

Childhood experience and the development of reproductive strategies

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Even though a great deal of mainstream developmental psychology is devoted to understanding whether and how experiences in childhood shape psychological and behavioral development later in life, little theoretical attention has been paid to why such cross-time influences should characterize human development. This is especially true with respect to the well-studied determinants of mating, pair bonding and parenting. Theoretically, Draper and Harpending (1982), Belsky, Steinberg and Draper (1991), Ellis (2004) and Chisholm (1996) have all addressed this lacuna, stimulating research on linkages between childhood experience and reproductive strategy which is summarised herein. Concern for experiential effects on pubertal timing distinguishes this line of inquiry from more traditional developmental studies because an evolutionary perspective suggests that experiences in the family might affect somatic development. Twenty years since BSD advanced their «uncanny» prediction, it seems clear that female pubertal timing is related to select aspects of early family experience.

Experiencia infantil y desarrollo de las estrategias reproductoras. Aunque la mayor parte de la psicología del desarrollo se ocupa de comprender si y cómo las experiencias infantiles dan forma al desarrollo psicológico y comportamental posterior, se ha prestado una escasa atención teórica a por qué tales influencias tipifican el desarrollo humano. Ello es especialmente cierto con respecto a los bien estudiados determinantes del emparejamiento, el establecimiento de lazos afectivos y las conductas parentales. Teóricamente, Draper y Harpending (1982), Belsky, Steinberg y Draper (1991), Ellis (2004) y Chisholm (1996) han tratado de subsanar esta laguna estimulando la investigación sobre los vínculos entre las experiencias infantiles y las estrategias reproductoras, que se resumen a continuación. El interés por los efectos de la experiencia en la llegada de la pubertad distingue esta línea de trabajo de los estudios sobre el desarrollo más tradicionales porque la adopción de una perspectiva evolucionista sugiere que las experiencias familiares podrían afectar el desarrollo físico. Veinte años después que BSD (Belsky, Steinberg y Draper, 1991) lanzaran su «misteriosa» predicción, parece claro que el comienzo de la pubertad en las chicas está relacionado con determinados aspectos de las experiencias familiares tempranas.

Students of human development, especially those working from traditional psychological perspectives, generally take for granted the biological structure of the life course. Introductory developmental textbooks routinely point out that humans are born relatively helpless at birth, have an extended juvenile period before reaching reproductive maturity and, in the case of females, experience a rather long post-reproductive life (i.e., menopause). The fact that the very nature of the human life course is something in need of explanation, at least from an evolutionary-biological perspective, is rarely considered.

By the same token, even though a variety of theoretical perspectives (e.g., social learning theory, life-course theory, attachment theory) and a huge research literature address the determinants and sequelae of variation in multiple elements of

human life history (e.g., onset of sexual behavior, parenting, marital/partner relations), evolutionary thinking informs little of this work. Indisputably, it is to a history of rewards and punishments or to the child's psychological attachment to a parent or to the quality of important relationships in the child's life (e.g., parent-child, marital, friendship) that students of human development routinely turn when seeking insight into developmental «outcomes» that evolutionary thinkers would characterize as features of life history and elements of reproductive strategy (e.g., age of first sex, sexual «promiscuity», quality of parenting). This seems mainly because students of child development, whether trained in psychological, sociological or cultural-anthropological traditions, have been —and remain— concerned principally with proximate questions of how —How does development operate?— rather than with ultimate questions of *why*: Why does development operate the way it seems to?

Even though mainstream developmental psychology and human development have not, for the most part, applied an evolutionary perspective when addressing questions about how experiences in childhood might shape development later in the life course, such efforts have been made. This paper reviews one such

programme of theory building dealing with childhood experience and reproductive strategy, along with some relevant evidence.

