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Life History Strategies

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Synonyms

Fast and slow strategies; Life history tradeoffs; R and K strategies

Definition

Life history theory posits organisms face tradeoffs in how they allocate resources to reproduction, parenting, and growth. These patterns of resource allocation can be classified more broadly into life history strategies, which vary on a continuum from fast to slow. These distinctions can be applied to describe within species and between species differences. Slow strategies are marked by increased investment in growth, a delay in reproductive investment, and increased investment in parenting. In contrast, fast strategies are marked by early investment in reproduction at a cost of growth and a reduced investment in parenting in favor of further reproduction.

Introduction

Life History Strategies

Life history theory (LHT) is grounded in a simple premise – resources are limited and thus organisms face tradeoffs in how they "decide" to allocate those resources to growth, health maintenance, and various forms of behavior. These choices involve seeking a benefit on one trait that incurs a cost on another trait. In essence, LHT addresses how an individual's life-stage, state of health, and local ecology determine that individual's range of possible allocation strategies, all of which vary in their fitness maximizing potential (Del Giudice et al. 2015). Whereas somatic investment involves growing and maintaining the physical body and mind, reproductive and parental investment involve competition with same-sex individuals, courtship, procreation, the rearing of offspring, and so on. Tradeoffs along these dimensions can further be characterized by another set of key investment conflicts: (1) current versus future reproduction, (2) quantity versus quality of offspring, and (3) mating versus parenting effort. For example, an individual could spend energy on producing a relatively large number of children but limit the amount of parental care devoted to those children, or instead that individual could produce a small number of children and bestow extensive parental care to the growth and development of those children. Importantly, there is no one absolute correct response to these tradeoff conflicts. Whether a

T.K. Shackelford, V.A. Weekes-Shackelford (eds.), *Encyclopedia of Evolutionary Psychological Science*,
DOI 10.1007/978-3-319-16999-6_1926-1

given decision is adaptive depends on what the decision maker's environment affords. Investing in child quality may produce better long-term outcomes for that child, but in a particularly harsh and unforgiving environment, a given child might not survive over the long term. In such conditions, having many children may increase the chances that at least one child survives into adulthood to reproduce himself or herself. Therefore, the particular strategy most functional for an individual depends on the local environment (Del Giudice et al. 2015).

Researchers classify typical response patterns to such tradeoffs as life history strategies, which vary along a continuum from slow to fast. Between and within species, slower strategies – marked by slower growth and later reproduction – correlate with longer lifespans, later maturation, fewer offspring, lower overall mating effort, and higher parenting effort. In contrast, faster strategies – marked by faster growth and earlier reproduction – correlate with shorter lifespans, early maturation, more offspring, higher mating effort, and lower parenting effort. Researchers have identified a number of correlates of life history strategies within humans, several of which are shown in Table 1. Individual differences in life history strategies have important consequences for our understanding of a variety of human cognitions and behaviors. Below, the origins of life history strategies are explained, and then the effects of slow/fast strategies on a number of important psychological domains are detailed.

Ecological Conditions

Investigations into the particular life history strategies that individuals follow indicate that allocation "decisions" are primarily a function of the harshness and stability of the local ecology. Harshness refers to age-specific rates of morbidity-mortality in the environment (Ellis et al. 2009) and may be operationalized by, for example, parenting styles, childhood socioeconomic status (SES), or the extent of childhood illnesses (e.g., Belsky 2012; Simpson et al. 2012; Finch and Crimmins 2004). Unpredictability refers to the degree to which there is stochastic variability in the harshness of an environment across time. If an environment is unpredictable, it may not be optimal from a fitness standpoint to invest energy in long-term outcomes when one is unlikely to survive to benefit from that investment. Following this view, unpredictability has often been operationalized as parental change in residence, job, and cohabitation status (i.e., romantic partners moving in and out; Simpson et al. 2012; Szepsenwol et al. 2015).

