

PARENTAL INVESTMENT AND MEN'S SEXUAL BEHAVIOR: LIFE HISTORY THEORY  
AND REPRODUCTIVE STRATEGIES IN A SAMPLE OF AMERICAN MEN

by

Adam Howell Boyette

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To the Faculty of Washington State University:

The members of the Committee appointed to examine the thesis of ADAM  
HOWELL BOYETTE find it satisfactory and recommend that it be accepted.

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Chair

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Abstract

By Adam Howell Boyette, M.A.  
Washington State University  
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Chair: Robert J. Quinlan

From a life-history perspective, differences in the timing of events relevant to reproduction reflect an organism's investment strategy. In humans, evidence suggests that the availability of direct parental care is an indicator to the offspring what strategy will have the highest payoff in later reproductive success. It was predicted that males who grow up in an intact family environment will have sex and father children at a later age than males who grow up in a situation indicative of less direct investment. Furthermore, since delaying reproduction is at a cost to quantity of reproductive opportunities available to males, those males from intact families were also predicted to have fewer sex partners. The presence of a stepfather within a child's family environment may indicate a further decrease in investment from the mother, who may be reducing her parenting effort in favor of mating effort. Therefore, it was predicted that stepfather presence would independently be associated with early ages of first sex and first birth, as well as a greater number of sex partners. Lastly, although cross-culturally it may be more common for a mother to assume the role of single parent to her offspring, there is evidence that, in terms of children's response to parental investment, a father can equally serve this role. The

hypothesis that there should be no difference in sexual behavior between those males raised by a single father and those raised in another situation was tested.

Hazard models of timing of first sex and first birth reveal significantly higher hazards of earlier first sex and first birth among males whose parents were separated. Significant independent effects were found for ethnicity, and father's education. General linear models of number of sex partners also support the predictions: males whose parents were separated had a greater number of sex partners. An independent effect of ethnicity was also present in the linear models. Stepfather presence increased the hazard of both first sex and first birth, but had no effect on number of sex partners. As predicted, living with a single father had no significant effect.

## TABLE OF CONTENTS

	Page
ACKNOWLEDGMENTS.....	iii
ABSTRACT.....	iv
LIST OF TABLES.....	vii
LIST OF FIGURES.....	viii
CHAPTER	
1. INTRODUCTION.....	1
2. METHODS.....	18
Sample.....	18
Variables.....	18
Hazard Analyses.....	23
General Linear Models.....	24
3. RESULTS.....	25
Age of First Sexual Intercourse.....	27
Age at First Child's Brith.....	28
Number of Sex Partners.....	31
4. POST-HOC ANALYSIS.....	33
5. DISCUSSION.....	40
6. CONCLUSIONS.....	50
REFERENCES.....	52

LIST OF TABLES

1. Descriptive Statistics.....26

2. Results of Cox Regression of Age of First Sexual Intercourse.....29

3. Results of Cox Regression of Age at First Child’s Birth.....30

4. General Linear Model Results of Number of Partners in the Last 12 Months.....32

5. General Linear Model Results of Number of Partners Over the Lifetime.....32

6. Results of Cox Regression of Age of First Sex,  
    Ethnicity X Family Intact Status Interaction.....37

7. Results of Cox Regression of Age of First Child’s Birth,  
    Ethnicity X Family Intact Status Interaction.....38

8. General Linear Model Results of Number of Partners in the Last 12 Months  
    Ethnicity X Family Intact Status Interaction.....39

9. General Linear Model Results of Number of Partners Over the Lifetime,  
    Ethnicity X Family Intact Status Interaction.....39

## LIST OF FIGURES

1. Survival Curve of Age of First Sexual Intercourse by Intact Family Status.....	29
2. Survival Curve of Age of First Child's Birth by Intact Family Status.....	30
3. Survival Curve of Age of First Sex by Ethnicity X Intact Family Status Interaction.....	37
4. Survival Curve of Age of First Child's Birth by Ethnicity X Intact Family Status Interaction.....	38



## INTRODUCTION

Life History Theory (1993; Kaplan 1996; Roff 2002), derived from behavioral ecology (Krebs and Davies 2004), has been a fruitful source of hypotheses concerning development and individual variation within and between human cultural groups (Allal, et al. 2004; Hagen, et al. 2006; Hawkes, et al. 1997; Hill and Hurtado 1996; MacDonald 1997; Quinlan 2003; Weinrich 1977). The trade-offs between somatic maintenance, growth, and reproduction fundamentally shape an organism's life history (Hill and Kaplan 1999; Kaplan 1996). Appropriately timing when to direct one's limited resources into reproduction is crucial for eventual fitness payoffs, as there are differential costs and benefits associated with early versus delayed sexual maturation and initiation of reproductive behavior. All things being equal, a minimal age at sexual maturity would be favored by natural selection as it would reduce the chance of pre-reproductive mortality or morbidity and allow for a longer reproductive lifespan (Ellis 2004; Roff 2002). However, benefits to delaying reproductive maturity can include greater time to produce and store energy to devote to reproduction, increased success in intrasexual competition, and the ability to attain a larger adult body size, which generally lowers adult mortality (Ellis 2004; Hill and Kaplan 1999; Kaplan 1996).

Investment in reproduction can take the form of parenting effort or mating effort. Parenting effort is any effort put towards increasing offspring fitness, whereas mating effort is directed at increasing one's own direct fitness by seeking out mating opportunities. It is assumed that resources are devoted to one activity at a cost to their availability for the other. Thus, after reproductive maturity is reached, further allocation decisions must be made with consideration of the differential costs and benefits of increasing quantity of offspring through mating versus

improving the quality of offspring through parenting. An optimal allocation strategy will depend on the organism's phylogenetic history, local ecology, and individual condition (Hill 1993).

For humans, where reproductive success can be strongly linked to cultural success (Betzig 1986; Borgerhoff Mulder 1987; Irons 1979) and extra-somatic resources can be accumulated and transferred between generations (Kaplan 1996; Kaplan, et al. 2002), there may be strong benefits to delaying reproduction and devoting resources to growth and parenting effort. This is especially the case when there is competition for resources and/or mates. Humans live in a huge variety of sociocultural systems and biotic environments, suggesting that an inflexible life history strategy would not have been selected for. Instead, humans should respond plastically to environmental circumstances during development within a range of reaction (Ellis 2004; MacDonald 1997). Contextual calibration of life history is not particular to humans (Ellis 2004; Kaplan and Lancaster 2003), and the mechanisms behind developmentally plastic responses to early life environments are evolutionarily ancient among vertebrates (Crespi and Denver 2005).

For some species the physical environment itself may be the best cue to an appropriate life history strategy (e.g. amphibians: Crespi and Denver 2005). In species with parental care the rearing environment may be more important. From a life history perspective, parents mediate between their offspring and the environmental context (Belsky, et al. 1991), at least as long as it is in their interest to do so (Trivers 1974). For dependent offspring in a social species, parents provide nutritional support and are also a primary source of salient social information (Bowlby 1969; Lamb and Lewis 2005).

Due to the trade-off between parental effort and mating effort, there is a limit to the amount of parental care an individual should be willing to provide. The threshold after which

care should be withheld is different for each sex. In general, mammalian males are more likely to be the “mating specialists” and females the “parental specialists” due to females’ greater energetic investment in reproduction (Trivers 1972). Human mothers gestate their offspring for nine months, breast-feed an average of two and half years, and then continually invest resources for at least another decade (Hrdy 1999). Human males are not required post-conception. However, even given the enormous female bias in requisite care, human males are relatively high-investing fathers compared to other species, and do expend a moderate amount of paternal effort (Hewlett 1988).

In sum, for a highly social species inhabiting a wide variety of environmental and social niches, life history theory predicts a plurality of resource allocation strategies to be adaptive within individual contexts. When to cease growth in favor of reproduction, and subsequently how much effort to expend in mating versus parenting are the crucial dilemmas facing a young human seeking to maximize genetic representation in future generations. Parents are thought to mediate between their offspring and the physical and social environment. The amount of parental care provided to an offspring should be relative to the costs imposed by the social and physical environment upon providing it. Thus, offspring should be adapted to develop in response to the care likely to be received. The costs of caring are different for males and females.

Note that the following discussion concerns individual variation in life history strategy within a particular range of environments. For example, in extreme environments where nutritional resources are critically scarce, choosing to reproduce may result in a total loss of investment for a female if it means her offspring will not be able to survive, or worse, both she and the infant are lost (Ellis 2004). One can posit an analogous situation for males where mate

competition can lead to violence (Chagnon 1983; Chagnon 1988). If a male is not competitively able due to starvation, and being competitively successful is the key to reproduction, then it may not be worth the risk to attempt reproduction through such means. That is, if it is likely a male will get himself killed by competing for mates while in imperfect condition, it may not be worth his effort. If nutritionally starved, delaying reproduction is the best strategy for both sexes. Studies of girls malnourished in childhood reveal later ages of puberty (Ellis 2004; Khan, et al. 1996) and age of first birth (Allal, et al. 2004), and the onset of adrenarche and gonadarche in males is also directly related to fat stores (Campbell 2003; Campbell, et al. 2005). Thus, the environmental factors of concern here are primarily social, and responses to nutritional deprivation, although important in the evolution of human reproductive strategies, are governed by a different set of physiological mechanisms than those discussed here (Chisholm, et al. 2005).

Father absence, one relevant aspect of the social environment, has been of interest to social scientists studying child development. Given the sex asymmetry of parental investment, it should not be surprising that a rearing environment lacking a father is more common than one lacking a mother. However, Draper and Harpending (1982; 1988) noted that studies of father absence have primarily been conducted in a Western environment, within a culture where father absence is “contranormative” (Draper and Harpending 1982:256). They suggest that, in the West, a two-parent rearing environment is considered the norm, and father absence is a phenomenon more common among lower socio-economic classes. Children of underprivileged, single-parent homes display behavior considered deviant within the predominant cultural view, and this has been attributed to the lack of a father to maintain the “proper” rearing structure.

Draper and Harpending (1982; 1988) saw this model as biased by Western views. They noted that there are societies where:

[w]omen...have husbands and their children recognize particular men as their fathers; however, prevailing customs regarding the division of labor and relations between the sexes are such that men and women, with their young children, have limited personal and social contact, even though the marriages themselves are durable and economically sound. (Draper and Harpending 1982:256)

In these societies, the absence of the father within the rearing environment is “normative” and the behaviors seen in children from father absent environments are not “deviant” if looked at from an evolutionary perspective. Thus, they argue that the two rearing environments are “differing but equally sound structural types” (256) that may reflect different adaptive reproductive strategies. They suggest that father absence may be the cue to the appropriate strategy, and children learn (not necessarily consciously) during a critical period between one and five years old what that strategy should be. The decision is reflected in their behavior as they enter into adolescence, the period during which sexual interest becomes biologically motivated and behaviorally evident.

Within this framework, the suite of behaviors often observed in children from father absent homes becomes understandable as a coherent phenotypic strategy along the “mating specialist” to “parenting specialist” continuum. Draper and Harpending (1982) review the general behavioral tendencies of father-absent adolescents as follows:

**Males:** “rejection of authority, particularly when it is imposed by adult females; exaggerated masculinity (often regarded by psychologists as “overcompensation” for insecure masculine sex-role identification); rejection and denigration of femininity; greater interpersonal aggressiveness; increased risk of arrest and incarceration; and a

relatively exploitative attitude toward females, with sexual contact appearing important as a conquest and as a means of validating masculinity.”

