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Aggression and Violent Behavior



Evolutionary social science: A new approach to violent crime

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ARTICLE INFO

Article history:

Received 17 October 2005
 Received in revised form 7 April 2008
 Accepted 10 April 2008
 Available online 20 April 2008

Keywords:

Evolutionary Social Science
 Violent crime
 Mating competition
 Adaptive development

ABSTRACT

Evolutionary Social Science unites evolutionary psychology and social science. Its core assumptions are that: (1) modern societies owe their character to an interaction of hunter-gatherer adaptations with the modern environment; (2) some changes in societies reflect change in individuals; (3) historical changes and cross-societal differences can be due to similar adaptational mechanisms, and (4) different social contexts modify development through adaptive mechanisms. Preliminary research is reviewed concerning historical and cross-national variation in violent crime to illustrate the new research strategy. Societal differences in violence can be partly explained in terms of reduced parental investment and increased mating aggression.

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Evolutionary psychology (EP) focuses on human adaptations to the hunter-gatherer way of life that is believed to have shaped human psychology over approximately two million years (Buss, 1999; Cosmides & Tooby, 1987; Durrant & Ellis, 2003). This approach generally identifies evolutionary influences on modern behavior in terms of cross-cultural universals such as proposed universal sex differences in sexual jealousy and mate selection criteria (Geary, 1998), or universal cheater detection mechanisms (Fiddick, Cosmides, & Tooby, 2000; Lickliter & Honeycut, 2003; Tooby, Cosmides, & Barrett, 2003) but recognizes that universal human characteristics, such as emotions, may be expressed somewhat differently in different societies (Fessler, 2004). It sees social sciences as falling within the natural sciences. By contrast, “standard” social science focuses on the present and attempts to account for behavioral variation in terms of contemporary influences without reference to the evolutionary past. There are at least two reasons why the social sciences do a poor

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job of incorporating evolutionary adaptations in their accounts of modern life. The first is historical: the humanities developed as academic disciplines separate from the natural sciences. The second is theoretical or ideological, stemming from Durkheim's (1962) view that human societies are distinct from nature and must be studied on their own terms.

Although the strategy of identifying universals at the level of information processing mechanisms of the brain was an important point of departure in the emergence of evolutionary psychology, this approach requires elaboration if it is to account for variation in modern behavior. Just as the social sciences are stuck in the present, so to speak, evolutionary psychology focuses on the evolutionary past. Admittedly, many evolutionary psychologists have wrestled with the problem of how one gets from evolved psychology to modern behavior using constructs that include cognitive modules, Darwinian algorithms, memes, and so forth (Barkow, Cosmides, & Tooby, 1992).

The new research strategy of evolutionary social science (ESS, Barber, 2005a,b, 2006a,b) strives to overcome the temporal limitations of both of these approaches by using concepts of evolutionary adaptation to account for variation in modern behavior whether between siblings, between families, or between societies. This paper employs the new approach to organize data concerning violent crime in a way that can stimulate research.

Before analyzing societal variation in violent crime, it must be acknowledged that this new paradigm makes many controversial assumptions. It would be helpful to make these assumptions explicit and to explain briefly why they are necessary. The paper then shows how these assumptions help to organize data concerning the development of violent antisocial behavior in different societies and at various points in history.

Before presenting this new research strategy, it is appropriate to mention previous Darwinian theories of crime. Cohen and Machalek's (1988) theory of expropriative crime is based on evolutionary ecology as is Vila's (1994) extension of this model to deal with all types of crime. Ellis and Walsh (1997) developed a more explicitly Darwinian gene-based approach to criminal behavior. They made the case that criminal tendencies are gene-based and products of evolution by natural selection.

1. The assumptions of ESS

ESS aims to account for evolutionary novelties in human social behavior produced by modern environments. In order to accomplish something that has not been undertaken successfully by other branches of social science, it is necessary to make assumptions that have not been made previously. Some of these are sufficiently complex, problematic, and even counter-intuitive, that they require some elaboration, although the brief descriptions here are designed to explain the assumptions in an elementary way rather than to provide a detailed justification, which must be left aside for a future publication.

Assumption 1. That modern societies owe their character to an interaction of hunter-gatherer adaptations with modern ecologies and environments. This assumption is fairly uncontroversial.

Assumption 2. Changes in societies may be caused by changes within individuals and they can affect individuals via bottom-up phenomena rather than via top-down transmission of values or behaviors.

This form of reduction is actively resisted in some social sciences but it is worth emphasizing that scientific explanations almost always proceed by accounting for complex events in terms of more elementary constituents. Thus, the "behavior" of a molecule is always reducible to the characteristics of the constituent atoms.

Assumption 3. That historical changes and cross-societal differences are due to the same adaptational mechanisms.

This assumption contradicts the argument of cultural relativism. This is not to deny that all societies have some unique features, such as the peculiarities of their language communication system, their forms of dress, body ornamentation, basketry, pottery design, and so forth. Rather, the argument is made that to the extent the phenomena are truly unique, they defy scientific

Table 1
Examples of different social contexts modifying development adaptively

Input	Outcome/s	Source/s	ESS Interpretation
Corporal punishment	Aggression	Ember (1974), Straus et al. (1997), Nightingale (1993)	Aggression aids survival, RS in violent society
Scolding	Hostility	Hart & Risley (1995)	Antisocial tendencies aid competition in harsh social environment
Distant, coercive Parenting	Early 'low-investing' sexuality	Belsky et al. (1991), Barber (2002)	Tradeoff between mating and parenting effort
Poverty	Crime, low achievement	Argyle (1994), Barber (2000a, 2002), Rosen & Dandrade (1959)	Children follow path to social/RS in their micro-environment
Childhood stress	Adult anxiety depression, bad health behavior, high morbidity, high mortality,	Dallman et al. (2003), Lupien et al. (2001), Teicher et al. (2002), Uvnas-Moberg (1998)	Adaptive fear/suspicion, adaptive hedonism

Note: RS = reproductive success, ESS = Evolutionary Social Science. These interpretations are not always unique to ESS but they should not be attributed to the data sources listed without checking. See text for fuller explanations.

explanation and are thus of minimal interest to scientists, as opposed to artists, for example. One practical ramification of Assumption 3 is that historical mechanisms can be studied indirectly through cross-societal comparisons of contemporary peoples. To take a simple example, the high fertility of women in Africa today is due to the same agricultural mode of production that supported the majority of American women a century ago, and was associated with high fertility for them also.

Assumption 4. That different social contexts (e.g., social status) modify psychological development through adaptive mechanisms.

This can be considered a general theory of psychological development that not only accounts for the adaptive match between individual behavior and the social environment, but also helps to explain historical, and cross-national societal differences. This assumption can be rephrased as an expectation that certain social inputs during development shall produce specific behavioral/psychological outcomes such as violent crime (see Table 1).