Childhood experience and reproductive strategy

In a seminal paper that would eventually stimulate a cascade of theoretical and empirical work pertaining not just to variation in human reproductive strategies but, more importantly, to the role of childhood experiences in shaping it, Draper and Harpending (D&H) (1982) argued that girls growing up in father-present and father-absent homes pursue distinctive reproductive strategies. Whereas father-absent girls develop behavior profiles consistent with an expectation that paternal investment in childrearing will not be forthcoming and pair bonds will not be enduring, those from father-present households develop as if anticipating the opposite, deferring sexual activity once they reach biological maturity while seeking to establish and maintain enduring, close, heterosexual relationships. What made the D&H argument original from the standpoint of traditional theories of child development was the casting of early-experience influences in evolutionary terms emphasizing reproductive fitness, parental investment, pair bonds, and reproductive strategy. Gone was any moral approbation about «problem» behavior and in its place were the potential reproductive-fitness benefits of varying mating and parenting behavior (i.e., reproductive strategy) to fit the ecological context.

Two things were lacking in this most provocative and original paper, however. First, no developmental process was offered to explain *how* the particular childhood experience in question (i.e., father absence) would shape later functioning in adolescence and adulthood. And second, although the D&H argument cast old data linking father-absence in childhood with sexual, mating and parenting behavior in adulthood in new theoretical terms, it failed to generate any new predictions. Was it more, then, than just old wine in a new bottle? Why embrace evolutionary theorising about «reproductive strategy» when a myriad of widely-acknowledged theoretical perspectives dating back to Freud himself already offered accounts of why the later-life developments addressed by D&H would result from father absence in childhood?

An «Uncanny» prediction: Pubertal timing

Considered reflection on these matters led Belsky, Steinberg and Draper (BSD) (1991) to advance «an evolutionary theory of socialization» linking childhood experience, interpersonal orientation and reproductive strategy, building directly on D&H. Central to BSD theory was the thesis that stressful and supportive extra-familial environments influenced family dynamics, most especially parent-child and marital/pair-bond relations, thereby shaping children's early emotional and behavioral development and, through it, subsequent social development, including sexual/mating behavior, pair bonding and parenting. Moreover, BSD argued, this complex and environmentally sensitive developmental system evolved as a means of fitting the organism to its environment in the service of promoting reproductive fitness—not psychological well being.

Of central importance to the BSD theory was the view that parenting, the parent-child relationship and, in particular, the attachment relationship serves to mediate the influence of stressors and supports external to the parent-child relationship on (1) the

child's general trustful-mistrustful outlook on the world, (2) opportunistic vs. mutually-beneficial orientation toward others, and (3) his/her behavior. But what fundamentally distinguished BSD from all other theories of, or perspectives on, early experience and human development was the explicitly-labelled «uncanny prediction» that these developmental experiences and psychological orientations would influence somatic development by affecting the timing of puberty; and that this cascade of developments shaped, in adolescence and adulthood, sexual behavior, pair-bond orientation and parenting.

More specifically, BSD posited two distinctive developmental trajectories while noting that it remained unclear whether environmental processes and the development of reproductive strategies should be conceptualized dimensionally or typologically. A quantity-oriented reproductive strategy was most likely to arise, BSD argued, in the context of a variety of stressors which would undermine parental well being and family relationships, including general stress, marital discord and/or inadequate financial resources. These forces would, probabilistically, give rise to harsh, rejecting, insensitive and/or inconsistent parenting, which would foster insecure attachment, a mistrustful internal working model and an opportunistic, advantage-taking interpersonal orientation. These developments would stimulate an earlier timing of puberty than otherwise would be the case and an earlier onset of sexual activity, short-term and unstable pair bonds, and limited parental investment.

The alternative, quality-oriented developmental trajectory was fostered by exposure to a supportive rearing environment, characterized by spousal harmony and adequate financial resources. These ecological foundations would give rise, again probabilistically, to sensitive, supportive, responsive and positively affectionate styles of mothering and fathering and, thereby, secure attachments, a trusting internal working model and a reciprocally-rewarding interpersonal orientation. Collectively, these developments would delay pubertal maturation and defer the onset of sexual activity while fostering enduring pair bonds and greater parental investment.

As BSD made clear, much traditional developmental research indicated, as it still does, that stressful rearing milieus, whether conceptualized in demographic terms (e.g., low income, lone parenthood), relationships terms (e.g., harsh/neglecting parenting; marital conflict, divorce) or psychological terms (e.g., depressed mother, insecure attachment), predict developmental «outcomes» typically regarded as «unfavourable» and certainly not «optimal.» These include, among other things, precocious and promiscuous sexual behavior, aggressive/antisocial behavior, depression, relationship instability and unsupportive, if not harsh parenting. The opposite tends to be true of rearing environments that are well resourced and emotionally and relationally supportive (Belsky & Fearon, 2002; McLoyd, 1990; Parke et al., 2004; Patterson 1986).