Whereas individuals who grow up in harsher, more unpredictable environments tend to develop faster strategies, children who grow up in more resource-abundant, supportive, and predictable environments tend to develop slower strategies. Moreover, this effect of the environment on the development of life history strategies appears specific to early childhood environments and experiences (Griskevicius et al. 2011; Belsky 2012; Simpson et al. 2012). For example, Simpson et al. (2012) found that an unpredictable family structure before age 6 influenced adult sexual activity and aggressive behavior more than the family structure after age 6. Additionally, research has identified unsupportive parenting and insecure attachments as mediating factors between environmental harshness/unpredictability and fast strategies in adulthood (e.g., Belsky et al. 2012; Szepsenwol et al. 2015; Sung et al. 2016). Children may use cues to harshness and unpredictability in their early environments to forecast the extent and permanence of future resources and receive input from their parents that is either consistent or inconsistent with these cues.

Despite increasing amounts of research on the effects of early-childhood harshness and unpredictability environment on life history strategy development (e.g., Belsky et al. 2012), it is currently unclear under what conditions each factor contributes to specific dimensions of life history strategies. For instance, when harshness and unpredictability are pitted against each other, harshness seems to be a stronger predictor of menarche (e.g., Sung et al. 2016); however, unpredictability appears to better predict number of sexual partners and criminal behavior (e.g., Szepsenwol et al. 2015; Simpson et al. 2012). The differential effects of harshness and

Life History Strategies, Table 1. Correlates of fast and slow life history strategies

Faster strategy		Slower strategy
	Physiology	
Faster	Rating of development	Slower
Earlier	Onset of puberty	Later
Faster	Biological aging	Slower
	Mating	
Earlier	Sexual debut	Later
More	Sexual partners	Less
Casual	Relationships	Pair-bond
	Parenting	
Earlier	Age of reproduction	Later
Higher	Number of offspring	Lower
Lower	Investment in offspring	Higher
	Reward orientation	
Short	Time horizon	Long
High	Impulsivity	Low
Take	Risk for reward	Avoid

Note. Table adapted from Griskevicius et al. (2013)

unpredictability may indicate that each factor is uniquely associated with specific outcomes.

Individual Differences in Environmental Sensitivity

When environments are highly variable over time or space, natural selection may favor developmental plasticity: biological mechanisms that can respond to cues in an individual's environment in order to "match" that person to the affordances of the environment to better maximize potential fitness. This plasticity can be expressed in at least two ways.

First, plasticity may be important for the initial development of one's life history strategy. Consider the following situations. In a relatively stable environment, or one in which cues to environmental conditions are unreliable and plasticity costly to maintain, selection may favor more fixed genotypes, "specialists" in a given allocation strategy. However, when the environment is variable and cues are both detectable and predictive of relevant social and physical features of the local environment, selection may favor individuals who are more "generalist" in their ability to calibrate their developmental trajectory to fit local conditions (Del Giudice et al. 2011). Given variable environments and the opportunity to change habitats, both specialist and generalist genotypes can exist together in a population. For instance, researchers examining this possibility studied the development of respiratory illnesses in 3–5-year-old children as a function of both their early rearing environments and individual differences in both cardiovascular and immune reactivity. Children with low reactivity – less plastic phenotypes – were no more likely to develop respiratory illnesses in high adversity settings compared to low adversity settings. However, highly reactive children – more plastic phenotypes – had the most frequent instances of respiratory illness in high adversity settings, but they had the least frequent instances in low adversity settings (Boyce et al. 1995; Del Giudice et al. 2011). Individual differences in sensitivity to the environment can help explain why environmental variables (e.g., family environments, parent–child relationships) often have weak effects on developmental outcomes; effects tend to get stronger when individual differences in stress reactivity are taken into account. For example, Ellis et al. (2011) found that parent–child relationships uniquely predicted earlier puberty for children with heightened SNS/HPA activity,

a measure of the stress response system (SRS) (Del Giudice et al. 2011).

Second, plasticity plays an important role in the proximate expression of life history strategies, even in adulthood. Sensitization models of life history suggest that childhood background may have relatively a minor influence on many of the behaviors and decisions adults make in relatively stable and benign environments, but when an environment appears threatening due to some cue, fast and slow patterns of behavior emerge (Griskevicius et al. 2011a, b; 2013). For example, in one set of studies, participants who grew up poor took more risks and discounted the future more than participants who grew up wealthy when presented with a news story about economic recessions, but there were no differences between these participants when the recession cue was absent (Griskevicius et al. 2013). In sum, the work conducted on life history strategies is broad: some studies find that early childhood levels of harshness and unpredictability predict adult outcomes such as risky sexual behavior and delinquency (e.g., Simpson et al. 2012; Belsky et al. 2012), and others demonstrate environmentally contingent responses to threat when cueing current mortality or resource scarcity (e.g., Griskevicius et al. 2011a, 2013).