2. Adaptive development and violent crime

Several examples of apparently adaptive connections between early social experience and adult behavioral or psychological outcomes are presented in Table 1. Most of these examples of adaptive flexibility in development are of fairly immediate interest to criminologists, contributing to our understanding of individual differences in crime risk as a function of variation in the childhood environment. One example is the concentration of violent crime in poorer neighborhoods (Crane, 1991), which means that the many forms of psychological stress associated with high-crime neighborhoods are a developmental input that evidently increases the probability of criminal violence.

While criminologists like to dwell on the complexity of the crime–poverty relationship from the perspective of data biases, there is little question that individuals raised in poverty are at greater risk of getting in trouble with the police, being arrested, arraigned, and found guilty of crimes. Thus, adolescents from poor homes commit over three times as many sexual assaults, robberies, and aggravated assaults as youths from middle-class homes. And this difference is not attributable to a reporting bias because it emerges in self-reported data as well as official statistics (Elliott & Ageton, 1980). In recent decades, many researchers have distinguished between the effects of absolute poverty and income inequality. Income inequality is strongly related to violent crime but has less effect on property crime whereas absolute poverty is more strongly related to property crime than violent crime in analyses of U.S. metropolitan counties (Kelly, 2000). Analysis of crime rates in countries of North and South America, finds that the connection between violent crime and income inequality is due to the fact that countries with high income inequality also have high ratios of single parenthood (Barber, 2006a) and with single parenthood controlled the Gini coefficient was unrelated to violent crime. Cross-national research typically finds small, or inconsistent, effects of wealth on violent crime but this could be due to a reporting bias such that wealthier countries report a greater proportion of crimes committed within their borders than poorer countries do (Kelly, 2000; Neapolitan, 1996).

The connection between poverty and violent crime fits in with a more general evolutionary scenario according to which a difficult rearing experience evokes behavioral development of a kind that facilitates aggressive competition, of which violent crime is arguably one outcome. Thus, homicides in Detroit have been interpreted as a manifestation of aggressive sexual competition among impoverished young men (Daly & Wilson, 1988).

Some rearing experiences evoke greater Darwinian competition, and hence greater violence, including violent crime than others do (Bjorklund & Pellegrini, 2002). The perspective developed in this paper assumes that our history of evolution by natural selection has equipped us with a capacity for developing different social dispositions (e.g., altruism, competitiveness) depending on the rearing environment and that these varying phenotypes help the individual to survive and reproduce in a specific context. (Note that natural selection includes sexual selection, and that these are not explicitly distinguished in what follows, so that increased aggression might enhance survival and also contribute to mating success in some contexts, Barber, 1995). Such developmental flexibility helps explain the predictability of input–output connections in personality development. Thus, children raised in cohesive communities, where their economic contributions are required and valued, are much more altruistic in their attitudes and behavior towards families and acquaintances, who are thereby protected from being victims of violent crime (Whiting & Whiting, 1975).

Such altruistic societies are characteristically pre-industrial and operate largely outside the monetary economy as exemplified by historical research on the Igbo agriculturalists of Nigeria (Onyeiu, 1997). With the dawn of a monetary economy, the system of reciprocal altruism that provided villagers with a cushion against hard times was destroyed and people became unwilling to help out on the farms of neighbors without payment.

An adaptationist explanation in this case is quite compelling because there is such a close match between the need of families for help from children and the development of their altruistic orientation. Children in a traditional Igbo village were disposed to help their neighbors because by doing so they not only contributed to their personal welfare, and that of relatives, but also invested in their siblings, a phenomenon that occurs in other species, particularly among birds (Barber, 2004a). (Hence the term “helpers-at-the-nest” commonly used in research on animal behavior.) This is just one of many examples of variation in child development of altruism and other personal qualities being consistent with variation in the adult way of life (Barber, 2000a; Low, 1989).

Violent crime occurs most commonly in circumstances where there is real deprivation in respect to basic needs like food and shelter and this phenomenon involves many aspects of developmental flexibility that falls into a Darwinian pattern: to be more specific, an aggressive phenotype develops where competition is intensified and physical aggression correspondingly common.

One mechanism through which aggressiveness is socialized is through extensive use of corporal punishment. This phenomenon has received considerable attention in cross-cultural research showing that warlike societies emphasize the use

of corporal punishment, and exposure to physical privation, in the training of children (Ember & Ember, 1994). Variation in child punishment within societies follows a similar pattern of adaptive variation. Children raised in inner city slums receive much corporal punishment. Parents both endorse the value of slapping their offspring for discipline and are highly resistant to social programs designed to teach them about the adverse effects of corporal punishment for emotional development (Nightingale, 1993). Corporal punishment in childhood fosters subsequent aggressiveness (Straus, Sugarman, & Giles-Sims, 1997) that would favor survival and reproductive success in difficult environments such as impoverished inner cities.

Another element of adaptive developmental flexibility relevant to aggressive criminal behavior concerns hostility and emotional negativity. In this respect there is also a clear connection between social inputs and developmental outcomes. Thus, children who are scolded more often by parents relate to parents and peers in emotionally negative ways according to detailed observational research on language development in early childhood (Hart & Risley, 1995). Specifically, these researchers found that the emotional negativity of children's speech mirrored the amount of negative comments they received from parents. It seems obvious that emotional negativity, as reflected in hostile speech, would be predictive of physical aggression. The language-development results dovetail with those on corporal punishment, conforming to a general pattern characterized as hostility in hostility out.

Such parent-child resemblances are amenable to various environmental explanations, but also to genetic ones. Psychologists now accept that scores on most personality traits, including hostility/aggressiveness, are substantially genetically heritable (Plomin, 1990). Yet, the relevance of paper-and-pencil tests to actual aggressive behavior may be surprisingly limited. Plomin, Foch, and Rowe (1981) found that there was no genetic influence on Bobo doll aggression in children, for example.

Evolutionary psychologists have long noted a connection between childhood experiences in regard to parental hostility and adult reproductive behavior. Generally speaking, environments that reduce emotional closeness between parents and children, (i.e., those that promote parent-child hostility), predispose offspring towards a low-investment reproductive strategy. "Low-investment" is defined as women initiating sexual behavior outside long-term committed emotional relationships and men preferring such uncommitted relationships to marriage (Barber, 2002; Belsky, Steinberg, & Draper, 1991; Draper & Harpending, 1982; Geary & Flinn, 2001). This connection evidently revolves around emotional insensitivity in the parent-child relationship that fosters suspicion and hostility and undermines trust in intimate relationships. If this logic is correct, then it is easy to understand why an environment of reduced parental investment, such as extreme poverty, would be conducive to the emergence of a more criminal phenotype. (One may think of predispositions to violent criminality as continuous rather than dichotomous, which would explain why criminal behavior is found in affluent communities as well as poverty-stricken ones.)