But what made BSD distinctive—and purposefully so—was the hypothesis that social-developmental experiences within the family would influence the timing of sexual maturation (i.e., puberty). Because this is a core life-history variable and because it is a feature of development that no other theory of, or perspective on, human development suggests would be affected by social-developmental experiences in the family, it highlighted the potential «added value» of an evolutionary approach to human development.

As it turns out, a good deal of evidence has emerged consistent with BSD's «uncanny» prediction. And virtually all of it derives from studies of girls. Del Giudice and Belsky (in press) have now made clear, theoretically, why this should be the case, while Belsky et al. (2007) have shown empirically that this can no longer be attributed to greater difficulties measuring pubertal onset in boys. Turning to the evidence, greater parent-child warmth, cohesion and positivity predict later pubertal development—in both prospective longitudinal studies (Ellis et al., 1999; Graber et al., 1995; Steinberg, 1988) and retrospective or concurrent ones (Kim & Smith, 1988a; Kim et al., 1997; Miller & Pasta 2000; Romans et al., 2003; Rowe, 2000). Second, greater parent-child conflict and coercion predict earlier timing of puberty, again in both prospective longitudinal work (Belsky et al., 2007; Costello et al., 2007; Ellis & Essex, 2007; Moffitt et al., 1992; Tither & Ellis, 2008) and in research adopting retrospective or concurrent-assessment designs (Jorm et al., 2004; Kim & Smith, 1988a,b; Kim et al., 1997; Mezzich et al., 1997; Weirson et al., 1993). Finally, and with respect to marital/partner relations, the happier and/or less conflicted the relationship between mother and father, the more delayed pubertal maturation—in both prospective-longitudinal studies (Ellis et al., 1999; Ellis & Garber, 2000) and investigations adopting weaker research designs in which predictor and outcome data are gathered at the same time and/or retrospectively (Kim & Smith 1998b; Kim et al., 1997; Romans et al., 2003). Of particularly note, perhaps, is Tither and Ellis' (2008) elegant study which discounted alternative genetic explanations of these apparent environmental effects—by studying sister pairs whose fathers left the family home at different points in the sisters' lives.

Another recent study by Ellis also merits special attention as it reveals that family processes predict adrenarche (Ellis & Essex, 2007), a first stage of pubertal development involving the maturation of the adrenal gland which carries with it no changes in secondary sex characteristics but coincides with the emergence of sexual orientation (Herdt & McClintock, 2000). Del Giudice and colleagues (2009) contend that adrenarche acts as a plasticity regulator, by integrating genetic and environmental information and shaping the expression of both sex-related and individual differences, including those related to reproductive strategy. Indeed, these scholars contend that rather than viewing reproductive strategy as established in the first 5-7 years of life, it makes more sense to regard it as a process under continual revision, at least in the case of some individuals, with new information obtained about the world and the individual's developmental—and especially reproductive—prospects being used to update it (Del Giudice & Belsky, in press).

The distinctive influence of the father

Whereas D&H exclusively addressed the role of father absence during childhood in shaping reproductive strategy, BSD expanded upon their model, arguing that father absence was an indicator of a stressful family environment and that D&H's narrow conceptualisation of the influential rearing milieu could be extended to consider a larger set of stressors and supports which contribute to the development of reproductive strategy (e.g., parenting, marital relations). Moreover, BSD made no particular distinction between contributions of mothers and fathers in shaping offspring reproductive strategy.

Ellis and associates (1999, 2003; Ellis & Garber, 2000), however, concluded that fathers may have a special role to play in the development of girl's reproductive strategies, upon repeatedly detecting effects of father presence vs. absence and even unique effects of the quality of fathering, father-daughter relationships and the presence of a stepfather on pubertal timing. They regarded father absence and stepfather presence as paternal-investment cues indicative of low-quality paternal investment: «girls detect and internally encode information specifically about the quality of paternal investment during approximately the first 5 years of life as a basis of calibrating ... the timing of pubertal maturation and certain types of sexual behavior» (Ellis, 2004, p. 938).