Influences on Key Life History Domains

Life history strategies have been tied to many outcomes, including outcomes in clearly relevant domains such as physiological development, mating, and parenting. These outcomes also hold strong implications for psychologically important concepts such as risk-taking, personality, and psychopathology. The following sections explore this research in more detail.

Somatic Development

As mentioned earlier, life history strategies entail trade-offs in investment within somatic, reproductive, and parenting domains. Fast strategists tend to invest less in somatic and parenting goals in favor of reproductive goals. This allocation of bodily resources encourages faster physiological development of sexual characteristics but impairs other forms of bodily growth and maintenance. Kuzawa and Bragg (2012) summarize a variety of studies that find a strong relationship between harsh early environments and impoverished physical characteristics, including (reduced) stature and (accelerated) aging. Such effects may be driven by particular aspects of the environment, including childhood nutrition, environmental stressors (e.g., poverty, authoritative school environments), and infection at childhood.

Much of the research done on aging emphasizes the progression of reproductive stages such as puberty (see Belsky 2012; Del Giudice et al. 2015 for reviews). Consistent with LHT, early childhood psychosocial stress seems to *accelerate* puberty. For instance, girls who were adopted at older ages and who therefore suffered more time in unfavorable orphanage conditions entered puberty more rapidly than earlier-adopted girls (Proos et al. 1991). Factors indexing environmental harshness and unpredictability also predict earlier age of menarche (i.e., first menses). For example, father absence and family conflict are associated with earlier puberty in females (Moffitt et al. 1992; see Belsky 2012 for review on studies on age of menarche). In men, some work has examined peak height velocity, the point at which males reach a maximum rate of growth. Men who were born small and who gained weight rapidly from birth to age 2 (a proxy for environmental unpredictability) experienced peak height velocity earlier (Karaolis-Danckert et al. 2009).

Based on LHT, a person's aging and dying progression should also be determined by how harsh their early environments are. This is because an individual who is born into a harsh environment and therefore on a fast track may invest less in their personal survival or may just suffer more risk of dying sooner. There is indeed evidence that early life harshness is associated with increased old-age mortality. For instance, Finch and Crimmins (2004) found that in the USA and Sweden, childhood illnesses and nutrition deficits significantly predicted shortened lifespans. In the same vein, in an analysis of hunter-gatherers and forager-horticulturalists, higher infant mortality,

infection rates, and violence were tied to a decrease in lifespan (Gurven and Kaplan 2007). Chisholm et al. (2005) went as far as to ask women who grew up in unpredictable environments to estimate their life expectancy; they indeed found that early life unpredictability reduced subjective life expectancy. Together, these findings provide evidence that early harsh and unpredictable environments accelerate maturation in favor of early reproduction, at the cost of more rapid aging and mortality.

Mating

Life history theory predicts that fast strategists should seek to reproduce earlier and at greater rates, implying a greater number of sexual partners and less stable relationships with those partners. Slow strategists, who invest more in embodied capital, should, in contrast, begin sex later in life, have fewer sexual partners, and have more lasting, pair-bonded relationships.

These ideas have been tested in several longitudinal datasets. In an analysis of the National Longitudinal Study of Adolescent Health (Add Health), a nationally representative longitudinal study spanning from seventh grade to young adulthood (ages 18–26), researchers found that environmental unpredictability (i.e., instances of lack of care/needs not being met, being seized by social services) in adolescence was associated with lower sexual restrictedness (e.g., more risky sexual behaviors and less frequent use of contraception; Brumbach et al. 2009). Concordantly, in an analysis of the Minnesota Longitudinal Study of Risk and Adaptation (MLSRA), a longitudinal study tracking approximately 165 individuals and their biological mothers from before birth to middle adulthood, childhood exposure to harsh (i.e., low childhood SES) and unpredictable environments (e.g., multiple changes in employment, residence, cohabitation) interacted to forecast earlier sexual debut: those exposed to harsh yet *predictable* environments from age 0 to 5 had first sex *later* than average, and those exposed to harsh yet *unpredictable* environments had first sex *earlier* than average (Simpson et al. 2012). High levels of childhood unpredictability at age 0 to 5 (not age 6 to 16) also predicted more sexual partners by age 23. A separate analysis using the same variables measured instead at age 6 to 16 found no such effects.