3. Reproductive strategies and the crime-poverty link

Many of the complex associations between criminal predisposition and economic disadvantage can be interpreted in terms of reduced parental investment. Parental investment was defined by Trivers (1972) as parental efforts that increase the chance of survival for one offspring at the expense of other offspring (actual or potential). This definition accommodates all species where young require much parental care and thus applies to humans. Survival is a real issue for children in economically underdeveloped countries where poor nutrition, and inability to pay for medicines influences probability of survival. In Punjab, India, for example, parents spend more than twice as much on medicine for male compared to female infants so that boys are more likely to survive than girls, reversing the usual mortality pattern (Das Gupta, 1987). Parental contributions to social success, such as providing an education, could be even more important for children's prospects of survival, and their social and reproductive success. Such investment in social status is not unique to humans, having been observed in different primate species, where dominant females pass on their rank to offspring, usually daughters (Hrdy, 1977).

Investment in the social status of human children is also illustrated by interactions between parents and children at different tiers of the economic hierarchy. Psychologists studying language development have documented substantial social class differences in the ways that parents interact with children (see below). Parents investing more in the social advancement of their children establish a warm and trusting relationship with them, use explanation as a primary tactic in discipline, and provide them with an intellectually stimulating environment, all of which decrease the likelihood of antisocial outcomes (Barber, 2004a; Hart & Risley, 1995).

A rearing environment characterized by reduced parental investment exposes children to developmental inputs that are known to increase the likelihood of antisocial tendencies and/or criminal behavior. Thus, children of poorer parents experience more emotional negativity (Hart & Risley, 1995), corporal punishment (Dietz, 2000), psychological and sexual abuse (Kotch, Browne, Dufort, & Winsor, 1999), and learn to fear and avoid cognitive challenges such as those required for educational and occupational success (Rosen & Dandrade, 1959). The respective outcomes include increased delinquency, crime, single teen childbearing, poor academic attainment and diminished earning capacity (Barber, 2000a).

The process of adaptation to life close to the bottom of the socioeconomic ladder in modern environments raises the question of which aspects of ancestral environments would have provided the relevant inputs for analogous developmental responses. If we knew what those inputs were, it would be easier to explain how our ancestors might have acquired the sort of developmental plasticity that is observed in the modern environment in response to economic variation in the household environment (as well as other sources of variation in parental investment, such as parental conflict and separation). One of the most obvious of these ancestral inputs would be food scarcity. Extant hunter-gatherer groups experience periodic food scarcity based on climatic variation, such as droughts, for example.

When food resources are scarce, intensified competition within and between families would be predicted to increase selfish and antisocial tendencies. This prediction receives empirical verification in the specific case of intensified competition for food within modern U.S. families. Research on correlates of food uncertainty (Alaimao, Olson, & Frongillo, 2002; Alaimao, Olson, Frongillo, & Briefel, 2001) finds that children in this unenviable situation are more antisocial in their behavior and attitudes and less motivated for academic effort. We cannot rule out inherited genes for antisocial tendencies as a rival explanation in this case and the preponderance of evidence shows that genetics and environment are both implicated in the development of antisocial tendencies and criminal behavior (Barber, 2004a; Lykken, 1995; Plomin, 1990).

3.1. *Varying early environments and violent crime*

There is little question that the quality of home life affects children's risk of committing serious crimes, particularly crimes of violence (Barber, 2000a, 2002). Thus, various patterns of differences between homes are reflected in arrest statistics and crime. Violent crime rates are substantially higher for children raised in poverty, children of single parents, and children whose parents have divorced, for example, and these differences are not simply a question of biased reporting or police discrimination against these high-risk categories (Barber, 2000a; Kelly, 2000; Wallerstein, 1998). While there is some confusion about whether economic disadvantage is affected most by absolute poverty, or income inequality, there is little doubt that economic disadvantage, however measured, affects criminality. Generally speaking, children in economically-disadvantaged homes are exposed to a more competitive early environment and experience greater psychological stress (which can be operationalized as increased production of stress hormones) that alters phenotypic development, including brain development, as elaborated below.

Why do children in the high-risk categories listed above have higher rates of crime? The main reason could be that parents invest less in their emotional development.

Why do children raised in poverty, for example, experience such reduced parental investment? This important question has two answers, an immediate answer, and an ultimate answer that delves into the evolution of human mechanisms of psychological development. The immediate answer involves such factors as insufficient funds to live in a pleasant neighborhood, eat well, buy books and toys, attend good schools, the fact that poor parents are more likely to use hostility and coercion as ways of controlling their children's behavior, and so on (Barber 2000a; 2002). The ultimate answer addresses the more general question of why poor parents are likely to coerce their children instead of using a reasoned approach to discipline. Reasonableness generally produces better compliance and has the added benefit of helping children to accept authority in their lives so that they are more obedient and successful in school and in other important social situations throughout their lives (Barber, 2004a).

Psychologists know a great deal about the first question of immediate causes, although not nearly as much as we would like to from the point of view of effective prevention. The issue of ultimate cause is shrouded in mystery and it is only in the past decade that psychologists and other social scientists have begun to grapple with it. The ultimate, or evolutionary explanation for the connection between rearing experiences and crime begins with the premise that the survival and future reproductive success of children are promoted by different patterns of behavior in different environments. This is hardly controversial and anthropological research confirms that child-rearing practices of different societies differ in ways that tend to promote children's social success (Barber, 2000a; Low, 1989).

The evolutionary theory of socialization (Belsky et al., 1991) proposes that a coercive, insensitive style of rearing fosters tough-minded children who look out for their own interests and are indifferent to the needs and suffering of others (Barber, 2002). In our society, children raised with little in the way of warm emotional support are more prone to crime. They are also more likely to do poorly in school, to be irresponsible in their sexual behavior, and to be more aggressive (Barber, 2000a, 2002; Belsky et al., 1991).

The other main premise of the theory is that coercive, insensitive, and emotionally distant parental behavior is a feature of social environments where interpersonal toughness is an advantage for children. Life at the bottom of a social hierarchy is difficult and stressful, for example, and people who flourish in this environment must be tough-minded to avoid getting taken advantage of by others. This is the adaptive part of the theory because it explains why harsh parenting is a typical feature of some environments, such as being brought up in a depressed crime-ridden inner city, but not others, such as being raised in an affluent suburb. (Needless to say, abusive parents can be found in all social strata: they are just thicker on the ground in poor homes for reasons that are specified in the theory).

The evolutionary theory of socialization is deeply influenced by the concept of parental investment and it so happens that coercive parenting and a relative lack of emotional closeness between parents and children are characteristic of social environments in which parental investment prospects are limited, whether by lack of resources, scarcity of high-investing men, or by marital conflict.

Trivers' (1972) definition of parental investment provides objective criteria that can be used to measure it. He implies that parental investment is reduced in large families, by close spacing of births (because a baby requires more attention than other children and raising two babies together means that corners get cut), and by single parenthood (because only one parent contributes, rather than two, Lancaster, 1997). Parental contributions to survival and social success include, food, energy, medicine, time investment, vigilance, work, money, career planning, social influence, and emotional support, the last being of critical importance in respect to antisocial behavior and violent crime. Parental investment is also affected by the sexual composition of a population and societies with a scarcity of adult men experience both diminished paternal investment in children as well as increased direct mating competition amongst males (on account of the greater prevalence of extramarital sexuality, Barber, 2002a). There are thus two related mechanisms through which a scarcity of males in the population would tend to increase violent crime rates (despite the greater criminality of males compared to females).

