlations were all in the predicted direction, there was not a statistically significant relationship between father closeness in early childhood and any aggression measure, or between internal aggression and either father closeness measure. Table VI shows the pattern of results schematically.

The non-findings could be explained in a few different ways. First, there could be no real effect, which is potentially interesting for further research on why there is a difference between father closeness in infancy and childhood and an associated difference between internal and

Figure 1 Relationship of father/infant closeness and external warfare

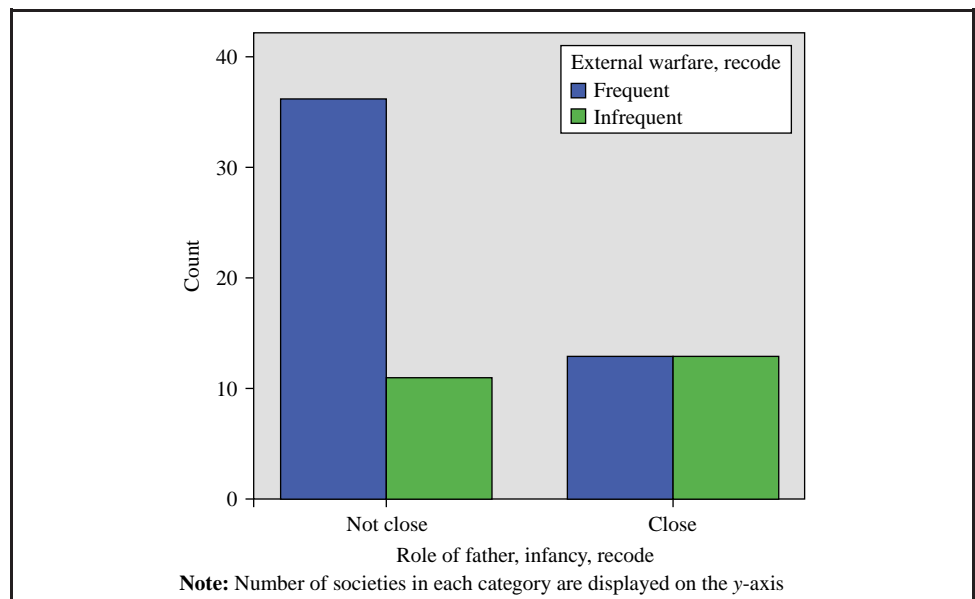


Table VI Schematic of statistical findings in explaining associations

	<i>Internal aggression</i>	<i>External aggression</i>
Father/infant closeness	Not significant	Significant
Father/child closeness	Not significant	Not significant

external aggression. One possible explanation for the former could be because cognitive and psychological development in infancy are different than in childhood. An explanation for why father closeness is associated with reduced rates of external but not internal aggression could be that fathers are absent from families in societies with external aggression because they are away at war and, therefore, cannot directly care for their offspring.

However, the lack of a finding could also be a problem with the data. It is likely that measuring father closeness is easier in infancy than in early childhood, because in infancy “closeness” can be measured simply through physical closeness, whereas in children it is a more complicated connection between physical closeness and the details of the father/child relationship. Similarly, internal aggression may be harder to measure because it could consist of insidious harm that is hard to detect, especially by foreign researchers. If a concept is difficult to measure, the data might contain more noise and, therefore, be less accurate. Considering the difficulties of coding complicated social phenomena, it seems impressive that there was any significant finding in the predicted direction.

Indeed, the roots of war are multifaceted, and aggression has been part of our evolutionary history for millennia. Aggression is a tactic used to satisfy drives such as for food or sex. However, because of the high risk using aggression poses (mortality), limited use is advantageous (Smith and Price, 1973). One main evolutionary reason for aggression is protecting kin, and in fact, much group aggression among primate populations as well as contemporary hunter-gatherers is between familial groups (Gat, 2006). Aggressive behavior can be influenced by society and early upbringing (Bandura, 1978; Eron, 1994; Huesmann and Guerra, 1997). This shows the importance of society, family and culture in warfare. Gat (2006) and Dawson (1996) recognize that warfare has a bio-cultural evolution: one where culture interacts with biology to influence aggression and war. Gat also identifies a difference between warfare before and after the agricultural revolution 10,000 years ago. After the invention of agriculture, the complexities of culture and civilization changed the nature of warfare (a cultural evolution). Basic, more primitive warfare is different from the wars of civilizations and states (Dawson, 1996).