**Females:** “precocious sexual interest, derogation of masculinity and males, and poor ability to maintain sexual and emotional adjustment with one male.” (For sources see Draper and Harpending [1982], p.257)

It seems implicit in these lists, at least from an evolutionary perspective, that those raised in father-absent homes, where relatively less parental effort is exhibited, are being primed for high expenditures of mating effort—males adopt behaviors that would serve them well in male-male competition for multiple mating opportunities, whereas females adopt behaviors to minimize time loss before reproduction and time wasted in bonding to a single male, who, in her perceived environment, is not likely to expend much parental effort himself. In sum, father-presence during one’s rearing elicits investment in offspring quality; father-absence elicits investment in their quantity.

Expanding the theoretical framework of Draper and Harpending (1982), Belsky, Steinberg, and Draper (1991) proposed that a more generalized theory of development and reproductive behavior should account for early effective experience beyond father absence. They argue that contextual stress, of which father absence is but one instance, has a distal effect on child development through parental behavior. Parenting then proximately affects the child, and ultimately increases the fitness of both parents and offspring. The early life experiences the child obtains from its parents will “induce in the child an understanding of the availability and predictability of resources (broadly defined) in the environment, of the trustworthiness of others,

and of the enduringness of close interpersonal relationships, all of which will affect how the developing person apportions reproductive effort” (650).

In addition to the suite of behaviors described by Draper and Harpending (1982; see above) for father-absent adolescents, Belsky et al. (1991) suggest that children who experienced early stress should also exhibit accelerated pubertal maturation. In accord with life history theory, this suggestion adds to the Draper and Harpending (1982) theory an expectation that precocious sexuality and a Machiavellian social attitude will be associated with an earlier ability to reproduce. Conversely, those behaviors characteristic of a parenting strategy will be associated with a later age of puberty. This addition to the theory is crucial, as it is expected that a life history strategy would require coordination at all levels of functioning: molecular, physiological, as well as behavioral (Hill, 1993). Thus, “[d]ifferential pubertal timing therefore provides a critical somatic link between early social experience and later reproductive behavior” (Belsky et al. 1991:656). Belsky et al. (1991) further posit that attachment processes (Ainsworth 1978; Bowlby 1969) may mediate the parents’ influence on their child’s eventual social behavior. Children from two-parent, high-investment rearing environments will be more likely to be securely attached and have an internal working model of social relationships as caring and durable. Those from stressful rearing environments will develop an insecure internal working model of relationships<sup>1</sup>. Due to a lack of longitudinal studies, it has yet to be conclusively demonstrated that infant attachment processes have continuous behavioral influences far into the

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<sup>1</sup> Belsky et al. (1991) specifically expect the contextual stressors they discuss to produce insecure-avoidant attachment, as opposed to the insecure-resistant form. How these different attachment security types each articulate with an adaptationist framework has not seen a lot of attention. However, Belsky (1997) argues that while secure attachment is an adaptation for high-investment parenting and strong social relationships, and insecure-avoidant attachment facilitates low-investment parenting and opportunistic interpersonal relations, insecure-resistant attachment might promote “helper-at-the-nest” behavior, whereby fitness is garnered indirectly through alloparenting of kin.

lifecourse. However, there is evidence for consistency albeit inferential. For example, Hazan and Shaver (1987) demonstrated that attachment style as an adult predicts individuals' experience of romantic love, as well as the way they conceive of relationships with themselves and others, including their parents.

Belsky et al. (1991) also noted the association between insecure attachment and so called "problem behaviors," such as "high levels of aggression, impulsivity, and/or noncompliance with adults and socialization norms (externalizing symptoms) or high levels of sadness, depression, and/or social withdrawal (internalizing symptoms)" (652). They assert that sex differences in expression of externalizing versus internalizing behaviors can be linked to the different mating tactics males and females must use in a strategy of high-mating effort. Internalizing symptoms, which are more common in females, stimulate menarche through lowering metabolism and building up fat stores. Whereas for males, externalizing symptoms are more common and stimulate maturation, though they do not specify what the mechanism might be, only suggesting it is likely linked to androgenic activity. This argument is echoed in a later contribution by Steinberg and Belsky (1996) as an explanation for the *paradox of normative disturbance*, the term used to encapsulate the fact that "deviant" behavior during adolescence appears to be more common than not. Again, from an evolutionary perspective, deviancy associated with internalizing and externalizing behaviors might be adaptive if it serves one's mating strategy. Adolescence is the period during which these behaviors are expected to peak (Steinberg and Belsky 1996).

The suggestion that the behaviors themselves invoke earlier puberty may be spurious, as it is likely, as they suggest, that endocrine processes probably underlie both behavior and reproductive maturation (Worthman 2003). However, the placement of age at puberty as an



independent variable is an important insight, as it is often interpreted as a causative factor in studies of adolescent behavior. For example, precocious pubertal maturation has been found to be associated with earlier first sexual arousal in males and females and higher sex drive in men (Ostovich and Sabini 2005); “sexual ideation” in males (e.g. thoughts about sex, expectation of sex, desire for sex; Halpern, et al. 1993); increased frequency and extent of sexual experience in both sexes (Flannery, et al. 1993; Halpern, et al. 1993; Zabin, et al. 1986); delinquency in females and males (i.e. aggressive behavior, theft, vandalism, trespassing, speeding in a car, noncompliance; Flannery, et al. 1993); and greater frequency of externalized hostile and internalized distressed feelings in males (Ge, et al. 2001) and females (Ge, et al. 2006). Ge et al. (2006), a study specifically of African American pre-adolescents, also reports that earlier maturing boys reported more conduct disorder (externalizing) symptoms and earlier maturing girls reported more social anxiety (internalizing) symptoms, although pubertal timing was significantly and negatively correlated with nearly all of the categories of internalizing *and* externalizing disorders in both girls and boys in their sample. In a study of the effects of neighborhood context on girls’ violent behavior, Obeidallah et al. (2004) report that age at menarche was associated with violent behavior only in neighborhoods with the most concentrated disadvantage, however earlier maturing girls engaged in three times more violent acts within these neighborhoods, suggesting a strong context effect. Presumably, the higher stress environment would be required to provoke these behaviors, since from an evolutionary perspective violent behavior is primarily a male attribute (Wrangham and Peterson 1996). This case may represent the extreme effect of social stress on girls’ asocial behavior.

Two studies, one of a Canadian population (Kim and Smith 1998; n=357 university students) and one of an English population (Kim and Smith 1999; n=509 students), report several

significant associations between pubertal timing and sexual behavior. Kim and Smith (1998) report that age at menarche significantly predicts women's age at dating men and their number of boyfriends, and men's age at spermarche predicts the age when they first start dating, number of girlfriends, and their age of first sexual intercourse. In the English population the results were more extensive. Kim and Smith (1999) report that age at menarche predicts age at dating, number of boyfriends, age at first intercourse, and number of intercourse partners. Earlier spermarche predicts men's age at dating, number of girlfriends, age at first sexual intercourse, and incidences of intercourse. In a sample of at-risk American adolescents, Capaldi et al. (1996) also report that earlier pubertal maturation, as measured by self-reports of Tanner stage, decreased age at first sexual intercourse.

Clearly, pubertal timing is associated with specific developmental outcomes. However, according to the theory of Belsky et al. (1991) the association is not causal, but both pubertal timing and the initiation and extent of sexual, high-risk, and anti-social behaviors are linked to early-life social stress. As predicted by Draper and Harpending (1982), father absence, independent from other early life stressors, has been shown to be associated with earlier age of menarche in a number of studies (Bogaert 2005; Chisholm, et al. 2005; Ellis, et al. 1999; Matchock and Susman 2006; Moffitt, et al. 1992; Surbey 1990; Wierson, et al. 1993). Additionally, Bogaert (2005) found the same effect for pubertal development in males using a US national probability sample (n=1511 men, with pubertal development measured by self-reports of voice change and growth of pubic hair).

Belsky and colleague's (1991) theory predicts that father absence is one of many potential stressors in the rearing environment that would effect children's reproductive development. Although father absence may be important in its own right, it can be confounded

with other variables. The father's absence may induce more stress in the mother, who may then treat her offspring differently; she may provide the same amount of care as she would in his presence, and the offspring may react to the lack of the additional direct care provided by the father; or there may be any number of additional factors that tend to co-vary with the presence or absence of direct male parental investment (e.g. lower socioeconomic level, lack of male gender-role model, genetically or culturally inherited behavioral tendencies, or stresses from other males seeking mating opportunities with the mother).

For example, Surbey (1990) reported that father-absent girls and girls whose parents were both absent did not differ significantly in their age at menarche. However, the two groups matured significantly earlier (4-5 months) than girls with both parents present during childhood. Surbey (1990) also reports that a measure of stressful life events predicted earlier age of menarche. When stress was controlled for, father absence remained a significant predictor, but the measure of stress was a significant negative predictor of age at menarche in a model including only girls who grew up with *both* parents present. Furthermore, using the 1995 wave of the National Survey of Family Growth, Quinlan (2003) demonstrated that parental divorce or separation between birth and 5 years old predicted earlier ages of menarche, first sexual intercourse, first pregnancy, and shorter first marriages, and that these effects were independent of which parent the woman lived with after her parents' divorced.

Belsky and colleagues (1991) emphasized that a child's subjective perceptions of stress are as important as objective measures such as the absence of a father. Measures of parental conflict or stressful family relationships are possible cues that the child may be perceptible to. Parental conflict independent of divorce has been shown to predict earlier age of menarche (Moffitt, et al. 1992; Surbey 1990; Wierson, et al. 1993). The two studies by Kim and Smith

(1998; 1999) report that earlier menarche is associated with more parental marital conflict before age 11, as well as more independence from parents between the ages of 8 and 11. In the Canadian sample (Kim and Smith 1998) it was also found that timing of spermarche was associated with more stress in the family, and parental conflict and unhappiness early in childhood, whereas in the English sample earlier spermarche was associated specifically with less emotional closeness between boys and their mothers (Kim and Smith 1999). Steinberg (1988) demonstrated that for girls, pubertal maturation may be accelerated by high levels of conflict with parents, autonomy from them, and low levels of intimacy between the daughter and her parents, especially with the mother. His results were not significant for boys. Ellis (1991) found some additional support for Steinberg's (1988) "pubertal acceleration hypothesis," though again primarily for girls, and for children's reports as opposed to parent's reports. The only significant result for boys was that "Child self-governance" was positively correlated with parent's reports of an increase in rate of pubertal change.

Stressful family environments should not only predict earlier age of reproductive maturation, but also, as predicted Belsky et al. (1991), precocious sexual activity and sex-specific differences in social attitudes and anti-social behavior. In general, a high-risk environment, one of high extrinsic mortality in the terms of life history theory, should predict earlier reproduction (necessitating earlier sexual activity). Wilson and Daly (1997) showed this to be the case in a study of 77 Chicago neighborhoods, finding that life expectancy declined with age of reproduction. Furthermore, risk taking, they hypothesized, should be a function of local life expectancy, and this relationship was also found to be significant: male life expectancy and

homicide rates were highly correlated ( $r=-.88, p<.0001$ )<sup>2</sup>. Hogan and Kitagawa (1985) also found that a high-risk environment increased the risk of pregnancy among black teenagers in Chicago.