4. The sex ratio and violent crime

By convention, the human sex ratio is expressed as the number of adult males for a specified age range per 100 females. The fact that there is a strong negative association between a country's sex ratio and its level of violent crime (Barber, 2000b) could be interpreted in terms of the influence of sex ratios on parental investment, including investment by fathers in children.

The connection between parental investment and crime is not only helpful in accounting for who is at risk of criminal offending in a particular society, but also at explaining why violent crime is so much more common in some societies than others, and at some historical periods than others. Children raised by single parents (usually mothers) are at greater risk of economic deprivation and otherwise experience diminished social support from fathers, although this is certainly not true in every case (Barber, 2000a).

Where there is a scarcity of marriageable men and women have difficulty marrying, there are high rates of single parenthood and teen births, not to mention a high level of marital instability, all of which are conducive to high crime rates (Barber, 2000b, 2002). Societies with a scarcity of men have diminished parental investment in children, thus creating a rearing environment that facilitates the development of antisocial tendencies, and low-investment reproduction. Crime rates could increase as a result. We are familiar with this relationship in our own society from evidence that children of single mothers, and divorced parents, are more likely to get in trouble with the law (Kelly, 2000; Lykken, 1995; Wallerstein, 1998) although a coresident father is protective in respect to criminality only if he is law-abiding himself (Jaffee, Moffitt, & Taylor, 2003). Although children of single parents may be more vulnerable to unfair treatment at the hands of law enforcement agencies and have less access to competent legal defense, such effects are substantial and difficult to explain away in terms of confounding factors (Anderson, 2002; Cookston, 1999; Demuth & Brown, 2004; Paschall, Ennett, & Flewellin, 1996). Children raised by single mothers in Finland are more than five times as likely to be found guilty of committing violent and nonviolent crimes (Sauvola et al., 2002) and a similar conclusion can be drawn from data on U.S. prison populations (Lykken, 1995).

This connection between the supply of men and violent crime is rather counter-intuitive. Thus, men commit far more violent crimes than women, yet, societies with a larger proportion of men in the population have lower rates of violent crime (murders, rapes, assaults) based on analysis of INTERPOL data for 70 countries (Barber, 2000b) that controlled for national wealth and other possible confounding variables. Violent crime rates are generally lower in Europe, where sex ratios are comparatively high, than in Africa, where sex ratios are low, for example (even with level of economic development statistically controlled).

Generally speaking, in high-sex-ratio societies, women are much in demand as marriage partners and can require a high level of paternal investment as a precondition of marriage. In earlier centuries, European wives were entitled to lifetime support for themselves and for their dependent children (Guttentag & Secord, 1983) and this environment of high parental investment was associated with low levels of violent crime. This conclusion is drawn from research relating official violent crime statistics from the early nineteenth century onward in Scotland and England (Barber, 2003c). A measure of the ease that women had in marrying (the ratio of single men to single women at the peak age of marriage) was a strong negative predictor of violent crime, even with the ratio of males to females in the population statistically controlled. Similar results were found for violent crime rates in the U.S. in the twentieth century (when usable official statistics first became available). Why might the marriage market affect crime in this way? One possibility is that stable marriages expose children to less overt conflict between their parents.

Societies with a scarcity of men experience a high level of conflict between men and women in marriage. The most direct evidence for this is that countries with fewer men than women have higher divorce rates (Barber, 2003a). Conflict between parents, and in homes more generally, facilitates the development of hostility and aggression (see below). Thus, children of divorce are more likely to commit crimes (about 50% more likely in the U.S. (Wallerstein, 1998).

Societies having low sex ratios also have much higher rates of single parenthood (Barber, 2003b). If a young woman has little prospects of finding a desirable, high-investing marriage partner, then she may begin reproducing outside marriage. Women facing a poor marriage market often begin their families when they are young because delaying reproduction is unlikely to improve their marriage prospects (Barber, 2000c, 2001a). If they are to raise children alone, then they might as well begin early when they have the health, energy, and motivation necessary to see their offspring through to adulthood. Such decisions are probably not made consciously as much as through evolved emotional mechanisms. The high level of teen births and single motherhood in societies with a relative excess of females to males evidently plays a role in their higher crime rates. The increased likelihood of crime is attributable to the combined effects of poverty and reduced parental investment (Barber, 2002; 2004a).

To summarize the argument thus far, low sex ratios generate interpersonal conflict between men and women and are associated with various measures of reduced parental investment including single parenthood, and teenage reproduction. Reduced parental investment might be expected to increase the likelihood of engaging in criminal activities and this hypothesis is supported by strong correlations between crime and young single parenthood, for example. Given such unambiguous connections between low sex ratios and reduced parental investment, one would expect that societies with an excess of women should have higher rates of violent crimes even though most such crime is committed by males.

From an ultimate, or evolutionary, perspective the increased criminality of children experiencing reduced parental investment could be an adaptive response in the sense that a difficult interpersonal environment makes people tougher, more selfish, more exploitative of others, and more aggressive. Such tough-minded individuals are more likely to survive and reproduce in a challenging social environment where economic resources are limited and competition for those scarce resources is correspondingly increased. What are the psychological mechanisms through which reduced parental investment might increase the likelihood of violent criminal offending?

5. How criminals are raised

Why would any parent want to raise a criminal? In the abstract, few would. Yet, abundant evidence implicates the relationship between parents and children either increasing, or protecting against, the risk of being a criminal offender. Parents may not want to raise criminals but they may do so inadvertently. This is most obviously true for parents who abandon or neglect their children but it also applies to homes where married parents stay together to raise their children. Parental qualities conducive to criminality include coercive disciplinary behavior and difficulty in forming bonds of empathy between parents and children (Barber 2004a; Lykken, 1995). These problems are conveniently illustrated by contrasting interactions of married couples and their children in poor homes compared to more affluent ones.

Detailed observational research comparing homes at different income levels (Hart & Risley, 1995) was motivated by the study of language development rather than the development of antisocial behavior, but the rather clear, and disturbing, findings speak volumes about the influence of coercive disciplinary tactics by poorer parents on antisocial tendencies, or delinquency of their children. Criminal behavior has its roots in childhood delinquency (Lykken, 1995) and delinquency is a predictable result of harsh and inconsistent parental behavior.

While it may be unreasonable to hold parents accountable for all of the actions of their adult children, the evidence that antisocial behaviors and attitudes of children are at least partly the products of parental actions is compelling. Thus, clinical psychologists who tackle the problems of children with “oppositional conduct disorder,” (i.e., unwillingness to obey parents), find that one effective strategy in dealing with such children is to teach the parents how to reinforce desirable behaviors in the children. Parental skills interventions may be so effective that when the “problem” children grow up they are indistinguishable from others who were not diagnosed with conduct disorder. Given the quasi-experimental nature of such research and the fact that, *as a group*, untreated children ordinarily do not grow out of their delinquency (although many *individuals* certainly do), we can reasonably conclude that it was caused by insensitive parental actions (Long, Forehand, Wierson, & Morgan, 1994). The same point is made by other research establishing the value of parental interventions in dealing with conduct disorder, e.g., Multisystemic Therapy and Multidimensional Treatment Foster Care (Hahn et al., 2005; Kazdin, 2000). Other lines of evidence bolster the same conclusion.