Rather consistently, father absence has been related to accelerated pubertal development in girls, demarcated either in terms of age of menarche or the development of secondary sexual characteristics; and this is so across rather diverse studies, including prospective inquiries following girls from childhood into adolescence (Campbell & Udry, 1995; Ellis & Garber, 2000; Ellis et al., 1999; Hetherington & Kelly, 2002; Moffitt et al., 1992; Rowe, 2000; Wierson et al., 1993) and retrospective research using adult samples (Doughty & Rodgers, 2000; Hoier, 2003; Jones et al., 1972; Jorm et al., 2004; Kiernan & Hobcraft, 1997; Quinlan, 2003; Romans et al., 2003; Surbey, 1990). Apparently, timing matters, such that the earlier in a girl's life that father departs, the more potent an impact it appears to have in accelerating female pubertal development (Jones et al., 1972; Ellis, 2004; Ellis & Garber, 2000; Quinlan, 2003; Surbey, 1990), with the same being true of step-father presence (Ellis & Garber, 2000).

But before father-absence effects are embraced all too confidently, it must be acknowledged that the studies just cited have not been positioned to discount alternative genetic explanations—which would contend that common genetic factors could account for links between father absence and early maturation. Notably, in fact, Mendle and associates (2009) recently employed a genetically-informative design to evaluate father-absence effects on age of first intercourse, not pubertal timing, and upon finding grounds to question environmental influences and support genetic ones raised questions about non-genetically-informative work linking father absence with earlier puberty.

In any event, discussion of absent fathers and step-fathers should not distract from the fact that biological fathers seem to matter with respect to pubertal timing. Consistent with BSD's original emphasis on the quality of parent-child relationships, Ellis et al. (1999) found that the more time such men spent taking care of their daughters across the child's first five years of life and the more they engaged in positive-affectionate interaction with their daughters at age five, the more delayed was pubertal development.

Mortality rate, time preference and attachment

Not long after BSD extended D&H, Chisholm (1993, 1996, 1999) further developed this line of theorising about the human life course—in three specific ways.

Local mortality rates

First, whereas BSD highlighted economic and marital resources, or the absence thereof, as forces shaping parenting, attachment and thereby nascent reproductive strategies, Chisholm

(1999) called attention to the importance of local mortality rates. Such information, he argued, afforded organisms unconscious if not conscious insight into the relative risk and uncertainty of the developing child surviving until maturity to bear its own offspring. Initiating reproduction earlier rather than later in life makes especially good biological sense when the risk of dying before reproducing is high or, probably more importantly, perceived to be high.

Consistent with Chisholm's (1999) reasoning is Wilson and Daly's (1997) finding that, across Chicago neighbourhoods, women's probability of reproducing by age 30 increased as life expectancy declined and Johns' (2003) evidence that teen mothers in Gloucestershire (UK) expected to die at younger ages than women who became mothers after their teenage years. Such results accord with Geronimus' (1996) qualitative interviews with poor, African-American teen mothers that reveal clear awareness of risks for an early death. In doing so, they support her «weathering hypothesis» suggesting that early birth is a strategic response to the rapid decline in health of these women in their third and fourth decade of life. Also of note are results of a recent on-line survey of university students showing that those with shorter subjective life expectancy evinced increased willingness to take mating and reproductive risks, such as engaging in unprotected sex during a one-night and maintaining long-term romantic relationships with more than one partner (Wang, Druger, & Wilke, 2009).

Time preference

Whereas BSD highlighted the role of interpersonal orientation, behavioral development and pubertal timing in mediating the effect of rearing environment, parenting and attachment security on future mating and parenting, a second contribution of Chisholm (1999, p. 135) was to call attention to an additional psychological mediator linking childhood experience and reproductive strategy, time preference, «the degree to which people prefer to or believe they will achieve their desires (i.e., benefits or consequences of action) now, more-or-less immediately, or later, at some point in the future.» Theoretically, individuals living in highly risky and uncertain environments in which waiting for a reward might prove to be a «fool's errand» should opt for immediate payoffs even when delayed ones would be greater (Wilson & Daly, 2005). In such circumstances, they hedge their bets against the risk that they may not be around to collect the larger reward. Here, of course, payoff and reward refer to the likelihood of reproducing.