Berezkei (1993) argues that the political and economic subjugation of Hungarian Gypsies<sup>3</sup> has led to a culture-wide low parental effort strategy. Gypsies, he reports, are more likely to have father-absent households, early sexual activity, and unstable conjugal relationships when present. They also tend to have significantly higher fertility and mortality—all traits indicative of a mating effort strategy. A later study by Berezkei and Csanaky (1996), using a sample of Hungarian non-Gypsy adults ( $n=999$ ), both male and female, found that males from father-absent homes were more likely to perform “delinquent” behaviors (i.e. fight with peers, take revenge, use violence), and both males and females from father-absent households were more likely to display “noncompliant” behaviors (i.e. cut class, tease teachers, manipulate peers). Those in the father absent group were also more likely to drop out of school, and less likely to get married, but should they do so their marriages were on average of shorter duration than the father-present group and they reported less marital satisfaction. Father-absent women were also found to have mothered more children. Berezkei and Csanaky (1996) concluded that, in their sample, the effects of father absence on behavior were more pronounced for females, which they

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<sup>2</sup> Life expectancy is particularly interesting as a correlate to life history strategy as it indicates a conscious awareness and internalization of the local extrinsic mortality rate—a feature of the environment key to determining any organism’s life history (Roff 2002)—independent of an awareness of “adopting a strategy” as such. In an unpublished study, I found that measures of different parental styles, used as indicators of social resource availability, were highly correlated with perceived life expectancy in predicted directions in a sample of university undergraduates (Boyette 2006). Furthermore, Chisholm et al. (2005) report significant associations between women’s age of first birth and age at menarche and their expected lifespan. It may be a profitable aim of further studies to understand how this psychological variable interacts with other life history traits in different contexts, expanding upon Wilson and Daly (1997).

<sup>3</sup> I’ve been told that the term “Gypsy” is not the most appropriate signifier for this culture group, however I retain its use for consistency following Berezkei and Csanaky.

argue is consistent with the generally higher costs inherent to female reproductive biology. However, there was an effect for males in line with their predictions.

As mentioned above, Quinlan (2003) found that parental separation before 5 years of age predicted not only earlier age at menarche but also earlier age of first sexual intercourse, first pregnancy, and shorter first marriage duration in a sample of American woman. Furthermore, multiple changes in the woman's caretaking situation significantly increased age at menarche as well as age of first sex, first pregnancy, number of sex partners, and decreased the duration of first marriage, each effect increasing cumulatively with the number of changes. Multiple changes in parental situation have also been linked to earlier sexual intercourse in males, as well as more antisocial or delinquent behaviors (Capaldi, et al. 1996). The effect of parental divorce on initiation of sexual intercourse in males was replicated by Newcomer and Udry (1987), though only when the change in family situation happened between their two sample periods, not if before sampling, which may be an artifact of sample size (n=10 white males, all from the same high school, experienced their parents' divorce during their study).

The presence of a stepfather in the rearing environment has been proposed as an independent stressor that may effect development of a reproductive strategy through one of at least three routes: The presence of a stepfather could have direct, independent effects on female sexual maturation through pheromonal effects (Matchock and Susman 2006) analogous to what occurs in other mammals (e.g. prosimians: Izard 1990; mice: Vandenberg 1967; tamarins: Ziegler, et al. 1990). In these species, the presence of an unrelated adult male accelerates pubertal maturation in juvenile females. If the function of this mechanism is to increase chance of reproduction, then clearly such an effect should not be seen in males exposed to a stepfather. However, if the presence of a stepfather means the mother is using her resources in mating effort

to secure investment in future offspring, then an acceleration in sexual maturation and the presence of associated mating-effort behaviors would be expected in both sexes. Alternatively, the stepfather could be a direct source of physical and/or psychological stress independent of the mother's behavior. The presence of a stepparent in the natal home is the strongest known predictor of severe child maltreatment, with the likelihood of child fatality at the hands of a stepparent being 50 to 100 times greater than it is for genetic parents (Daly and Wilson 1998). This is not surprising from an evolutionary perspective. Parental investment is costly, and investment in offspring who are not genetically related shouldn't be expected under most circumstances. Instead, it would serve the reproductive interests of a male entering an established family to reduce any competition for investment in offspring he himself has fathered. Infanticide by non-paternal males is seen in many other species, and is thought to occur for exactly this reason (see citations in Hrdy 1999, especially chapters 2 and 4).

Tests for the presence of a stepfather-effect on pubertal maturation and/or sexual behavior have so far been equivocal. For example, Ellis and Garber (2000) conclude that the presence of a stepfather decreased age of reproductive maturity and accounted for more of the variance in girls pubertal maturation in their study (n=87) than did biological father absence alone. Quinlan (2003: n=10,847), found a weak but significant negative effect of stepfather presence on women's reproductive development. However, Bogaert (2005: n=1921) found no effect for either males or females. Furthermore, Matchock and Susman (2006: n=1938 university women) found that biological father absence was associated with earlier menarche, but stepfather presence was not. Arguing for a pheromonal mechanism at work, they conclude their results are due to the absence of reproductive inhibitory pheromones from the biological

father. No evidence of the presence of pheromones is offered and no data from males was collected to disconfirm an explanation based on the mother reverting to a mating-effort strategy.

In sum, there is empirical evidence supporting the theory of Belsky et al. (1991). The timing of pubertal maturation is linked to the timing and incidence of sexual behaviors and risky, competitive, anti-social behaviors in both males and females. This includes links to the timing of reproductively relevant behaviors such as first sexual intercourse, first birth, and also to the frequency of sex partners. Both timing of pubertal maturation and sexual and anti-social behavior are also linked to individual differences in stressful rearing environments, not limited to father absence. However, the evidence is not always from studies explicitly testing the predictions made by Belsky et al. (Capaldi, et al. 1996; Flannery, et al. 1993; Ge, et al. 2006; Ge, et al. 2001; Halpern, et al. 1993; Newcomer and Udry 1987; Obeidallah, et al. 2004; Ostovich and Sabini 2005; Zabin, et al. 1986), and is occasionally of only weak support, possibly as a result of small samples (Ellis and Garber 2000; Newcomer and Udry 1987).

Furthermore, less, or simply weaker, evidence is available linking early life stress and timing of male sexual behavior than there is for females. The study with the largest sample size and statistical clarity explicitly addressing the Belsky et al. (1991) predictions examined the effect in females only (Quinlan 2003). At least one study of a large sample of American men has demonstrated a link between early life stress, in this case parental divorce, and the timing of male pubertal maturation (Bogaert 2005), and pubertal timing has been linked to age at first sex, and number of sex partners in males (Kim and Smith 1998; Kim and Smith 1999). However the link between early life stress and age of first sexual intercourse, age of first birth, and number of sex partners for males is so far absent. The goal of the current study is to fill this gap in the literature. If males from stressful rearing environments are adopting a mating effort life history



strategy, than it should be the case that these males will be sexually active earlier, father children earlier, and have more sexual partners throughout their lifetime. Data on family history and sexual behavior of American men will be used to test for this relationship. The predictions of this study are as follows:

1. Males whose parents were separated will tend to have sex earlier than males from intact families independent of socioeconomic variables.
2. Males whose parents were separated will tend to father their first child earlier than males from intact families independent of socioeconomic variables.
3. Males whose parents were divorced will have a greater number of lifetime sexual partners and a greater number of sexual partners within the previous 12 months before sampling independent of socioeconomic variables.

Additionally, the equivocal conclusions regarding stepfather presence and the development of reproductive strategies will be addressed. The following hypothesis will be tested:

4. The presence of a stepfather will independently increase the probability of an earlier age of first sexual intercourse and earlier age of first birth, and will be positively correlated with number of sexual partners among males.

Finally, I will also include in the analysis a control for the effects of living with a biological father after divorce or separation. I will test the hypothesis that my results will replicate for males that which was previously found for females (Quinlan 2003):

5. Living with the biological father after parent's separation will have no effect on the timing of males' first sexual intercourse, first birth, or their number of sexual partners.

## METHODS

### Sample

The data used in this study is from a public database compiled during Cycle 6 of the National Survey of Family Growth (NSFG) conducted by the National Center for Health Statistics (NCHS) in 2002. The survey used an area probability sampling design and is representative of the US population as whole, not biased by region or state. Surveys were carried out by 200 female interviewers trained by the Survey Research Center of the University of Michigan. Interviews were in-person, voluntary and confidential. In total, there were 12,571 respondents, 7643 female and 4928 male, aged 15-45<sup>45</sup>. The male component of the survey used here had the same age range as the total sample, and a mean age of 28. Sixty-seven percent of the men were Caucasian, 21% African American, and 12% reported other ethnic/cultural backgrounds.

### Variables

Independent variables used for analysis come from raw data reported in the survey, from post-data collection “recoded” variables created by the NCHS statisticians, and from new variables constructed from these two sources specifically for these analyses.

The key predictor variable, *Intact Status of Childhood Family* is coded as 0=Lived With Both Biological or Adoptive Parents from Birth Until Age 18 (or until interview if less than 18 years old) versus 1=Any Other Situation (or Intact versus Non-intact). That biological *and* adoptive parents are, therefore, treated similarly in this analysis is an imperfection in this study and stems from a lack of clarification in the dataset as to which respondents from intact families

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<sup>4</sup> <http://www.cdc.gov/nchs/about/major/nsfg/nsfgback.htm>

<sup>5</sup> The NCHS website reports that the maximum age in the sample was 44, however 45 years old is the maximum reported in the raw data for males.

were adopted. Although future studies should attempt to control for adoption effects, frequency of adopted children in other American samples is low (between 2-3% of children per year: Adamec and Peirce 1991; cited in Terrell and Modell 1994). Additionally, studies show that if children are adopted before they are 6 months of age, developmental outcomes are comparable to those for children raised by biological parents (Berry, et al. 1996; Juffer and Rosenboom 1997; Singer, et al. 1985). The term “intact” in opposition to “non-intact” may confer some moral supremacy to those families with both parents present. No such value attribution is implied in my use of the term. As originally stated by Draper and Harpending (1982), from an evolutionary perspective, the two types of rearing situations are seen as equally adaptive ends of a continuum of possible reproductive strategies. As used here, “intact” simply indicates a lack of one, theoretically grounded, source of stress in the rearing environment. Conversely, “non-intact” indicates the presence of that stress.

The dependent variables used in this study indicate three components of the reproductive strategy adopted by males in response to their rearing environment (represented by the Intact variable). They are as follows:

*Age at First Sexual Intercourse:* Life history theory emphasizes the timing of reproduction as key to how resources are allocated. Delaying sex indicates investment in other activities such as accumulation of extra-somatic resources (e.g. education). Initiation of sex is predicted to occur at a later age in males from intact homes, as these males are expected to adopt a parenting effort sexual strategy of delayed sexual behavior. The original variable was computed from raw data by NCHS, recoded to account for discrepancies with other variables (e.g. if respondent reported that he has only been with one partner but the date reported for their first sex does not match his reported age at first sex). Additionally, since this variable excludes

all cases who reported not having had sex, I replaced all of the missing values for these cases with their Age at Interview. This allows for their inclusion in the hazard analysis, where they will be treated as censored cases (not yet having had the event of concern).