Thus, some parents rely on hostility, and coercion, as strategies for controlling the undesirable behavior of their children. Such approaches may have unintended consequences as children rebel against parental tyranny. One study that videotaped interactions between parents and children found that parents directed more hostility towards the child who had the most problems (Reiss et al., 1995). Differences in relationships with the parents accounted for 60% of the differences in conduct problems between sibling pairs. Interesting as this research is, it raises a chicken-and-egg problem. Did parental nastiness cause the child's antisocial behavior, or were parents nasty to the more antisocial child in reaction to his/her bad behavior?

One way of shedding light on such problems is to collect a great deal of observational data reflecting the parent–child relationship as it unfolds in the home over long periods of time. This has been done in a study of language development, from birth to the age of 3 years (Hart & Risley, 1995). This study compared children raised in either professional (13 homes), working class (23), or welfare (6) homes, numbers that are really too small to permit reliable statistical analysis. The differences were substantial but sampling bias cannot be ruled out.

Children in professional and working class homes scored higher on measures of cognitive ability and verbal development than those in welfare homes and this relationship was consistent with differences in parental behavior. Particularly striking was the contrast in verbal stimulation as a function of income. Children in affluent homes received more than twice as much verbal stimulation from their parents and heard twice as many different words as children in welfare homes. Small wonder that by the age of three they were more verbally fluent, having a much larger vocabulary (1116 compared to 525 words).

Important as these data are for our understanding of the cognitive and educational difficulties of children raised in welfare homes, they pale in significance compared to the researchers' analysis of the emotional tone of parent–child relationships. Parental conversations directed at children were coded in terms of whether they expressed a positive sentiment (i.e., were warm and friendly, or affirmative), or were negative (i.e., scolding, hostile, or prohibitive). Children growing up in professional homes received about six times as many positive responses, and only half as many negative responses as children growing up in welfare homes.

If these findings have any generalizability, then there is no mystery about why children growing up in poverty should be more likely to develop antisocial attitudes and behavior and to commit crimes. Hostile, or coercive, parental control strategies bring out defiant and antisocial responses in children. Patterson, DeBaryshe, and Ramsey (1989) described the coercive family in which each member uses unpleasant tactics, like teasing, scolding, and physical force, to control other family members from their perspective as family therapists. When the therapist demonstrates how family members can get along with each other using emotionally positive methods of negotiation, instead of scolding and irritating each other, the conduct problems of children in the home improve greatly, however.

All of this research on the antecedents of delinquency fits neatly into the evolutionary theory of socialization (Barber, 2002, 2004a; Belsky et al., 1991). Under difficult social and environmental conditions, parents resort to a low-investment rearing style that evokes emotionally negative interactions. Doing so makes adaptive sense because children develop the tough competitive attitude to others that helps them survive, and reproduce, in a challenging social environment whether this is a function of scarce resources or group conflict. Although most poor people certainly are not criminals, being raised in poverty nevertheless pushes children in the direction of delinquency, and crime by fostering antisocial attitudes, including wariness, hostility, and suspicion of others (Barber, 2004a).

Hostility and coercion directed at children by parents generally evokes a response in kind so that children growing up in conflict-ridden homes develop a mean-spirited attitude and are selfish and cynical in their orientation to others. Such children get in trouble in school because of inability or unwillingness to conform with the rules of expected behavior (Lykken, 1995). They are

more likely to be delinquent as teenagers, to become involved in criminal enterprises, and to be arrested for committing serious crimes, including crimes of violence. Societies in which there is more emotional conflict in the home should therefore have higher levels of crime in general and violent crimes in particular. These ideas are relevant to the connection between low sex ratios and violent crime.

Marital conflict is exacerbated in low-sex-ratio societies, as noted above, because men do not need to make the emotional, and economic, commitment to marriage that women desire (Barber, 2002; Guttentag & Secord, 1983). Sociologists, historians, and social psychologists have been struck by the level of hostility between the sexes in societies where women faced a difficult marriage market. This is a ubiquitous feature of literary depictions as diverse as *The Canterbury Tales* and *The Color Purple*, a novel chronicling the romantic tribulations of 20th century African American women. Nor is it merely a question of the subjective impressions of authors: societies with a scarcity of men have higher divorce rates (Barber, 2003a; Trent & South, 1989). Divorce is usually preceded by a period of conflict. Women have higher theft rates in countries with low sex ratios, suggesting that they experience economic difficulties due to insufficient economic support from male sexual partners (South & Messner, 1986). Conflict between parents is one ingredient of the coercive and insensitive rearing environment that promotes delinquency and crime. Such conflict is diagnostic of reduced parental investment.

Many other circumstances reduce parental investment within a country also. They include poverty, which involves scarcity of resources and an accompanying difficulty in marriage formation (Abrahamson, 1998, 2000). Of course, poverty is often linked to crime in sociological analyses. Polygyny also reduces paternal investment in children for the simple reason that the investment of one father is split up among the children of several women. This logic is controversial because polygynous men are often unusually wealthy so that their material resources could compensate for the inevitable lack of emotional closeness with children in a large polygynous family including scores of children.

6. Polygyny and violent crime

Apart from splitting up of the father's investment in children, and thus reducing parental investment overall, there are many reasons for believing that polygynous families would be associated with high levels of violent crime. One reason is that polygynous societies often have low sex ratios given that polygyny is sometimes a response to scarcity of men of marriageable age (Barber, 2002). The absence of men can be due to high mortality in warfare. Men in warlike societies are raised to be highly aggressive in other contexts, leading to the expectation that these societies should have high rates of violent crime.

Apart from sometimes having low sex ratios, polygynous societies have increased mating competition between men: some individuals have large numbers of children while many others may have none at all. Such competition is often determined indirectly by access to wealth and property. Yet, mating competition is arguably the major cause of male-on-male assaults and homicide around the world (Daly & Wilson, 1988).

Polygyny may produce a coercive rearing environment due to inevitable conflicts between co-wives over how resources are invested in children. These conflicts can be minimized, as in the case of the Mormons, by maintaining wives in different residences but this is only a partial solution. It did not prevent Mormon co-wives from engaging in heated disputes over the division of their husband's property after his death, for example. Co-wives often live in close proximity, as in the case of the Dogon, and this is particularly stressful for these unrelated women. Sororal polygyny, in which sisters share a husband, avoids much of the conflict among co-wives. For the 54 societies in the *Ethnographic Atlas* that practice sororal polygyny, 60 (or 81%) thus have shared dwellings. Conversely, for the 303 societies in which co-wives are unrelated, only 32% (96 societies) share their residence (Daly & Wilson, 1983).