According to Chisholm (1999), then, time preference should be regarded as an evolutionary important psychological construct sensitive to rearing experience that influences future mating and parenting. Evidence that children growing up in more economically-, socially- and psychologically-disadvantaged families have a more difficult time waiting to secure a more attractive reward and are more inclined to settle for a lesser one sooner would seem consistent with Chisholm's argument (Evans & English, 2002; Lengua, 2002).

Attachment styles

Chisholm's (1996) third notable contribution involved his elaboration of the role that BSD attributed to attachment security in entraining the development of the most appropriate alternative

reproductive strategies —by distinguishing two different manifestations of insensitive parenting and their developmental consequences. Insecure-resistant attachment, which reflects a strategy of exaggerating emotional neediness to evoke care and support, he speculated, arose in reaction to a parent's *inability* to invest, whereas insecure-avoidant attachment, which reflects a strategy of dampening communications of emotional need, derived from a parent's *unwillingness* to invest. Relatedly, Belsky (1997, 1999) suggested that while the opportunistic-advantage-taking interpersonal orientation was most likely promoted by insecure-avoidant attachment, insecure-resistance may have evolved to promote helper-at-the-nest type behavior and thus foster in the child emotional and behavioral dependency on the mother well beyond the infancy years.

A rather large body of evidence highlights the potential role attachment security plays in shaping reproductive strategy, though rarely are findings considered in such life-history terms. First, self assessments of attachment security in the context of romantic relationships, presumed to be shaped by rearing history, systematically relate to a variety of aspects of sexual behavior, mating and pair bonding in a manner consistent with BSD theorising. Regarding sexual attitudes and behavior, individuals self-classified as secure are less likely to endorse promiscuous sexual behavior (Brennan et al., 1998) or to engage in one-night stands or extra-pair sexual liaisons (Brennan & Shaver, 1995). One study, in fact, showed that over a hypothetical 30-year period, males and females with secure attachment orientation ideally desired only one romantic partner (Miller & Fishkin, 1997), less than those with insecure orientations. Related work further indicates that in the case of females, attachment security is associated with an older age of first sexual intercourse (Bogaert & Sadava, 2002).

Regarding pair bonding and relationship processes, one consistent finding is that self-reported relationship satisfaction is greater when individuals describe themselves as secure rather than dismissing (i.e., adult form of insecure-avoidant) or preoccupied (i.e., adult form of insecure-resistant) (Feeney, 2000; Mikulincer et al., 2002). Moreover, higher scores on dismissing-avoidant attachment predict lower levels of marital quality (Shaver & Mikulincer, 2002). Observational research also indicates that secure partners manifest less negative affect, less avoidant nonverbal behavior, and more constructive conversation patterns in response to their partners' distancing behavior (e.g., Feeney, 1998; Rholes et al., 1998). These findings are consistent with related results showing that attachment security predicts greater communication levels within close relationships in adulthood (Collins & Read, 1990), including greater self-disclosure to the romantic partner and responsiveness to the partner's self disclosure (Collins & Read, 1990). Such findings can be meaningfully interpreted as reflecting the BSD view that security promotes a mutually-beneficial interpersonal orientation (as opposed to an opportunistic-advantage-taking one).

In light of the findings just summarised and the interpretation offered, it seems almost commonsensical that secure individuals prove less likely to get divorced or separated from their romantic partners (Kirkpatrick & Hazan, 1994); have longer lasting relationships (Kirkpatrick & Davis, 1994); and manifest greater levels of commitment to and trust of their partners, irrespective of whether they are dating (Pistole & Clark 1995) or married (Fuller & Fincham, 1995). In sum, the data suggest, consistent with

evolutionary theorising and attachment theory more generally, that attachment orientation in adulthood is systematically related to sexual behavior, mating and pair bonding processes.