*Age of First Birth:* Similar to the timing of sexual intercourse, it is predicted that males from intact homes will have a later age of first birth, consistent with a parenting effort strategy, Life history theory predicts that delaying reproduction trades investment in quantity of offspring for investment in quality. The original variable was recoded from the variable “Date When Respondent Fathered His First Biological Child”, which was recoded from raw data on the respondent’s first child’s birthday. Similar to the Age at First Sex, I then replaced the missing values for those cases who hadn’t yet had children with their age. Again, this allows these cases to be included in the hazard analysis as censored, rather than missing.

*Number of Sex Partners in the Last 12 Months, and Lifetime Number of Sex Partners:* Males who adopt a parenting strategy are not only expected to delay sex, and fathering a child, but also to exert less effort in mating. Conversely, a mating effort strategy trades quality for quantity, and thus males from non-intact homes are expected to be maximizing mating opportunities and thus to have more sex partners. Both sex partner variables were recoded by NCHS for internal consistency of the data (based on other variables recording equivalent information) and to include those who have had no sex partners (who were not asked questions involving having had sex). Number in the Last 12 Months is coded 0-6= Number of Sex Partners, 7= 7 or More Sex Partners. Lifetime Number is coded 0-49= Number of Sex Partners, 50= 50 or More Sex Partners. Both of these variables were used in separate analyses in order to control for periods of greater access to sexual opportunities (e.g. living in a college dormitory),

which may hide consistent trends in sexual behavior over an individual's lifetime. Males from intact homes are predicted to have had fewer sex partners over both time frames.

The control variables entered into each model were as follows:

*Age:* Naturally, the likelihood of having sex and fathering a child should increase over time, as should the number of sex partners. This variable also controls for cohort effects in the hazard analyses, accounting for any secular trends in sexual behavior over time. Values for age are from raw data of respondents reported age at interview.

*Ethnicity:* Although more specific ethnic categories were available in the data set, only data from Euro-Americans and African Americans are reported in this study. African American's were oversampled in the 2003 NSFG. Restricting the analysis to only these two ethnic groups simplified the analysis and interpretation of the results and is consistent with previous work (e.g. Quinlan 2003). The inclusion of this variable in the initial models led to further analyses that will be discussed below. The variable was coded as Euro-American Ethnicity= 0, African American Ethnicity= 1.

*Education:* Investing in education may limit the resources available to pursue reproduction thereby affecting the outcome variables. However, investment in education is expected to be a component of a parenting strategy, as it should increase quality of offspring in exchange for quantity. Thus, the effect of education, if significant, is expected to be independent from the effect of rearing environment. The variable was recoded by NCHS, coded as 9= 9<sup>th</sup> Grade or Less, up to 19= 7 or More Years of Graduate School.

*Income:* Similar to education, a higher income may represent resources being spent in activities that would limit reproductive opportunities, and thus was included to control for any effect income may have on sexual behavior. Income was recoded by NCHS to create a

categorical variable from the raw data. Income refers to respondents total annual combined family income in 2001, coded as 1= under \$5000 up to 14= \$75,000 or more.

*Mother's Education and Father's Education:* Since highly educated parents are expected to invest more in their offspring, both directly and indirectly (i.e. through accumulating more social resources such as skill and money), as their own education represents a parenting strategy, the influence of parent's education needed to be controlled for to demonstrate the independent influence of parental separation. Both variables were raw data for the highest degree earned by each parent or parental figure, coded as 1= Less Than High School, 2= High School Grad or GED, 3= Some College, 4= Bachelor's Degree or Higher.

*Stepfather Presence:* This variable was included to control for any effects a stepfather may have on male sexual strategy independent of parental separation. It is predicted that a stepfather's presence will increase the stress of the rearing environment beyond family separation, and thus have an independent effect on the outcome variables. The variable was recoded by the author as 0= Stepfather Not Present, 1= Stepfather Present. The original variable, "Male Parent (Figure) Living With Respondent at Age 14" was coded 1= Biological Father, 2= Stepfather, 3=No Father Figure Present, 4= Other. To be certain the variable of concern was the presence or absence of a stepfather specifically (as opposed to an uncle, a grandfather, or another genetic relative), a dichotomous variable was created.

*Lived With Biological Father After Divorce:* Evidence suggests that in single parent homes, father absence has an effect unique from a mother's absence. It is hypothesized that a male's living with his biological father instead of his biological mother after parental separation will not independently affect any of the outcome variables in the models. This absence of a relationship has been demonstrated previously for females (Quinlan 2003). I created the variable

I included in the models from two original variables, “Intact Status of Childhood Family” and “Male Parent (Figure) Living With Respondent at Age 14”. The variable for intactness has an age cutoff at 18 years (see below), and latter variable refers to the living situation at age 14, thus this variable is not ideal and may include cases who lived with their biological father at age 14 whose parents were subsequently divorced in the following 4 years. However, this was as close as the dataset would allow for the inclusion of this control and, given the sample size, should account for the majority of cases who were raised by their biological father only. Additionally, this variable doesn’t capture those individuals whose parents were divorced before they were fourteen but, for example, switched custody from the mother to the father. I hope to correct for these flaws in future work, but accept them for now. The variable is coded as 1=Lived with Biological Father After Divorce/Separation (at least until age 14), 0=Any Other Situation (including living in an intact family).

### **Hazard Analysis of Age at First Sexual Intercourse and Birth of First Child**

Hazard analysis, using an extended Cox regression method (Kleinbaum 1996), was performed to assess the relationship between family intactness and age of first sex and age of first birth.

Hazard models estimate the instantaneous potential of a specified event occurring, indicated by values for the Status Variable (i.e. Ever Had Sex or Ever Had a Biological Child, 0= No, 1= Yes). The strength of the estimate is indicated by the value for exponent beta ( $\exp \beta$ ), or the hazard ratio. The hazard ratio is a value that gives the likelihood of one group having had the event (i.e. those males that lived in an intact family at age 18) compared to a reference group (i.e. males who did not have an intact family). A hazard ratio greater than 1.00 indicates that the

event occurs later for the reference group, less than 1.00 indicates that the event occurs earlier for the reference group.

Hazard analysis using Cox regression allows for cases who have not yet had the event (sex or birth) to be included in the model as censored cases. This method also does not assume a normal distribution (Kleinbaum, 1996). To test whether the proportional hazard's assumption is met, time-dependent covariates (Time X Time-independent predictor variable) were included in each model and kept if they were found to be significant as noted in each result table (significant if  $p \leq .05$ ; Kleinbaum, 1996).

The dependent variables included in the models are Age of First Sexual Intercourse (status variable: Has Had Sex) and Age of First Birth (status variable: Has Had a Biological Child), respectively. The predictor variable in both models is Living In an Intact Family Until Age 18. Control variables are Age, Ethnicity, Family's Income, Education, Father's Education, Mother's Education, Stepfather Presence, and Lived with Biological Father After Divorce/Separation. Any variable that did not reach significance at the  $p = .05$  level was removed from the model.

### **Number of Sex Partners**

A general linear modeling (GLM) approach is used to examine the relationship between number of sexual partners and family history (Glantz and Slinker 2001). Both the Number of Lifetime Sexual Partners and Number of Partners in the Last Year are used as dependent variables in separate analyses. As mentioned above, frequency of sex was examined over both time frames to demonstrate the consistency of male strategies. It is possibly that the last twelve months may not represent the mating behavior of a male over his lifetime (e.g. if he is living at a residential



college, where access to sex may be greater, though he may take a parenting effort strategy over his lifetime). However, it is predicted that males who take a mating effort strategy, those males from non-intact families, will have a significantly greater number of partners in both models (after age is controlled for. I expect that there will be less of a difference between the two models as age decreases). Both outcome variables are essentially continuous with the highest category being a large interval (coded as 0-7 or more for Last 12 Months, and 0-50 or more for Lifetime). The independent variables are Living in an Intact Family Until Age 18 (predictor), Age, Ethnicity, Family's Income, Education, Father's Education, Mother's Education, Stepfather Presence, and Lived with Biological Father After Divorce/Separation.

Linear regression models require a normal distribution. I plotted the standardized residuals from the linear model and found that the data did not meet this requirement; the residuals were not linearly correlated. Results for both of the linear regression models were then confirmed with an ordinal logit regression method, which does not require normally distributed data. For this analysis, Lifetime Number of Partners was divided into quartiles (replicated with seven categories to match Partners in the Last Year) to fit the requirements of the model. Only the general linear models are reported for interpretive ease.

## **RESULTS**

Life history theory predicts that timing and extent of reproductive behavior will reflect a strategy of resource apportionment. In this study, it was hypothesized that males who experience the psychosocial stress of parental separation would have sex earlier, father their first child earlier, and have more sex partners than males who grew up in an intact family. The presence of a stepfather is hypothesized to increase the stress of the rearing environment, independently

affecting timing and extent of reproductive behavior. Lastly, it was hypothesized that living with their father versus their mother after parental separation would not have a significant effect on males' reproductive behavior.

Tables 1 gives descriptive statistics for the sample. The NSFG oversampled the African American population to account for the “scaling effect” of random sampling (see the Data and Documentation section at <http://www.cdc.gov/nchs/nsfg.htm#Datadocpu> for more information). Subgroups may have different sampling rates, response rates, and coverage rates so NSFG included sampling weights to adjust the statistics to fit national averages. Both the unweighted and the weighted mean, median, and stand deviations are given in Table 1. The sample was also artificially restricted to only the Euro-American and African American subgroups for my analysis, so these statistics are additionally skewed in that respect. However, the omitted cases account for only about 12 percent of the total sample.

Table 1. Descriptive Statistics

	Mean		Median		SD		Min	Max
	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted		
Age	28.31	29.99	28	31	8.899	8.786	15	45
Education	12.65	12.92	12	12	2.631	2.701	9	19
African American Ethnicity	<b>0.24</b>	<b>0.15</b>	0	0	0.427	0.357	0	1
Sex Partners (last 12 months)	1.23	1.13	1	1	1.387	1.132	0	7
Sex Partners (lifetime)	8.90	8.89	5	5	11.871	11.654	0	50
Has Had Sex	<b>0.83</b>	<b>0.87</b>	1	1	0.371	0.333	0	1
Has Fathered a Child	<b>0.35</b>	<b>0.47</b>	0	0	0.478	0.499	0	1
Age at First Birth	24.95	25.32	23	24	7.416	6.966	12	44
Age at First Sex	17.15	17.32	16	17	4.376	4.074	4	44
Stepfather Present	<b>0.08 (0.21)</b>	<b>0.08 (0.28)</b>	0	0	0.26358	0.26479	0	1
Lived with Bio Dad After Separation	<b>0.10 (0.27)</b>	<b>0.09 (0.24)</b>	0	0	0.29471	0.28452	0	1
Not from Intact Family	<b>0.35</b>	<b>0.32</b>	0	0	0.478	0.466	0	1

N=4341. Values in bold are percentages. Parentheses indicate percentage of males from non-intact families.

The mean age was 28 and 24 percent of the sample were of African American ethnicity.

The mean age of first sex was 17, and the mean age of first birth was about 25. Eighty-three

percent of the sample had had sex prior to sampling, but only 35 percent had yet fathered a child. Sixty-five percent of the respondents lived with both biological or adoptive parents at age 18. Of the remaining 35 percent, 27 percent of males in the sample lived with their biological father after the divorce or separation and 21 percent lived with a stepfather present.