In a separate study, Belsky et al. (2012) examined data from the NICHD Study of Early Child Care and Youth Development, a study of 1,300 children and their families from infancy to age 15. Here, harshness was operationalized as income-to-needs ratio from ages 0 to 5 (lower scores indicating fewer needs were met). Unpredictability was measured as in Simpson and colleagues' MLSRA project (Simpson et al. 2012). Mirroring Simpson and colleagues' findings, high levels of childhood unpredictability and high levels of harshness (i.e., a low income-to-needs ratio) predicted a larger number of sexual partners. This was serially mediated by maternal depressive symptoms and maternal sensitivity (i.e., responsiveness and care) at childhood. That is, harsh and unpredictable ecologies were associated with greater depressive symptoms; these, in turn, were associated with less sensitivity, and lowered maternal sensitivity led to more sexual partners as the child grew up.

Beyond mating behavior itself, the quality of romantic relationships may be influenced by particular life history strategies. Some work suggests that fast strategists tend to engage in less committed romantic relationships. This could reflect their own insecure attachment orientations which may lead to their having more, and more genetically varied, offspring (e.g., Del Giudice et al. 2015; Barber 1998). For instance, unstable parental relationships in childhood (indexed by larger numbers of stepsiblings) predicted lower college GPA as well as greater frequencies of low-commitment relationships, particularly for daughters (Barber 1998). For the daughters in this study, the effect of unstable parental bonds on lower GPAs was mediated by their orientation towards low-commitment relationships, illustrating the trade-off between investing in somatic capital (operationalized by GPA) vs. investing in current reproduction. In sum, life history strategies affect a range of mating-related outcomes, from specific partner preferences to relationship quality and longevity to sexual behavior.

Parenting

According to LHT, the adaptiveness of parenting investment is dependent on aspects of the local environment. Parenting refers to outcomes related to child rearing, but it also extends to earlier processes such as gamete production and the timing of births. The theory predicts that, relative to slow strategists, fast strategists should devote fewer embodied resources to creation of gametes, have children sooner, and spend less time and effort on rearing behavior. Consistent with this idea, multiple studies have demonstrated the link between indicators of high mortality and age at first birth (e.g., Chisholm et al. 2005). For instance, Nettle et al. (2011) found that experiencing many residential moves during childhood, low investment from parents, and maternal absence each independently reduced age of first birth by half a year. Another set of experimental studies showed that ecological threats to mortality can influence the motivation to reproduce. In these studies, Griskevicius et al. (2011a) primed participants with a mortality cue (reports about violent crime) and then assessed attitudes towards early reproduction. Participants who grew up in resource-scarce environments (i.e., fast strategists) responded to the mortality cue by becoming more open to having children earlier in life. These fast strategists were also more likely to choose starting a family over furthering their own education and careers. The opposite patterns emerged for people who grew up relatively financially well off (i.e., slow strategists).

Less work has been done examining the direct consequences of life history strategies on investment in child rearing (e.g., parenting styles). Overall, LHT predicts that early environmental harshness and unpredictability should be associated with greater emotional distance and less engaged parenting. However, Parental Investment Theory (PIT; Trivers 1972) suggests sex-differences will exist in parenting outcomes. This latter theory predicts that the sex that incurs higher reproductive costs tends to focus relatively more on their mate's genetic quality and ability to provide consistent resources, elements useful for creating viable offspring. In contrast, the sex that invests less in parenting tends to invest more in mating effort. In humans, women carry most of the burden in caring for children and face higher bodily costs from reproduction (e.g., pregnancy). Thus, PIT predicts men are more likely than women to disengage as parents, thereby increasing their fitness by investing in other domains (e.g., other mating opportunities). In contrast, women may increase their total fertility primarily by having children at a younger age (Belsky 2012).

These hypotheses were tested in another analysis of the MSLRA, featuring 112 individuals (and their low-income mothers) tracked from birth to parenthood (Szepsenwol et al. 2015). All individuals completed an interview at age 32 that assessed their general orientation towards parenting. Unpredictability from age 0 to 4 was operationalized by their parents' changes in employment, resident, and cohabitation status during that period. Men (but not women) who experienced early-life unpredictability had a less positive orientation to parenting at age 32 (i.e., lower emotional connectedness and parental involvement, and more hostile parenting). This was serially mediated by maternal supportive presence and insecure attachment, such that unpredictable childhood households had lower maternal supportiveness, leading to the development of insecure attachments, which then was negatively associated with a positive parenting orientation in adulthood and less supportive parenting behavior.