The developmental consequences of conflicts between parents increasing antisocial tendencies would also be caused by conflicts among co-wives. The practical importance of such conflict is suggested by the higher mortality of children raised by polygynous Dogon women, whose cause has not been identified (Strassman, 1997). Although these mortality differences have not been adequately explained, several possible reasons can be posited. First, psychological conflict could well undermine children's health. Another possibility is that there is greater competition over critical resources, such as money to pay for medicine than would be the case for nuclear families where there are fewer children. The worst case scenario is that co-wives either deliberately starve, or even poison, offspring of their reproductive competitors (i.e., cowives). Under any of these scenarios, the rearing environment is of a highly competitive sort that would be expected to bring out antisocial attitudes and behavior in children, predisposing them to future criminal violence.

In summary, there are many different reasons for predicting that polygynous countries should have higher rates of violent crime, ranging from reduced paternal investment, to violent conflict over sexual access to women, to increased warfare, and stressful conflicts among co-wives and it can be difficult to distinguish between these varied potential causes of cross-national differences in violent crime. Whatever the intervening mechanisms, analysis of rates of violent crimes against the person (murders, rapes, assaults) in 70 countries based on United Nations data for 1990 found a positive effect of polygyny intensity on crime rates even with level of economic development statistically controlled (Barber, 2000b). Such cross-national comparisons suffer from methodological problems, however.

7. Violent crime in different countries

Cross-national studies of crime encounter major challenges in connection with the quality of the data and specifically concerning whether violent crime rates are truly comparable from one society to another. In many sexually-repressive societies,

rapes are rarely reported, for example, and it is not hard to see why this would be so in countries, like Pakistan, for example, where the *victim* is exposed to criminal penalties for “allowing” herself to be raped. Different countries may also define crimes differently and reporting procedures may differ in consistency and reliability (Soares, 2004).

Despite all of these undeniable problems, there are good reasons for believing that U. N. crime data are of sufficient quality to permit meaningful comparison between different countries. One is that the homicide data are significantly correlated with independently-derived World Health Organization data (Barber, 2000b). Another is that the various violent crimes (murder, rape, assaults) are correlated with each other as would be expected if violent societies have high levels of various crimes of violence. Cross-national data certainly contain substantial error and this statistical “noise” makes it more difficult to reach significance in statistical tests and thus increases the likelihood of falsely rejecting hypotheses (making Type 2 errors).

Bearing this problem in mind, it is still surprisingly difficult to account for cross-national variation in violent crimes. Among the many possible explanations for country differences in crime rates rejected by Barber (2000b) were: urbanization of the population; population density; population migration rates, which usually increase with political instability; literacy rates; infant mortality; life expectancy; hot climate, which is supposed to be predictive of aggression in the context of street riots, for example; and national economic productivity (gross domestic product) which falsifies the commonplace view, at least among social scientists that violent crime is caused by national poverty. (While Soares, 2004 reported that crime rates increased with economic development this effect was attributed to better reporting of crime in developed countries.)

Despite such copious negative findings, there is evidence of strong regional patterns in violent crime, specifically the much higher rates for countries in the Americas (Barber, 2006a). Why would rates of violent crime be higher in the Americas? One intriguing possibility is that the differences are due to family influences, such as teen births and single parenthood. Many countries in South America and the Caribbean have unusually high rates of teen births and single parenthood, indicating a poor marriage market for women.

Apart from geographical region, the only major predictor of violent crime is the sex ratio (Barber, 2000b). Countries with low sex ratios have much higher rates of murder, rape, and assault. Countries with polygynous marriage have higher assault rates but do not have more rapes or murders (although the statistical tests were in that direction).

The lack of impact of national poverty on levels of violent crimes against persons is perplexing to many different theoretical perspectives, including the evolutionary one. Why does poverty predict crime within a country but not between different countries? One possibility is that poverty within a country is correlated with reduced parental investment but whereas poverty differences between countries do not have the same implication.

Striking as the lack of impact of economics on violent crime was the fact that the only interesting predictor of crime rates was parental investment, as measured by the sex ratio and polygyny (Barber, 2000b). Countries with low sex ratios had significantly higher rates of all violent crimes. Polygynous countries had significantly higher assault rates but not rapes or murders. Theoretically interesting as these findings are, it might be objected that the sex ratio and polygyny are rather indirect measures of parental investment.

8. Single parenthood and violent crime around the world

Single parenthood is arguable a more direct measure of parental investment in the sense that absent fathers invest less in their children so that offspring are much more likely to experience economic and social deprivation during childhood. The problem is that cross-national data on illegitimacy rates are difficult to obtain for many countries. A smaller-scale study was thus conducted on the 39 countries, of the original 70, for which illegitimacy rates were available (Barber, 2004b). (Note that “illegitimacy” is a historical term that refers more narrowly to children born outside wedlock and this is used here because it occurs in the data sources. “Single parenthood” is generally preferred today as being less evaluative but it is also broader and includes both divorced parents and those who have lost a spouse through bereavement).

Countries with high single parenthood rates also had high rates of the three violent crimes (Barber, 2004b). Illegitimacy rates explained a substantial proportion of country differences in crime rates, 27% for murders, 38% for rapes, and 36% for assaults, a notably large and consistent effect size given the problems in the cross-national data and the likelihood of making Type 2 errors. On average, about a third of national differences in violent crimes are thus potentially explainable in terms of differences in single parenthood.

The cross-national data are thus consistent with findings within countries to the effect that being raised by a single parent is a major individual risk factor for criminal activity, as noted above. Given that the Americas have much higher rates of violent crime than the rest of the world and also have higher rates of single parenthood, it is worth investigating whether the higher crime rates of countries in North and South America, Central America and the Caribbean are related to their high illegitimacy ratios. This question was examined using regression analysis that controlled for illegitimacy and asked whether location in the Americas was still useful as a predictor of violent crime. For murders, rapes, and assaults, higher crime rates of the Americas can be entirely accounted for in terms of higher single parenthood ratios (Barber, 2006a).

The fact that illegitimacy is such an important factor in violent crime differences between countries is easily explained if individuals raised in single-parent homes are at a higher risk of becoming criminals, which is clearly the case, given that children of single mothers are greatly over-represented among prisoners, although this might be due to genetic and biological influences as well as environmental ones (Lykken, 1995).

Extensive research into the causes of juvenile delinquency indicates that youths are more likely to commit crime if they: (a) have a distant or hostile relationship with parents and (b) are less under parental control and supervision (Barber, 2000a). Thus, juveniles are most likely to commit crimes in the few hours after school when there is diminished parental supervision. Increases

in the proportion of juvenile offenders in recent decades has also gone along with increases in the numbers of latchkey kids who are left to their own devices in the time from when school closes to when parents return from work.

Lack of parental supervision has become more of a problem as more women have gone to work and there is an almost perfect correlation between increases in the numbers of women who work full time and increases in juvenile crimes of violence (Barber, 2000a). This fact is rarely publicized, possibly because it could be interpreted as suggesting that mothers should stay at home with their children. Such data also point to a dearth of affordable childcare institutions that can support the efforts of working mothers. Either way, reduced supervision is more of a problem for children of single parents for a variety of reasons, including time budget, reduced economic resources and lower neighborhood quality.