### **Age of First Sexual Intercourse**

Males from intact families were predicted to have sex later than males from non-intact families. Cox regression analysis showed this to indeed be the case (Table 2). The Hazard Ratio for the final model was 2.223 ( $p < .001$ ), indicating that being from a non-intact family increases the hazard of earlier sexual intercourse by a factor of nearly two and a half. Figure 1 shows the survival curve of age of first sex for intact versus non-intact family males. Survival curves represent the proportion of the sample who have not yet had an event occur (in this case, those who have not had sex) at the time specified by the x-axis values (in this case, age in years).

There were independent, significant effects of age, ethnicity, family income, and the presence of a stepfather. A hazard ratio of 1.052 ( $p < .001$ ) for age indicates a very small secular trend toward later age of first sexual intercourse. Being of a African American ethnicity has an independently greater effect on the hazard of earlier sexual intercourse than being from a non-intact family; African American males have nearly seven times the risk of Euro-American males ( $HR = 6.718$ ,  $p < .001$ ). Furthermore, the presence of a stepfather also increases the hazard of earlier sexual intercourse by about 14 percent for males from non-intact households ( $HR = 1.142$ ) but this was only marginally significant ( $p = .051$ ). Both respondents' education and income significantly decrease the hazard of early sexual intercourse ( $HR = .959$ ,  $p < .001$ ;  $HR = .898$ ,  $p < .001$ , respectively). Lived With Biological Father After Divorce/Separation did not reach significance

and was removed from the model. All other non-significant covariates were also removed. Doing this did not appreciably alter the independent effects reported.

### **Age at Birth of First Child**

Similar to the analysis of Age of First Sex, males from non-intact family environments had over twice the hazard of fathering a child earlier than those from non-intact homes, in line with the predictions (HR=2.239,  $p=.004$ ; Table 3). Figure 2 shows the survival curve for males from intact and non-intact families. The same trends as seen for Age of First Sex in age, ethnicity, education, income, and stepfather presence were seen in this analysis: older cohorts have slightly younger ages of first birth (HR=1.073,  $p=.002$ ), as do African American males (HR=1.371,  $p<.001$ ; a greatly reduced hazard as compared to Age of First Sex); stepfather presence increases the hazard (HR=1.314,  $p=.014$ ); education and income both decrease the hazard of becoming a father earlier (HR=.597,  $p<.001$ ; HR=.845,  $p<.001$ , respectively). Additionally, respondent's father's education also independently reduced the hazard of earlier first birth (HR=.872,  $p<.001$ ).

Respondent's father's level of education also decreased the hazard of earlier first birth (HR=.872,  $p<.001$ ), whereas this variable was omitted from the Age of First Sex model because it was non-significant. All other non-significant covariates were also removed from the model. Omission did not appreciably alter the model statistics for the other variables. Again, living with his biological father after his parent's separation did not significantly increase or decrease a male's hazard of early sexual intercourse.

Table 2. Results of Cox Regression for Age of First Sex

	B	SE	Wald	df	Sig.	Exp(B)
Age	0.051	0.012	18.477	1	0.000	1.052
African American Ethnicity	1.905	0.212	80.709	1	0.000	6.718
Education	-0.042	0.007	37.092	1	0.000	0.959
Income	-0.108	0.023	22.575	1	0.000	0.898
Stepfather Present	0.133	0.068	3.819	1	0.051	1.142
Non-Intact	0.799	0.19	17.689	1	0.000	2.223

Time-dependent covariates were kept in the model if they were significant at  $p < .05$ . Significant time-dependent covariates in this model were Age, African American Ethnicity, Income, and Intact Family Status.

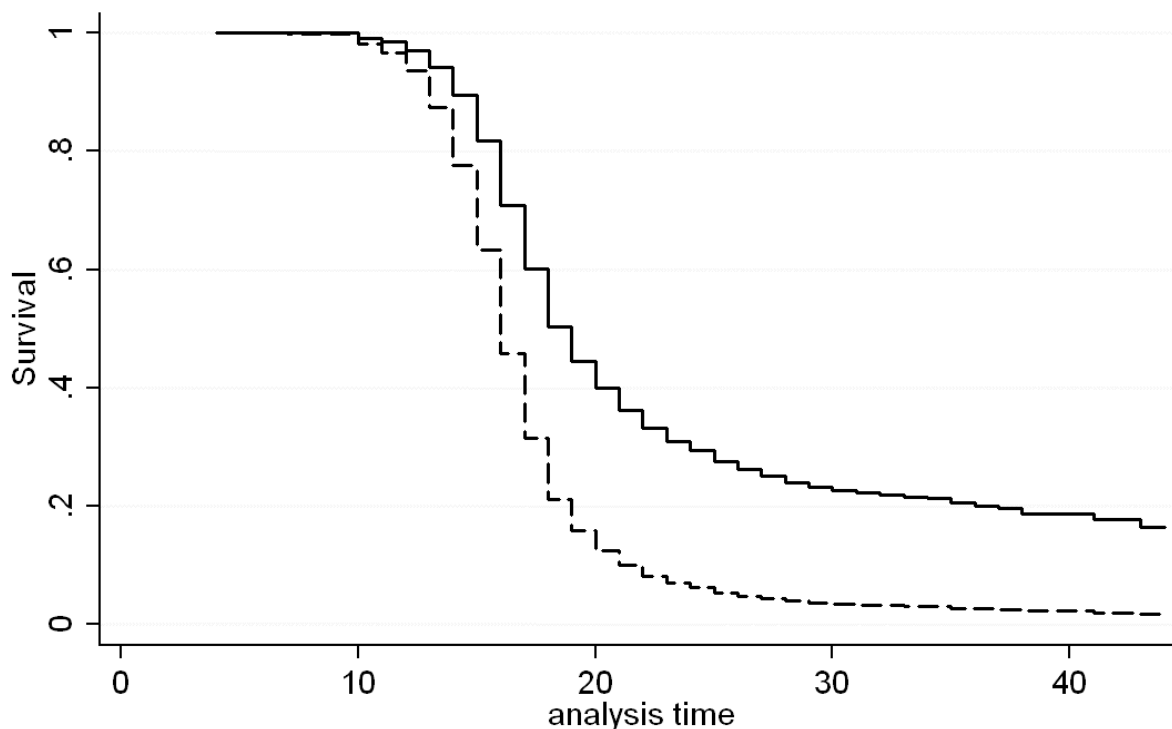


Figure 1. Survival Curve of age of first sexual intercourse for males from intact (solid line) and non-intact (dotted line) families. X-axis is years of age, Y-axis is proportion who have not yet had sexual intercourse.

Table 3. Cox Regression Results for Age of First Birth

	B	SE	Wald	df	Sig.	Exp(B)
Age	0.07	0.023	9.219	1	0.002	1.073
African American Ethnicity	-0.316	0.062	25.698	1	0	1.371
Education	-0.516	0.053	93.641	1	0	0.597
Father's Education	-0.137	0.028	23.242	1	0	0.872
Income	-0.168	0.037	20.521	1	0	0.845
Stepfather Present	0.273	0.112	5.948	1	0.015	1.314
Non-Intact Family	0.806	0.282	8.184	1	0.004	2.239

Time-dependent covariates were kept in the model if they were significant at  $p < .05$ . Significant time-dependent covariates in this model were Age, Education, Income, and Intact Family Status.

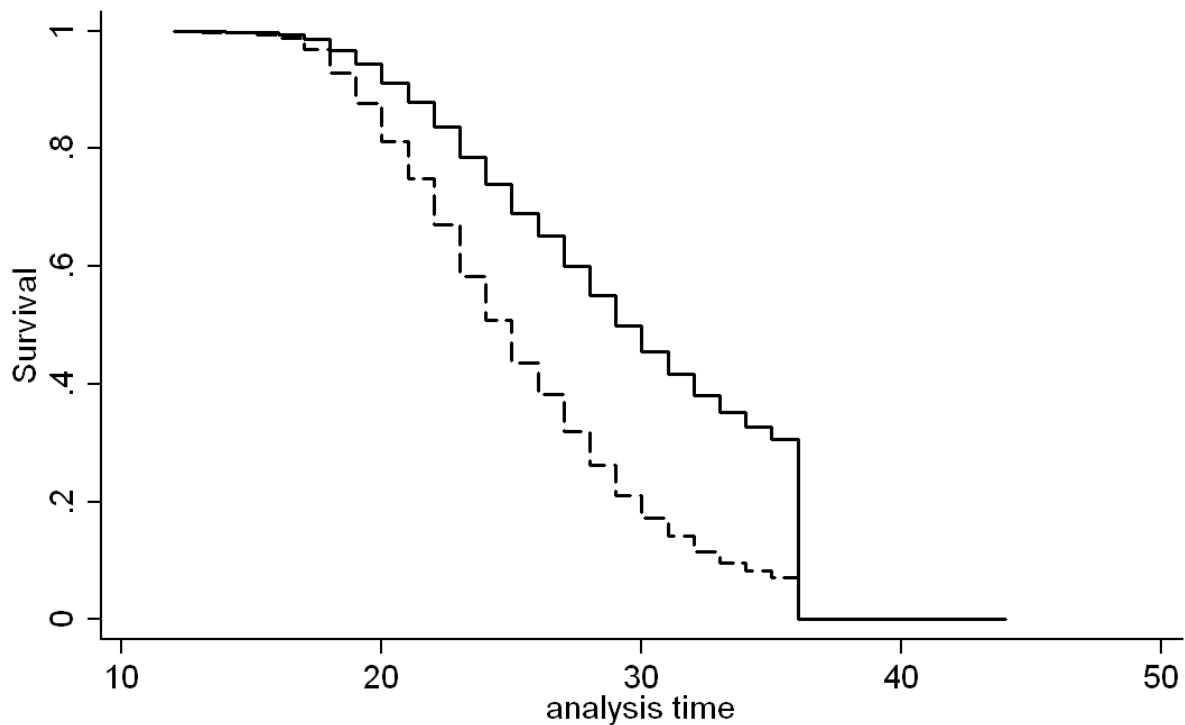


Figure 2. Survival curve of age of first birth for males from intact (solid line) and non-intact (dotted line) families. X-axis is years of age, Y-axis is proportion who have not yet fathered a child.

## Number of Sexual Partners

**Last 12 Months** As predicted, family intactness significantly predicted the number of partners respondents had in the last 12 months prior to data collection ( $\beta^6=.188$ ,  $p=.004$ ; Table 4).

African American ethnicity was also associated with a greater number of partners ( $\beta=.458$ ,  $p<.001$ ). Education was positively associated with number of partners in the last 12 months ( $\beta=.035$ ,  $p<.001$ ), however income was not a significant predictor. Father's nor mother's education level was significantly correlated with number of recent sex partners. Neither stepfather presence nor living with biological father after divorce were significant predictors of number of sexual partners in the last 12 months.

The data was determined to be non-normally distributed, so this model was replicated using ordinal logit regression, which does not require normal distribution. The direction and significance level of the estimates in the logit regression model were equivalent to those of the GLM with two exceptions: respondent's mother's and father's level of education were significantly negatively correlated (log odds=-.097,  $p=.009$ ; log odds=-.082,  $p=.019$  respectively). For ease of interpretation only the GLM results are shown.