What about parental investment? Here the reproductive-strategy-pertinent evidence derives from studies using the Adult Attachment Interview (George et al., 1985), which has been found to capture variation that is itself predicted by attachment measured in the opening years of life in prospective longitudinal research (Fraley, 2002). Parents classified as autonomous-secure—and thus presumed (but not demonstrated) to have experienced supportive rearing environments while growing up—rear their offspring in a more supportive, sensitive manner than those classified non-autonomous/insecure. Indeed, security has been linked to more warmth and appropriate structuring of the child's learning environment for both mothers and fathers (Adam, Gunnar, & Tanaka, 2004) and to greater provision by mothers of emotional support in a variety of contexts (Crowell & Feldman, 1991), less negativity (Slade et al., 1999), along with greater sensitivity to the child's needs and states (Das Eiden et al., 1995). In sum, then, not only is adult attachment security related to mating and pair bonding processes in social-psychological research, it is also related to presumptive indices of parental investment in developmental research.

Conclusion

Even though a great deal of mainstream developmental psychology is devoted to understanding *how* experiences in childhood shape psychological and behavioral development later in life, little theoretical attention has been paid to *why* such cross-time influences should characterize human development. This is especially true with respect to the well-studied determinants of mating, pair bonding and parenting. Theoretically, D&H, BSD, Ellis (2004) and Chisholm (1996) have all addressed this lacunae, stimulating research on linkages between childhood experience and reproductive strategy. Concern for experiential effects on pubertal timing distinguishes this line of inquiry from more traditional developmental studies because only an evolutionary perspective suggests that experiences in the family might affect somatic development. Almost 20 years since BSD advanced their «uncanny» prediction, it seems clear that pubertal timing in females is related to selected aspects of early family experience.

BSD theorised that this would be the case because pubertal timing is the developmental vehicle through which experiences in childhood influences reproductive functioning later in development. And recently, Belsky and associates (in press) reported the first longitudinal evidence to this effect, documenting an indirect pathway, via age of menarche, by which maternal harsh

control in the preschool years shapes female sexual behavior at age 15. Ellis (2004, p. 947), intriguingly, questioned BSD thinking on this matter, arguing that (a) while family experiences do predict female pubertal timing (in girls) and, *independently*, other reproductive-strategy-relevant outcomes, (b) pubertal timing does not itself predict important features of reproductive strategy that BSD stipulates it should: «although earlier timing of puberty clearly predicts earlier onset of major forms of sexual experience and reproduction»—meaning age at first dating, kissing, petting, and engaging in sexual intercourse, as well as increased rates of teenage pregnancy and even first birth in natural fertility populations—«there is currently no empirical basis for the hypothesis that earlier timing of puberty leads to a more unrestricted sociosexual orientation, unstable pair bonds, greater number of sexual partners, or lower parental investment.» With only six studies addressing the latter issues, none of which longitudinally follow individuals from childhood, Ellis (2004) appropriately acknowledged that «more research is needed.»

Ellis' (2004) alternative model of evolutionarily adaptive developmental pathways clearly merits serious consideration, as it is based on the premise that even though family experiences shape age of menarche and, independently, adult reproductive strategy (e.g., pair bonding, parental investment), pubertal timing does not link childhood experience with adult reproductive strategy, as BSD stipulated. Indeed, Ellis (2004) provocatively argued that childhood experiences influence *the duration of childhood*, serving to abbreviate it (via accelerated pubertal timing) when family social resources are limited and extend it (via delayed maturation) when family resources are relatively abundant. Under the former conditions, nature has designed development to move the child out of the family and into the world of peers, given the family's limited capacity to enhance the child's competitive advantage. In contrast, under higher-resource conditions, an extended childhood serves to increase the time that children can benefit from parental investment. Thus, children «should be selected to capitalize on the benefits of high-quality parental investment, and to reduce the costs of low-quality parental investment, by contingently altering the period of growth and development prior to reproductive maturity» (p. 947).

Irrespective of whether one embraces Ellis' (2004) re-conceptualisation of BSD's uncanny prediction linking social-developmental experiences in the family to pubertal timing (i.e., as just terminating childhood rather than facilitating mating, pair bonding and parenting), the fact remains that he, just like D&H, BSD and Chisholm (1996), regards early experiences in the family as playing an influential role in shaping human reproductive strategy. This remains an all-too-uncommon way of thinking about development within the field of developmental psychology.

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