There is little reasonable doubt that the family environment plays a major role in the development of violent tendencies as reflected in crime statistics. Cross-national evidence indicates that where parental investment is reduced, either by a poor marriage market for women, or by polygyny, violent crime increases. The fact that crime rates are so strongly predictable from national illegitimacy rates suggests that reduced parental investment increases violent crime, but an alternative mechanism could be the increased mating aggression to be expected in societies where more women are sexually active outside marriage. Each of these mechanisms can be accommodated by an evolutionary theory of socialization.

9. Violent crime and mating aggression

Copious anthropological evidence indicates that mating competition, particularly between men, sometimes culminates in homicide. In subsistence societies that lack frequent warfare, the primary motive for homicide may be sexual competition among men and the jealous aggression surrounding lover's triangles in which men sometimes kill sexual competitors and unfaithful spouses (Daly & Wilson, 1988; Symons, 1979). This generalization applies to societies around the globe from the !Kung of the Kalahari Desert in south Africa, to the Eskimos of North America, the Siriono of Bolivia, the Tiwi of North Australia, and the Arapesh of New Guinea. Sexual jealousy remains the primary motive for violence against women in nation states around the world (Daly & Wilson, 1988).

Sexual competition may be the primary motive underlying male–male homicides even if this is not superficially obvious. Analysis of homicides in Detroit finds that many arise from “trivial altercations” between young men, for example. According to Daly and Wilson (1988), such arguments have consequences for social status and are thus less trivial than they appear because men who lose “face” in a dispute may suffer a decline in social status that diminishes their attractiveness as potential mates.

Although little quantitative research has directly investigated the association between mating competition and violent crime, many probable indices of mating competition are positively correlated with violent crimes in cross-national research. Violent crime, for example, is positively, if weakly, correlated with divorce rates in developed countries (Neapolitan, 1999). High rates of divorce, generally imply more sexually active unmarried women of reproductive age, and thus more rationale for increased mating effort by men. Similar logic explains why violent crime rates are higher in countries having low sex ratios that promote premarital sexuality (Barber, 2000a). Conversely, a scarcity of women, promotes premarital chastity, and an environment in which men compete indirectly for permanent mates via resource acquisition (Guttentag & Secord, 1983). Such indirect competition would minimize interpersonal aggression. Societies having circumstances conducive to direct mating competition are thus more likely to have high levels of violent crime.

The association between single parenthood and violent crime is thus amenable to two possible evolutionary explanations: one operates through child development in the context of high family conflict; the other operates through mating aggression. These two approaches yield one key differential prediction. The developmental (or parenting) hypothesis predicts that the marriage market will be related to violent crime with an approximate one-generation lag (as children mature to peak ages of criminal offending). The mating aggression hypothesis predicts that there will be a contemporaneous relationship between single parenthood ratios and violent crime. A cross-national test of these two competing hypotheses found that current single parenthood ratios were strongly and consistently related to murders, rapes and assaults whereas single parenthood ratios a generation earlier added nothing to prediction of the violent crimes (Barber, 2004b). Similarly, the higher violent crime rates of North and South America compared to the rest of the world were fully explained by the mating aggression approach (Barber, *in press-a*). Historical analyses of violent crime rates in England, Scotland, and the U.S., also found a contemporaneous association between single parenthood ratios and crime, but no delayed effect, thus falsifying the parental investment approach (Barber, 2003c). These preliminary results support the mating aggression hypothesis and call the parental investment hypothesis into question but it is arguable that societies in which mating aggression is more intense are also likely to be the ones where parental investment is reduced, making it difficult to separate these influences unambiguously. More research is clearly desirable.

10. Conclusions: violent crime and ESS

The data on violent crime around the world and throughout recent history suggest that ESS provides the kind of large framework into which many kinds of evidence can be usefully assimilated. Thus, the response of violent crime rates to similar influences across time and from one society to another is consistent with ESS and this consistency adds to our understanding of criminal violence from the perspective of evolved human tendencies playing out in different societies through the mechanism of diverse developmental histories of individuals thereby complementing evolutionary theories of crime based on largely on genetic variation. The basis of this distinction is that natural selection operates on adaptive mechanisms of development as well as on genetic variation that is conceived as having a more direct, or one-to-one relationship to criminal behavior, as in the example of gene-based sociopathy (Mealey, 1995).

Perhaps the most interesting aspect of the application of ESS to violent crime is the fact that antisocial tendencies of young people vary predictably both as a function of the broader social environment as defined by the population sex ratio of a country, for

example, and as a function of the developmental social environment within families. One important source of variation in criminal tendencies at each level of the social environment is arguably variation in the potential for parental (and particularly *paternal*) investment in children, as affected by income, for example, but poverty also intensifies male-male mating aggression which could be an even more important cause of violent crime.

A diminished capacity for paternal investment is characteristic of poverty in modern societies, helping to account for real variation in criminal behavior as a function of income. Research on brain development points to psychological stress as a plausible mediator in the ontogeny of antisocial behavior as a function of parental income. Presumably, this example of evolved developmental plasticity would have tracked very different stressors in the evolutionary past, perhaps periodic scarcity of food rather than the modern stimulus of insufficient monetary resources. Either stimulus would increase psychological stress in the rearing environment and thus alter brain development in the direction of antisocial behavior.

Although this paper focuses primarily on male perpetrators, as responsible for the great majority of violent crimes, it is worth pointing out that female participation in violent crimes is on the rise and that this is at least partly attributable to economic problems associated with declining male investment in children, as reflected in the higher proportion of thefts by women in low-sex-ratio countries (South & Messner, 1986). The specific case of female involvement in violent crime would thus likely benefit from an evolutionary analysis.

Scientific theories perform two essential functions. They organize information and allow it to be stored in an orderly fashion, rather like the ordered arrangement of merchandise in a warehouse. Large scale theories, like ESS provide a great deal of space where new information can be housed. In addition to the role of organizing information, they stimulate research. To use the warehouse metaphor, this is analogous to the owner finding that a bay of the warehouse is empty and sending out to the supplier for the missing item/s. The function of supplying needed information is performed by researchers. Of course, scientific knowledge is cumulative instead of ebbing and flowing like merchandise in a real warehouse.

This paper demonstrates that ESS can accommodate a great deal of crime data in an orderly fashion. As far as the function of stimulating research is concerned, it should be obvious that the author's work on an ESS approach to violent crime merely scratches the surface of potential research projects in this field. Even so, ESS reveals new phenomena and helps us to see established facts in a new light. Thus, the persistence of violent crime in economically distressed circumstances that is often dismissed as a pathological phenomenon should probably be seen as an adaptive response to a developmental environment characterized by reduced paternal investment. From this perspective, criminal tendencies are just one outcome of a broader pattern of adaptation to a highly stressful, highly competitive rearing environment.