**Lifetime** As predicted, parental separation predicts a greater number of partners over a male's lifetime ( $\beta=2.059$ ,  $p<.001$ ). Similar to the above model, African American ethnicity is positively associated with number of lifetime sex partners ( $\beta=2.424$ ,  $p<.001$ ), however no other covariates were statistically significant contributors to the model except for age.

This model was also replicated with ordinal logit regression to account for non-normally distributed data. In the ordinal logit model education became significant (log odds=.084,  $p<0.001$ ) as did father's education (log odds=-.065,  $p=.044$ ).

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<sup>6</sup> All model statistics I'm reporting in the text are the unstandardized  $\beta$  values.

Table 4. General Linear Regression Model of Number of Sex Partners in the Last 12 Months

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	0.608	0.126		4.816	0.000
Age	0.006	0.003	0.040	2.194	0.028
African American Ethnicity	0.458	0.053	0.138	8.596	0.000
Education	0.035	0.010	0.067	3.567	0.000
Income	-0.001	0.006	-0.002	-0.129	0.897
Mother's Education	-0.021	0.026	-0.016	-0.808	0.419
Father's Education	-0.034	0.025	-0.027	-1.352	0.176
Stepfather Present	-0.110	0.098	-0.021	-1.119	0.263
Bio Father After Separation	-0.125	0.091	-0.027	-1.372	0.170
Non-Intact Family	0.188	0.065	0.063	2.897	0.004

Table 5. General Linear Regression Model of Number of Sex Partners in Lifetime

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-7.688	1.024		-7.505	0.000
Age	0.447	0.023	0.340	19.793	0.000
African American Ethnicity	2.424	0.433	0.085	5.600	0.000
Education	0.129	0.079	0.029	1.642	0.101
Income	0.088	0.049	0.028	1.794	0.073
Mother's Education	0.167	0.214	0.015	0.777	0.437
Father's Education	-0.056	0.202	-0.005	-0.278	0.781
Stepfather Present	0.011	0.797	0.000	0.014	0.989
Bio Father After Separation	-1.05	0.738	-0.026	-1.422	0.155
Non-Intact Family	2.059	0.526	0.081	3.915	0.000



## **POST HOC ANALYSIS: INTERACTION BETWEEN CULTURE AND REARING ENVIRONMENT**

The effects of African American ethnicity on the above results were not predicted and further investigation of the dual influences of culture and rearing environment seemed warranted. Previous studies have shown that African Americans, both male and female, experience earlier ages of first sexual intercourse and earlier ages of first birth (e.g. Hogan and Kitagawa 1985; Quinlan 2003), suggesting a potential cultural origin to the timing of reproductive behavior. In the current study, I used the variable “African American Ethnicity” to control for the effects of culture. Similar to the results reported in Quinlan (2003) for females, I found that African American men in my sample had a higher hazard of early sexual intercourse and early first birth than their Euro-American counterparts. African American males were found to have over six times the hazard of earlier sex, a result greater than that found by Quinlan for females (Quinlan 2003: HR=3.918; this study: HR=6.718). The hazard ratio for age of first birth is less than that for age of first sex, and substantially less than Quinlan’s result for females, but still significant (HR=1.371; Quinlan 2003: HR=8.463).

Culture-wide differences in sexual behavior have long been a focus of anthropological research, as has the link between sexual behavior and parenting. For example, in one of many classic studies, Whiting and Whiting (1975) used the standard cross-cultural sample (Murdock and White 1969) to demonstrate that intimacy between husbands and wives, measured by whether or not they sleep in the same room, varies with a few key factors, such as the division of labor between the sexes, the need for warriors, and the necessity to guard capital investment. They argue that the presence of these factors, and the associated aloofness of husbands and wives effects child social development: “The social behavior of children brought up in cultures with the

rooming apart pattern is less intimate and more aggressive than that of children brought up in cultures in which the fathers are more involved in domestic affairs” (Whiting and Whiting 1975:199). These “rooming apart” cultures seem to echo Draper and Harpending’s (1982) “normative father-absent” cultures. In a recent study also using the standard cross-cultural sample, Quinlan and Quinlan (In Press) found that several common cultural practices seem to reflect the link between parenting behavior and sexual strategies. Specifically, acceptance of extramarital sex, aggression, theft, and witchcraft (used as a measure of general mistrust of others) were associated with unresponsive parenting cross-culturally. Furthermore, Bereczkei (1993), reviewed above, found evidence of clear differences in sexual strategies and parenting between Hungarian Gypsies and non-Gypsies, which were theoretically linked to the Gypsies political subjugation. It may be that the environments experienced by minorities in America mimic those that provoke mating effort strategies within other cultures.

However, this may be too simple a characterization of the phenomena at work. Although cross-cultural differences in sexual strategies certainly are related to variations in parenting, an almost tautological notion in the first place, in large, diverse populations such as in the United States variation *within* cultural groups should be evident as well. In this study, parental separation was an independent and significant independent variable in each of the analyses conducted, as was predicted—the effect is population wide. That ethnicity also had such large and independent effects led me to further investigate the relationship between these two variables. In order to do this an interaction term was created by multiplying Intact Family Status and African American Ethnicity. I entered the interaction term into a Cox regression model for Age of First Sex and Age of First Birth and in GLMs for Number of Partners in the Last Twelve Months and Number of Lifetime Partners.

This additional analysis proved fruitful. Tables 6 and 7 show the most highly specified Cox regression models for age of first sex and age at first birth, respectively. All covariates that were significant at  $p < .01$  were removed to be sure of the relative effects of Non-intact Family, African American Ethnicity, and their interaction. In neither model was the interaction term significant. However, in the model for age at first birth, while the interaction term was never significant, if the time-dependent covariate for intact family status was removed from the model ( $p = .013$ ), Non-intact Family became non-significant as well. This suggests that when the model is specified at the desired level ( $p < .01$ ), the difference between intact and non-intact family males disappears, leaving only an ethnicity construct to explain the results. It was decided to include the time-dependent covariate in the model, even though the other variables included were at  $p < .005$ . This was a judgment call and thought to best fit the patterns seen in the other analyses.

Thus, ethnicity and intact family status each has an entirely independent effect on the outcome variables. To better illustrate the nature of this effect, a variable was created from these two variables with four categories describing the possible combination of effects: Euro-American and Intact, Euro-American and Non-intact, African American and Intact, and African American and Non-intact. Cox regression models for age of first sex and age at first birth were then run with this categorical variable in place of the interaction term. The results are illustrated in Figures 3 and 4 by the survival curves for each model. The effect is clearly dose-dependent, both parental separation and African American ethnicity each increase the hazard of having sex earlier and fathering a child earlier.

The results for the GLM analysis of the interaction are mostly in-line with the results of the hazard models and the previous GLMs. However, for number of partners in the last 12

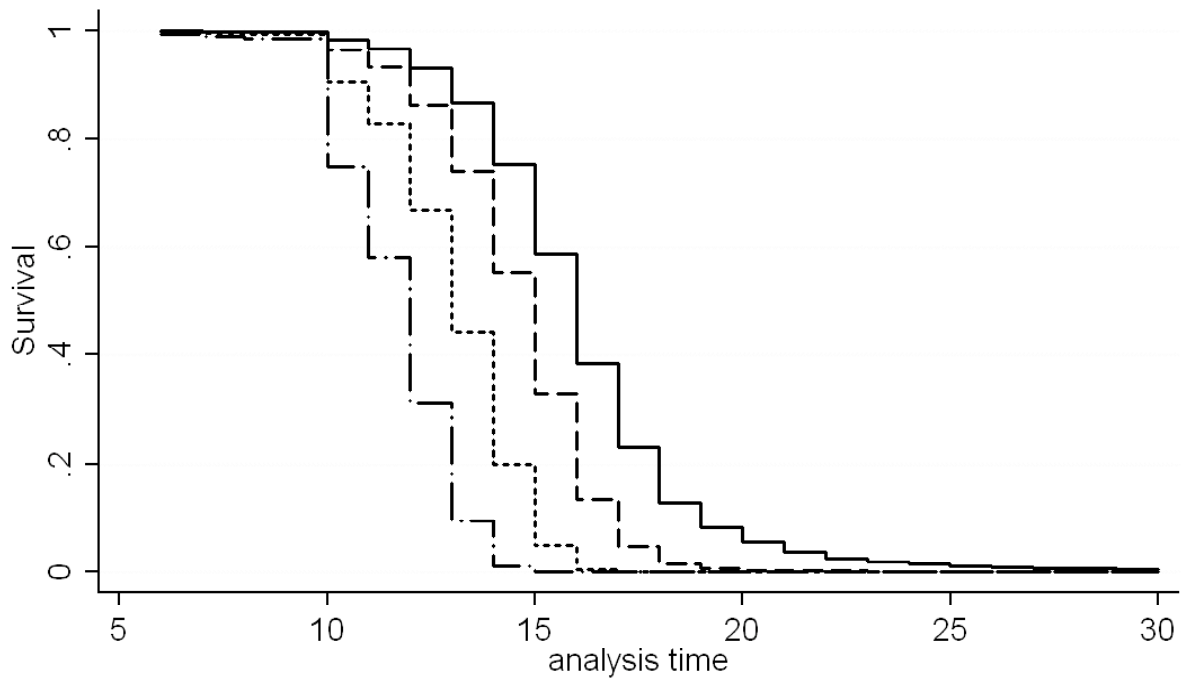
months, Non-intact Family was not a significant predictor (Table 8;  $\beta=.089$ ,  $p=.082$ ) when the interaction term is included, though it is significant in the model for lifetime number of sex partners (Table 9;  $\beta=1.60$ ,  $p<.001$ ). Otherwise, the GLMs including the interaction term are identical in interpretation to those without it: for number of recent partners, age and education are the only other significant variables are positively correlated ( $\beta=.008$ ,  $p<.001$ ;  $\beta=.028$ ,  $p<.001$  respectively); for number of lifetime, only age was significant ( $\beta=.456$ ,  $p<.001$ ). Both models including the interaction term were also replicated with ordinal logit regression and the results were the same as for the previous models without the interaction term: for number of recent partners, respondent's mother's and father's education became significant and, more importantly, so did intact family status (log odds=.202,  $p=.046$ ). For number of lifetime partners, education and father's education became significant.

Table 6. Results of Cox Regression for Age of First Sex, Ethnicity x Intact Family Status Interaction

	B	SE	Wald	df	Sig.	Exp(B)
Age	0.050	0.012	18.072	1	0.000	1.051
Education	-0.041	0.007	36.862	1	0.000	0.959
Income	-0.106	0.023	21.981	1	0.000	0.899
African American Ethnicity	1.988	0.219	82.35	1	0.000	7.302
Non-Intact Family	0.914	0.196	21.856	1	0.000	2.495
Ethnicity x Intact Family Status	-0.125	0.079	2.488	1	0.115	0.882

Time-dependent covariates were kept in the model if they were significant at  $p < .01$ .

Significant time-dependent covariates in this model were Age, Income, Ethnicity, and Intact Family Status.