Thus, the roots of modern war stem from our biological and cultural heritage. In *On War* (1908), Clausewitz argues that war has explicitly moral and political causes and goals. Keegan (1993) points out that although this may have been partially true in the wars Clausewitz experienced, it is definitely not universal. Keegan emphasizes the importance of culture in warfare, and argues that instead of war as the “continuation of policy” (Clausewitz, 1908, p. 23) war stems from culture. He cites non-industrial societies as well as modern multinational wars as having their hearts in culture rather than politics. War, he argues, is not always rational. Carefully constructed cost/benefit analyses of war is a recent invention used by current nations of the world. Dawson (1996, p. 1) explains that “warfare has no grand functions”. This may be explained by the biocultural perspective of the evolution of war. In the last 10,000 years, warfare has changed much more rapidly through cultural evolution than would be possible through biological evolution. Thus, modern warfare has cultural (and, therefore, familial) roots. The Standard Cross-Cultural Sample contains mostly pre-industrial societies, so the data analyzed in this study represent societies with perhaps more basic warfare and aggression but in the modern cultural context. In this way, the data have elements of both more primitive warfare and complex state warfare with both strong biological and cultural elements.

Warfare has, therefore, roots in family and culture. Direct paternal care is clearly related to both as well, so this suggests that a possible mechanism for the connection between direct paternal care and warfare is through culture and family.

Because of the cross-sectional nature of the data, this study could only report correlations – none of the findings can prove causality. Although the data to support the theorized relationship that increased direct paternal care causes lower levels of aggression are purely correlational, the observed effect could be explained with at least three different causal pathways. First, paternal care could affect the amount of aggression: for instance, as has been discussed, lower testosterone levels of fathers could explain lower rates of aggression; or children attached to their fathers could be more secure and later not need aggression to satisfy their egos. Second, amount of aggression could affect paternal care: maybe men in low-war societies have more time available for childrearing. Third, a third variable could explain them both, such as the status women in society. The existence of a high status of women might cause high rates of paternal care and low rates of aggression. There are many possible third variables, such as health of family relationships, overall quality of childrearing, or economic stability that longitudinal work by Farrington (1989) identifies as highly relevant predictors of later-life aggressive and violent behavior (see also Leschied *et al.*, 2008). These three possible causal relationships are, furthermore, not mutually exclusive. To test a hypothesis about causality would require a longitudinal study, perhaps even an experimental study with an intervention to change father closeness. This is one possible future direction of this work.

An interesting approach to my hypothesis would be to look at the effects of and associations between aggression and care in same-sex couples. It could be that the finding about fatherhood is not strictly connected to the biological father, but is true when considering any caregiver in a similar role. There could be even specific aspects of caregiving by fathers that match with those by one gay or lesbian parent whose presence predicts aggression. It would be interesting to carefully examine roles of gay and lesbian parents in caregiving and correlate those roles with aggression in the parents' and children's lives. It is likely that more paternal care is associated with higher quality parental relationship and healthier, more secure family, which could itself create less aggressive children. Fonagy and Target (2002) argue that early secure attachment significantly affects a child's responses to stress, ability to maintain attention, and empathic accuracy, which in turn affect her or his social behavior ability. Such an investigation of homosexual parents and their children would tell us if the negative association between aggression and direct paternal care is less about the father and more about the caregiver role; it might tell us how big the gender effect is.

Another future direction is to look at this question among nonhuman primates rather than humans. Whereas very few non-primate species employ direct paternal care, some primate species do (Wright, 1990). A similar statistical analysis to the one presented in this study could determine if the relationship between paternal care and aggression holds with other species. To my knowledge no data yet exists with which one could perform this analysis. However, it is reasonable to hypothesize that the finding among primates would be similar to that among humans because of similar hormonal and social findings about both human and nonhuman primates discussed in the introduction of this paper. This statistical research could also potentially help in understanding the phylogeny of direct paternal care, which would better our understanding of the phenomena of fatherhood and aggression in humans.

Another way to investigate the relationship between direct paternal care and aggression would be an historical analysis of a single society, looking at the correlations between times of high or low father involvement and of warfare. Such an analysis could perhaps see a generational lag between the effects of father closeness on war or vice versa. Such a finding could even hint at a causal relationship.

We could also look inside societies – between families rather than between societies as in this investigation. Father/child relationship and amount of aggression can each be operationalized in a number of ways. For example, surveys could ask about individuals' childhoods and measure their levels of aggression, both past and present.

If the current findings are replicated, they could have public policy implications. Research focused on understanding the causes of war will do well to devote attention to studies of family dynamics and child development. Although we do not know the causal relationship

between direct paternal care and aggression, changing one of the variables in a society is likely to change the other. So if we are interested in either lowering external warfare levels or increasing paternal involvement, an intervention in one is worth exploring as a way to affect the other.

In summary, this study demonstrated, based on data in the Standard Cross-Cultural Sample, that infant-father closeness and external warfare are negatively related.

Implications for practice

- This study shows that higher levels of direct paternal care are correlated with lower levels of external warfare and societal aggression, although amount of variance accounted for is modest. It is reasonable to suspect a causal relationship between the two variables.
- Policy directed towards one of the variables (fatherhood or aggression) is likely to at least slightly affect the other (the causal arrow, however, is still unknown).
- More research is needed to determine whether increasing paternal involvement could lower societal aggression.

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