While reduced parental investment (broadly construed as lack of economic resources and emotional support) has been widely connected with violent crime (Barber, 2000a; Lykken, 1995), and seen as a crucial link between poverty and crime, for example, the possibility that violence is produced by direct mating competition is a recent contribution of evolutionary psychology. Cross-national data suggest that the link between mating aggression and violent crime is even stronger than that between parental investment and violent crime, based on the finding that violent crime rates of a country were more strongly predicted by contemporary single parenthood ratios than single parenthood a generation previously (as the parental investment approach would predict, Barber, 2004b). Yet, these results are preliminary and await confirmation from systematic research conducted within a country. Time series data for three nations confirms this picture, however (Barber, 2003c).

These findings suggest that much research supposedly establishing parental-investment effects on crime does so because it fails to take account of aggressive direct competition between (mainly young) males over issues of social status that determine mate value and mating success. Comparison of violent crime rates between U.S. states suggest that both parental investment and mating competition matter, however (Barber, 2003c). On balance, it seems likely that both mechanisms are important. Either way, ESS offers a challenging new way of interpreting the evidence on predictors of violent crime and suggests many variables that should be routinely controlled in criminological research, such as single parenthood ratios, measures of the marriage market that gauge the availability of marriageable men, divorce rates, indices of pre-marital sexuality, and so forth. From a developmental perspective, it is also clearly valuable to measure psychological stress accompanying reduced marriage market opportunities for women.

Modern evolutionists agree that our history as an evolved species must be taken into consideration in scientific explanations of modern behavior (Barber, 2002). Yet, there are many social scientists who share a vehement mistrust, even horror, of reductionist natural science accounts of human social behavior (Ellis & Walsh, 1997; Lopreato & Crippen, 1999). This visceral response, however sincere, does not, of course, mean that they are scientifically correct, any more than many of Darwin's contemporaries were in rejecting his theory of evolution by natural selection for similar reasons.

Scientific reduction calls for a reconciliation between phenomena that are observed at the group level with what is happening at the individual level. So far as the correlates of crime are concerned, there is surprisingly good agreement between what we know about the development of criminal behavior within families and the cross-national, and historical correlates, respectively.

A reductionist science of violent crime is encouraged by the agreement found in the data for different levels of analysis and using different methodologies. Whether this conclusion stands up in the light of future research evidence is, of course, unknowable. Faith in ESS as a way of gaining greater understanding of violent crime seems justified by the current evidence. Moreover, it is heuristically justified because it suggests many avenues for future research.

ESS assumes that modern social influences, such as socioeconomic status, tap into psychological mechanisms that evolved in a comparatively non-stratified society and this is a further stumbling block for many sociologists and other social scientists. Anthropologists find little evidence of social stratification in hunter-gatherer societies, however, suggesting that the ancestral human condition was more egalitarian than modern life. Although headmen occasionally have multiple wives, as contrasted with the monogamy that prevails for most other men in such subsistence societies (Symons, 1979), they are very much servant leaders whose services are heavily used in

the mediation of personal disputes (Shostak, 1981). In fact, the ethos of hunter–gatherer bands is decidedly anti-authoritarian, or egalitarian, in the sense that the community strives to prevent leaders from rising above them (Boehm, 2000). There are real distinctions in social status, nevertheless, and these have reproductive consequences. Thus, skilled hunters enjoy high social status, are preferred by women as sex partners, and have healthier children (Hawkes, O'Connell, & Blurton-Jones, 2001; Symons, 1979).

The contention that modern influences, including a high degree of social stratification, can affect development of antisocial tendencies in evolutionarily relevant ways might thus appear questionable. Yet, it seems obvious that the psychological adaptations for status competition are well-developed among hunter–gatherers, even if their way of life favors leveling tendencies (Boehm, 2000). Low social status makes the life of children more difficult, and more psychologically stressful, in any society.

It is now widely accepted that psychological stress modifies, and literally sculpts, the developing brain (Teicher, Andersen, Polcari, Anderson, & Navalta, 2002) so as to increase irritability (i.e., sensitivity to survival-related threats), and to promote reproductive opportunism (i.e., early reproduction in an environment of uncertain survival) and that a similar developmental irritability occurs among other mammals also, including laboratory rodents (Kalinichev, Easterling, Plotsky, & Holtzman, 2002) and primates (Suomi, 1997). Children are exquisitely sensitive to their social environment and minor daily occurrences, such as arguments between parents, or other potential threats to parental investment, can have a measurable impact on the level of stress hormones (Flinn, 1999). Given that poverty is a potent stressor in the lives of children in stratified modern societies (Lupien, King, Meaney, & McEwen, 2001), it is quite easy to see how modern social status can tap into developmental mechanisms that evolved in less stratified societies, helping our ancestors to adapt themselves rapidly to changing ecological conditions.

From the perspective of more recent historical change, ESS has a comparatively narrow focus on the social (including antisocial), and reproductive, behavior of individuals and is thus powerless to explain larger themes of historical and sociological change. It does not explain, for example, why the welfare state is well developed in Sweden, and Europe generally, compared to the U.S., or concern itself with why the Industrial Revolution in England preceded that in the U.S. (Alesina, Glaser, & Sacerdote, 2001). Considered as an adaptationist theory, ESS treats such phenomena rather like Darwinian ecology treats climatic change, i.e., as essentially random variation to which people adapt as best they can using whatever flexibility in behavioral development has been built into them by their history of evolution by natural selection.

Given that industrialization changes the adaptive landscape, how does ESS help us to understand associated changes in crime? The fact that so many strangers congregate in cities helps to account for the tendency of violent crime to increase with degree of urbanization, although this relationship is complex, emerging more distinctly within countries than in cross-national comparisons (Barber, 2000c; Glaeser & Sacerdote 1999; Soares, 2004). ESS helps us to organize this complexity in several different ways however (Barber, 2004a). To begin with, the transition to a monetary economy undermines the network of mutual aid that solves many of life's basic problems in traditional farming communities, including labor exchange, and disaster relief. Then, the anonymity of cities greatly alters the cost-to-benefit ratio of crime if victims cannot recognize the perpetrator (Barber, 2004a).

Urban life also increases the economic capacity of women to raise children alone, although this is not an optimal method of raising children who can succeed in a monetary economy and is thus more common among poor women, whose male acquaintances tend to be bleak marriage prospects from an economic perspective (Abrahamson, 1998; Barber, 2003b). This particular urban niche is the one that generates most of the violent crime in modern societies.

In summary, ESS helps to explain a great deal of the variation in violent crime across time, countries, ethnic groups, and economic classes. The concept of adaptation can thus be applied to modern low-fertility societies. Doing so draws together a great deal of information from many disciplines (including evolutionary biology, anthropology, history, health, sociology, psychology, and economics among others) and promises a social science that transcends disciplinary boundaries and may provide universal explanations for social behavior that can be applied at any time, place, or historical context. Researchers may have a great deal to gain by adopting this perspective. Hopefully, they will embrace the challenge.

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