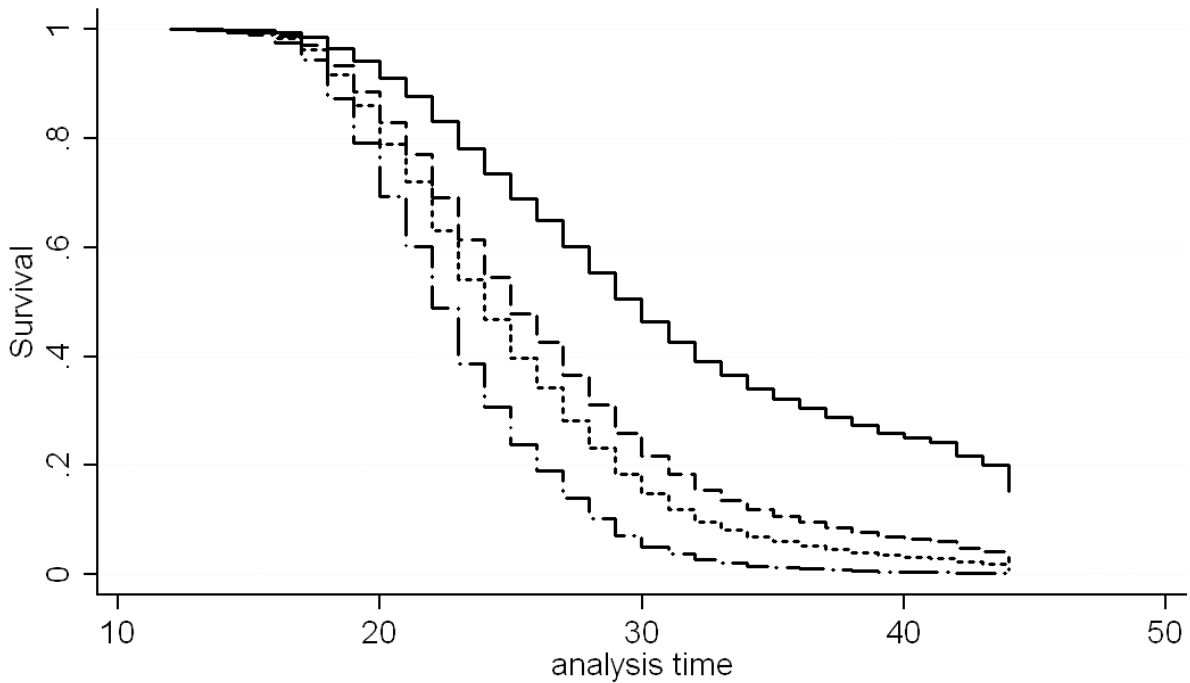
**Figure 3. Survival curve of age of first sex by ethnicity x intact family category. Solid line is Euro-American Intact, dashed line is Euro-American non-intact, dotted line is African American Intact, Dot-dashed line is African American Non-intact. X-axis is years of age, Y-axis is proportion who have not yet had sex.**

Table 7. Results of Cox Regression for Age at First Birth, Ethnicity x Intact Family Status Interaction

	B	SE	Wald	df	Sig.	Exp(B)
Age	0.071	0.023	9.266	1	0.002	1.073
Education	-0.513	0.053	93.237	1	0.000	0.598
Father's Education	-0.138	0.028	23.701	1	0.000	0.871
Income	-0.169	0.037	20.586	1	0.000	0.845
African American Ethnicity	0.252	0.078	10.445	1	0.001	1.286
Non-Intact Family	0.811	0.285	8.079	1	0.004	2.249
Ethnicity x Intact Family Status	0.174	0.127	1.869	1	0.172	1.19

Time-dependent covariates were kept in the model if they were significant at  $p < .01$  except Intact Family Status ( $p = .013$ , discussed in the text).

Significant time-dependent covariates in this model were Age, Income, Education, and Intact Family Status.



**Figure 4. Survival curve of age of first birth by ethnicity x intact family category. Solid line is Euro-American Intact, dashed line is Euro-American non-intact, dotted line is African American Intact, Dot-dashed line is African American Non-intact. X-axis is years of age, Y-axis is proportion who have not yet fathered a child.**

Table 8. General Linear Regression Model of Number of Sex Partners in the Last 12 Months

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	0.509	0.113		4.512	0.000
Age	0.008	0.002	0.051	3.233	0.001
Education	0.028	0.008	0.052	3.279	0.001
African American Ethnicity	0.404	0.065	0.124	6.236	0.000
Non-Intact Family	0.089	0.051	0.031	1.740	0.082
Ethnicity x Intact Family Status	0.188	0.099	0.042	1.892	0.059

All non-significant covariates were removed from the model for clarity.

Table 9. General Linear Regression Model of Number of Lifetime Sex Partners

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-5.138	0.598		-8.590	0.000
Age	0.456	0.019	0.342	23.926	0.000
African American Ethnicity	2.110	0.525	0.076	4.018	0.000
Non-Intact Family	1.600	0.417	0.064	3.836	0.000
Ethnicity x Intact Family Status	0.520	0.806	0.014	0.645	0.519

All non-significant covariates were removed from the model for clarity.

## DISCUSSION

Life history theory predicts that organisms are adapted to allocate resources throughout the course of their lives to activities that will maximize their reproductive success. Investing resources in one activity will necessarily make those resources unavailable for investment in an alternative one. In deciding when and in what fashion to reproduce (the most crucial activity of nearly every organism's life), two trade-offs must be considered: investing in current offspring will be at the cost of investment in future offspring, and, similarly, investing in the quality of offspring will be at a cost of investment in quantity of offspring. Belsky, Steinberg and Draper (1991), based on theorizing by Draper and Harpending (1982; 1988), asserted that psychosocial stress early in life, such as could stem from separation between one's mother and father, may inform a young human's development as to what should be expected of the future environment, and thus how to apportion reproductive effort. Such stress may be indicative of a lack of socioeconomic resources, for example, that would allow others to take advantage of developing slowly, forming lasting social bonds, and investing high quality care into a few offspring. Instead, a strategy of quick development, followed by early reproductive behavior and ephemeral, opportunistic social relationships might be more advantageous if one can't count on a steady supply of benefits from one's social surroundings.

A body of evidence exists supporting the causal connection between social stress early in life and the timing of reproductive maturity and extent of reproductive and asocial behaviors exhibited throughout the lifecourse. The results of the current study provide further evidence for this connection, and support the theory of Belsky et al. (1991). It was predicted that males living in an intact family until the age of 18 would tend to have sex later than males from non-intact homes, and that this would be independent of socioeconomic factors (Prediction 1). This was the



case for my sample of American men. It was also predicted that males from intact families would father children later than those who experienced the stress of parental separation (Prediction 2). Again, the results support this prediction. Accordingly, if males who experienced early life stress take the strategy of maximizing reproductive opportunities, investing in mating effort more than parenting effort, than they should not only start having sex and fathering offspring earlier, but they should seek out opportunities to reproduce more frequently (Predictions 3). As predicted, being from an intact family was independently and negatively correlated with the number of sexual partners a male has had, whether measured for the last year or across his lifetime. This last result indicates that men's strategies are consistent throughout their life.

Admittedly, the predictor variable used in my analyses, "Lived with Biological or Adopted Parents Until Age 18," is imprecise. No notion of the timing of parental separation, nor any general allusion to the circumstances that caused the transition from "Intact" to "Non-intact" status is captured in the variable itself. Certainly, some separations were legal divorces, others more casual, and a proportion may have been due to the death of a parent. With the exception of the latter, the circumstances leading to the change in family situation could have ranged from intense familial conflict to entirely cordial mutual agreement to state-appointed child fostership (in the case of those who were adopted). Furthermore, I would never deny, and wouldn't claim the results herein dispute, that a child from a highly investing, caring single parent home can experience a qualitatively and quantitatively less stressful rearing environment than a child from an abusive two parent—"intact"—family, and that the developmental outcomes of these two children may vary in ways not predicted by this study. Despite the ambiguity, it is clear that, in general, there are differences in sexual behavior between males who grew up in a family with

both parents present and those who did not, and these differences are in-line with the predictions of life history theory. Specifically, these results support the theory that men adopt a particular sexual strategy in response to their rearing environment. I cannot pin-point the exact qualities of each different rearing environment that may act as causal cues of individual strategies, however the multivariate modeling approach used here allows for some useful conclusions to be drawn.

First, the presence of a stepfather earlier in life does have an effect on the sexual behavior of males, however the evidence is not equivalently positive for all of the behavioral variables studied here, nor is it as strong of an effect as parental separation alone. Men who grew up with a stepfather present had an increase in hazard of first sexual intercourse of only 14 percent (HR=1.142), but had an increase in the hazard of fathering a child earlier that was twice as large (HR=1.314). However, each of these effects was the least significant covariate in their respective Cox regression models ( $p=.051$  for age of first sex,  $p=.015$  for age at first birth, all other variables were significant at  $p<.005$  in both models). Stepfather presence did not near significance as a predictor of males' number of sexual partners in either linear regression analysis (nor in the ordinal logit models). Thus, while this study did not investigate the role of stepfather presence in the timing of pubertal maturation, as was done in previous studies (Bogaert 2005; Ellis and Garber 2000; Matchock and Susman 2006; Quinlan 2003), a relatively weak effect on timing of sexual behavior was found. That this effect is seen in a sample of males has a couple of implications.

If there is some effect of unrelated male pheromones on the timing of sexual maturity of juvenile humans, either the mechanism is not specific to female reproductive functions, since males may also be affected, or there is a qualitatively different adaptive design for males' pheromone detection and response. Perhaps more parsimoniously, however, these results

support the position that both males and females may perceive the presence of a stepfather as competition for maternal solicitude. Having already experienced the separation of their biological mother and father, a stepfather may have an independent effect on children's developmental timing by drawing parental effort away from the mother. Thus, the adaptive design is sex nonspecific and linked solely to the effect an unrelated male will have on the offspring's chance of continuing to garner parental resources. The agreement between parents and offspring as to how much the parents should be investing changes with time, and conflict is expected at a certain threshold (Trivers 1974). The presence of alternative mating opportunities for the mother may decrease that threshold and further increase the magnitude of offspring response (in this case, decreasing timing of sexual behavior and reproduction). Even if the mother does not change her level of investment, stepparents may go to extremes to reduce competition for investment in their own reproductive interests (Daly and Wilson 1998). Even in cases where violence is not present, effects of neglect may remain (Flinn, 1999; although see Anderson, et al. 1999). The absence of an effect on the number of sexual partners a male has may be because stepfather presence has a pronounced early effect, hastening the young male's sexual maturity, but not necessarily increasing his mating efforts any further than parental separation alone. Though somewhat weak, my results yield support for the notion that the presence of a stepfather may be an independent factor in determining the timing of male sexual behavior, and indirectly give credence to the existence of similar effects in females. That previous studies have reported equivocal results, and that the effects seen here are relatively weak indicates much more work needs to be done to better understand the effects of stepfather presence on human sexual maturation. Evolutionary based studies need to control for the timing of stepfather's presence in the lifecourse of particular offspring, number of offspring from each

parent in stepfamilies, mother's current projected reproductive potential, and time offspring spend with each parental figure in order to clarify investment logic for each individual involved.