These above predictions and data were corroborated by online survey data from 435 parents, whose early childhood unpredictability was associated with more attachment anxiety and avoidance, which were negatively associated with men's parenting orientations (Szepsenwol et al., 2015). These studies demonstrate that early childhood unpredictability predicts expression of fast strategies through child rearing behavior.

Influences on Other Domains

Risk-Taking

Beyond the three broad domains of investment relevant to LHT (somatic, mating, and parenting domains), life history strategies have important

implications for decision-making styles – namely, risk-taking and risk-tolerance. Fast strategies stem from a reaction to ecological cues signaling limited, unstable resources and shorter time horizons. This leads to a preference for immediate benefits and rewards relative to longer-term goals. As fast strategists are looking to jumpstart their reproduction and accumulate a greater number of children, their goal is to amass resources for the present. In contrast, slow strategists exhibit the opposite pattern, with an emphasis on personal survival as well as the survival of a few high-quality children, leading to risk-averse behavior and delay of gratification in favor of future payoffs.

These predicted patterns enjoy support from several studies. A large scale global study found that countries high in ecological harshness (e.g., high infant mortality, high homicide rate, low GDP, lower life expectancy, etc.) are populated by more people with risk-taking personalities who engage in more risk-taking behaviors (Mata et al. 2016). Relatedly, an analysis of the Add Health study mentioned earlier revealed that environmental unpredictability in adolescence (e.g., parents not tending to their children's basic needs and changing living situations) significantly predicted delinquency and impulsivity in young adults (Brumbach et al. 2009). Finally, an analysis of the MLSRA dataset revealed that people who experienced unpredictability (measured by changes in employment status, residence, cohabitation status) between ages 0 and 5 reported more delinquent and aggressive behaviors at age 23, such as lying/cheating, substance use, arguing, and being mean to others (Simpson et al. 2012).

Researchers have also explored risk-taking in experiments highlighting the contingent expression of life history strategies. Griskevicius and colleagues found that priming people with either mortality or economic instability led people who grew up in poorer environments (i.e., fast strategists) to increase risk-taking in financial decisions marked by probabilistic and temporal differences. For instance, fast strategists preferred to take a chance on a gamble for $20 rather than receiving a certain $10, and they preferred smaller immediate rewards over larger later rewards (Griskevicius et al. 2011b, 2013). In contrast, people who grew up in wealthier environments (i.e., slow strategists) took fewer risks and preferred larger rewards later rather than smaller immediate rewards.

Life history strategies also play a role in risk management through bet-hedging. Bet-hedging can enhance long-term reproductive success at the cost of short-term fitness by decreasing variation in outcomes over time (Ellis et al. 2009). From a life history perspective, bet-hedging can help to manage risks in resource/financial decisions: LHT predicts fast strategists will rely more on diversified bet-hedging (i.e., diversifying investments into multiple choice options to reduce the risk of any single choice) and slow strategists will rely more on conservative bet-hedging (i.e., investing more in a smaller number of low-risk options). In related experiments, people who grew up in lower-SES households (i.e., fast strategists) tended to prefer diversification strategies when facing current mortality threat, including preferences for product variety and stock investments (White et al. 2013). In contrast, people who grew up in higher-SES environments and who were primed with mortality threat engaged in more conservative decision-making.

Personality

Variation in life history strategies may correspond with different patterns of stable personality traits. Fast strategies are typically associated with increased impulsivity, aggression, and sensation seeking but decreased sociality (Del Giudice et al. 2015). Borrowing from the Five Factor Model of personality, conscientiousness and agreeableness are often tied to reduced mortality, reduced mating effort, increased parental effort, and increased prosociality/cooperation, all outcomes associated with slow strategies. Agreeableness, conscientiousness, and emotional stability all load onto the same factor called *alpha* or *stability*, a slow life history trait which negatively predicts impulsivity (DeYoung 2011). In contrast, some aspects of extraversion and openness to experience (e.g., dominance, sensation seeking, imagination) as well as neuroticism can be tied to outcomes associated with fast strategies: increased relationship instability, mortality, sexual

partners, and antisocial behaviors (see Del Giudice et al. 2015 for a review).

Other, more pernicious types of personality traits are linked to fast strategies as well. For instance, dark triad traits (narcissism, psychopathy, and Machiavellianism) are associated with impulsivity and pursuit of immediate rewards (e.g., Jonason et al. 2012), characteristics of a fast strategy. Life history strategies themselves have even been construed as highly heritable personality traits (Figueredo et al. 2004). In this framework, the regulatory genes that produce strategic patterns of behavior would likely be conditionally expressed through interaction with environmental inputs, akin to the strategic plasticity discussed in earlier sections.

Psychopathology

Most theoretical work in developmental psychology suggests that negative experiences in early-childhood increase the risk of psychological distress and psychopathology in adolescence and adulthood. Recent evolutionary-developmental theorizing has incorporated LHT in order to, "address the organization of individual differences, the nature of environmental risk, the role of early stress, the nature of gene-environment interactions, and many other critical issues" (Del Giudice and Ellis 2014, p. 3) in our understanding of psychopathology. Del Giudice and Ellis (2014) outline four potential causal pathways from life history strategies to psychopathology. First, life history traits may be diagnosed as undesirable, pathological symptoms. For example, traits associated with psychopathy – low guilt, low empathy, high impulsivity – may increase fitness by increasing the ability to exploit others. Second, typically functional life history traits may express themselves at maladaptive levels. It is possible that parents who are both high on some trait, but still within an adaptive and socially desirable range, may have a child who expresses the same trait at an extreme, maladaptive level. Third, strategies that are adaptive across individuals may prove maladaptive for a given individual. For example, aggressive behavior yields fitness benefits for males on average (e.g., increased access to mates), even though individual males can suffer devastating costs (e.g., dying in fights). Fourth, life history traits may increase risk for dysfunction. For example, schizotypal personality may increase verbal creativity and interest in short-term mating, thereby increasing fitness; however, when schizotypal personality is coupled with drug use, nutritional deficiencies, and infections, it can increase the risk of schizophrenia, thereby decreasing fitness (Del Giudice and Ellis 2014).

Broadly, factors that determine individual differences in life history strategies are expected to increase risk for some mental disorders and not others. Though psychopathologies associated with faster or slower strategies will overlap to some extent, faster strategies tend to be associated with subclasses of disorders characterized by impulsivity, disinhibition, and bizarre ideation; slower strategies, in contrast, tend to be associated with subclasses of disorders characterized by inhibition, over-control, and cognitive rigidity. For example, both fast and slow strategies are broadly associated with eating disorders and OCD, but faster strategies are associated with bulimia nervosa and OCD featuring autogenous (i.e., unevoked, internal) obsessions, and slower strategies are associated with anorexia nervosa and OCD featuring reactive (i.e., evoked from external stimuli) obsessions (Del Giudice and Ellis 2014). In general, faster life history strategies are associated with externalizing disorders, schizophrenia spectrum disorders, obsessive-compulsive disorder (OCD), bulimia nervosa, and depressive disorders; slower life history strategies are associated with obsessive-compulsive personality disorder (OCPD), OCD, autism spectrum disorders, the perfectionist and over-controlled subtypes of eating disorders, and depressive disorders (Del Giudice and Ellis 2014).

Conclusion

Life history theory is a powerful explanatory tool for organizing patterns of cognition and behavior. The strategies that emerge from differential investment in somatic, reproductive, and parenting outcomes are individually specific and often emerge through interaction between child and

adult environmental conditions. Such strategies predict a wide range of outcomes, and many further topics in human psychology await placement within this important theoretical framework.

Cross-References

- Adaptive Plasticity
- Bruce Ellis
- Economic Decisions
- Environmental Harshness
- Environmental Harshness/Mortality
- Environmental Risk
- Environmental Unpredictability
- Environmental Unpredictability and Bet-Hedging
- Fundamental Tradeoffs
- Jay Belsky
- Jeffrey Simpson
- Life History Model of Psychopathology
- Life History Theory
- Marco Del Giudice
- Quantity Versus Quality of Offspring
- Reproductive Strategies
- Reproductive Strategy
- Risky Behavior
- Sexual and Reproductive Development

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