Quinlan (2003) reported that, for females, parental divorce increased the risk of early sexual intercourse, early first birth, and a greater number of sex partners and that these results were unaffected by whether or not a woman lived with her father or mother after parental divorce. The current study replicated this result for males. When entered as a covariate in both Cox regression models, being raised by a single father did not significantly alter the odds of having sex, nor fathering a child earlier than being raised in any other situation. This variable was also not a significant predictor of the number of sex partners a male has had, either in the last twelve months, or across his lifetime. However, when ordinal logit regression was used instead of a general linear method, being raised by the biological father did significantly and negatively predict males' number of lifetime partners. Overall, these result, along with those of Quinlan (2003), go against the prediction of Draper and Harpending (1982) that father absence in particular is the cue to an appropriate life history strategy. Instead, the loss of direct parental investment from either biological (or adoptive) parent may be the most salient cue.

Respondent's income and level of education significantly decreased the hazard of early first sex and first birth. Investment in education, which tends to increase one's income in America<sup>7</sup>, as well as worldwide, certainly requires sacrifices in time and energy devoted to reproduction and often requires a greater initial investment by one's parents as well (Kaplan 1996). Theoretically, then, those who are more likely to be highly educated are also more likely to be those from intact families. A simple linear regression of Intact Family Status on Education confirms this is the case among the sample of American males studied here ( $\beta = -.626$ ,  $p < .001$ ).

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<sup>7</sup> Education and income are significantly correlated in this dataset ( $\beta = .172$ ,  $p < .001$ ).

However, both education and income are still independent predictors of delayed sexual behavior and reproduction, demonstrating a clear tradeoff.

The relationship between income and education and the frequency of sexual partners is somewhat more complex. While income was not significant in either GLM, education level predicted a greater number of recent sex partners ( $\beta=.035$ ,  $p<.001$ ), though was not a significant predictor of number across the lifespan. This difference was expected, since both models were included to account for the greater access to sexual opportunities that may be present during certain periods of men's lives, such as during college. The difference in significance between the two models in terms of effects of education likely reflects this increased opportunity among that population. The greater effect size for age of first birth versus age of first sex (Age of First Birth: Education HR=.597, Income HR =.845; Age of First Sex: Education HR=.959, Income HR=.898), in addition to the absence of an effect of education or income on number of lifetime partners, may indicate that, while educated men have an open opinion regarding sex, they fully adopt (deliberately or not) a high investment strategy when it comes to family planning.

It should be noted that when ordinal logit regression was used to model number of males' lifetime partners, the effect of education became positive and significant, similar to the results of both the linear and ordinal logit regression models for number of partners of the last twelve months. The effect of father's education also became significant but negatively correlated with number of lifetime partners, again in-line with the results for number of recent partners. Both of these results show weak effects (log odds=.084,  $p<.001$  for education; log odds=-.065,  $p=.044$  for father's education) and are difficult to interpret. If educated fathers are more likely to invest highly in their sons, than it is counter-intuitive that, across a male's lifetime, his education increases his mating opportunities, whereas his father's education restricts them. Due to the

weakness of the effect sizes, a more thorough analysis is not warranted here, but the relationship between a male's own education, his father's education, and his number of sexual partners in his lifetime remains unclear.

The post hoc analysis of the interaction between ethnicity and rearing-environment has revealed that parental separation increases the hazard of earlier age of first sexual intercourse across ethnic groups, although African American males are at a still greater hazard than Euro-American males irrespective of rearing environment. Thus, the psychosocial stress of parental separation does have population-wide effect on male sexual behavior but it acts in addition to self-identification as being of African American ethnicity. Thus, an important question is What is being captured by my inclusion of this "cultural control"? Research indicating that differences between African American and Euro-American culture may explain these results. For example, African American males are reported to have sex earlier than Euro-American males (Furstenberg 1987), in-line with the above results. Engaging in sex at younger ages may lead to the less regular use of contraception reported among this population, in turn leading to a greater chance of earlier pregnancy (Furstenberg 1987). There is also a lower probability of marrying before childbirth within the African-American community, possibly linked to a greater tendency to see marriage as a less viable institution than Euro-Americans (Furstenberg 1987), or to their holding a "less traditional" view of marriage and childbearing (Gadsden and Smith 1994:639). African American males may view sex and paternity as demonstrations of masculinity (Gadsden and Smith 1994), however this does not necessarily indicate a denial of paternal responsibility (Sullivan 1985).

Research among unwed African-American adolescent fathers shows that paternity was desired and that they felt prepared to assume a parental role (Taylor, et al. 1990). Furthermore,

although African American adolescent fathers may be less likely to cohabit with their partner and child, they are more likely than Euro-American adolescent fathers to be involved in their child's life. African-American males report the desire to be a good provider for their families (Taylor, et al. 1990), even if socio-economic disparities and discrimination deter their ability to do so (Gadsden and Smith 1994). Thus, it may be the case that, while Euro-American and African American males may adopt the same reproductive strategy in response to parental separation, Euro-American males may be more likely to use contraception to avoid pregnancy, possibly in response to greater cultural pressure to wait until marriage before child birth. African American males, on the other hand, may see fatherhood differently, and even those who are likely to be high-investing fathers (those from intact families) may desire, or are more willing to accept, earlier fatherhood.

Alternatively, MacDonald (1999) has suggested that perception of upward social mobility may influence one's sexual strategy. He has used this to explain the variation in parenting and sexual behavior between Western and Eastern European Jews during the demographic transition in the 19<sup>th</sup> century. Western European Jews were able to thrive socially and economically and took a low-fertility/high-investment reproductive strategy, whereas the more socially subjugated Jewish populations in Eastern Europe obtained record levels of fertility but lived with (partially state-sponsored) high rates of poverty and low university enrollment. When Eastern European Jews were able to emigrate to the US, they found enhanced opportunities for upward social mobility and facultatively changed their strategy to one of high-investment and low-fertility (MacDonald 1999). Thus, it may be the case that, although African American males from intact homes may be prone to more of a high-investment, low-fertility strategy than those from non-intact homes, in general, African American males may perceive their chances of social success

through high-investment in their offspring as lower than Euro-American males and respond accordingly in their sexual strategy.

If this is an accurate explanation, it has important implications. The “ethnic” differences that are seen in this study, if looked at from the perspective of MacDonald (1999), are a result of common notions of potential social success among self-identified groups within the US population (assuming social success within a particular context is a reason for a high-investment, low-fertility strategy). Thus, if we take Atran and colleague’s (2005) definition of culture as *shared mental representations*, then the differences can be described as *cultural* differences. This may also explain the variation in views on the viability of marriage. I find both of the above non-mutually exclusive explanations, that fathering and marriage are perceived differently between cultures and that the perceived chance of upward social mobility within a self-identified culture influences reproductive decision-making, more palatable than one based on racially-linked genetic differences in behavior (i.e. Rushton 1995). Both seem more in-line with the results reported here for the effects of rearing environment—these are *universal* human responses to context, and cultural heritage is one component of that context.

Of course, the results on the effects of rearing environment are not closed to alternative interpretations. For example, one can argue that the behavioral patterns demonstrated here could be individually different responses to being endowed with a particular gender and body in a social context with specific social norms and attitudes. These norms and attitudes provide feedback throughout development that influences how one responds to self and others, and how sexuality is expressed (Richards 1996). One is exposed to one’s culture’s views on love, sex, and gender from early on, often from parents, and this exposure can have lasting effects on the development of sexuality (Chodorow 1994). From this perspective, observed patterns are only



due to overlap in context, and individual phenotypes are the base from which culture constructs sexuality and the sense of self. Whereas this view may prove helpful in explaining individual differences in proximate responses to sexual stimuli, and perhaps also personal opinions and thoughts on sex and gender, it does not suggest an ultimate explanation, one based on fitness differentials. Thus, though perhaps compelling, psychoanalytic explanations are left wanting from an evolutionary perspective.

Alternatively, it can also be argued that the above results reflect behavioral repertoires that are genetically inherited, rather than canalized in response to the level of direct parental investment (Rowe 1994; Rowe 2000). This would be an evolutionary account. However, given the importance of phenotypic plasticity and development in evolution (West-Eberhard 2003) and the variety of human contexts in which similar trends in life history trait variation exist (Flinn, et al. 1999; Flinn, et al. 1996; Quinlan and Quinlan In Press; Weinrich 1977; Whiting and Whiting 1975) it seems more parsimonious to attribute variation to plastic properties of human development. Furthermore, Quinlan (2003) controlled for heritability of age of first birth and found no effect of the mother's age of first birth on her daughters. This is not to say that genes are unimportant, but rather that they code for genetic tendencies, or reaction ranges, within which certain developmental trajectories are more or less likely given the appropriate environmental stimuli (Ellis 2004; MacDonald 1997).

Readers will have noted that this study did not include the number of offspring a man has had in any of the analyses, nor were there any predictions made regarding this crucial, ultimate determinant of reproductive fitness. The meaning of "number of offspring" as a measure in contracepting societies is hard for evolutionary researchers to interpret. For example, in the current study, males from non-intact homes may be acting to maximize reproductive

opportunities but may still use contraception, disconnecting the ultimate determinate of this behavior from the proximate desire for sex. This may additionally be the case for males from intact homes, who reduce their optimal fecundity even below their expected, lower, quantity. It may be the case that these males are acting maladaptively by making their decisions based upon a false assumption that cultural success, which can come at a great cost in post-industrial society, is associated with reproductive success (MacDonald 1999). Furthermore, those males from intact families who are attempting to maximize their fitness through a high-investment strategy may not reap the fitness benefits of their strategy for many generations. Measuring reproductive success is more accurate using grand-offspring, assuming equal reproductive effort by all individuals in a population (Borgerhoff Mulder 2000). Thus, accurately determining differences in fecundity, as a component of studies such as this one, are not feasible without longitudinal or detailed retrospective data over several generations. Nevertheless, resolving theoretical and methodological issues regarding the disconnect between sexual behavior and reproductive success in contracepting societies is an important challenge for evolutionary studies of human behavior.

## **CONCLUSIONS**

This study tested several predictions of a life history model of the relationship between parenting and offspring sexual behavior, that of Belsky, Steinberg and Draper (1991). All of the predictions of this study were supported by the data: Males from an intact rearing environment engage in sex later, and father children later than those whose parents separated during their childhood. Those males from intact homes also have fewer sex partners throughout their lifetimes. These patterns of behavior are interpreted as coordinated responses to the

psychosocial stress of parental separation, which is viewed as a cue to the sort of social resources that will be available during development, and thus how one's own resources should be apportioned throughout life. The lack of either parent initiates a developmental trajectory toward high investment in mating behavior and minimal investment in durable social relationships, trading quality of offspring for quantity. A stepfather in the rearing environment may hasten the timing of this trajectory. The presence of both parents correspondingly initiates a strategy of high-investment in parenting behavior, and lasting social relationships, trading current for future reproduction in order to increase offspring quality. The tradeoffs involved are visible through measures of education and family income, primarily the former. These two general patterns of investment can be seen across the American population, as well as within American ethnic groups. Between ethnic groups, there are apparent cultural differences in sexual behavior that amplify the effects of the rearing environment. This dose-dependent effect may be due to cultural differences in the perceived value of a high-investment strategy.

In demonstrating the relationship between rearing environment and sexual behavior patterns in males, this study fills a gap in the literature. The relationships demonstrated are complex, the mechanisms not entirely clear, and the importance of cultural differences and genetic reaction ranges not sufficiently elucidated...yet. However, predictable patterns are evident and any scientist can be satisfied having demonstrated that much, especially so with evolutionary studies of human behavior. Afterward, leaving further clarification to future investigations is not a regret but an honor.

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