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Life History Theory

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Although developmental psychologists have in-depth knowledge of human life-span development, developmental biologists have a breadth of knowledge of the life-span development of all or many animals, including that of humans. Life history theory (LHT) is a developed field in evolutionary and developmental biology and is increasingly adopted by developmental psychologists. Life history (LH) concerns developmental events (e.g., weaning, pubertal onset, giving birth), their schedules (i.e., when do these events happen and do they happen early or late in life?), and their characteristics (e.g., a prolonged childhood and childhood events; postmenopausal life and its function). All of these are termed LH traits, which comprise LH from birth to death. The *theory* part of LHT focuses on trade-offs among different LH traits in response to environmental conditions. The various LH trade-offs can be summarized as two general trade-off patterns through which LH traits are prioritized to optimize the life and development of the individual. They are called fast and slow LH trade-off strategies. The environmental conditions can also be simplified into two overarching categories known as the resource condition and the extrinsic risk condition. The remainder of this entry discusses (a) the fast and slow LH strategies and (b) the resource and risk conditions in shaping these two LH strategies, before (c) presenting psychology research conducted within the aforementioned LH trade-off framework. Because the trade-off and other concepts of LHT are developed in an evolutionary and species-general framework, unlike other entries that focus on human development exclusively, this entry discusses the human LH trade-off and development in both species-general and human-specific terms.

Fast and Slow LH Strategies

Imagine that one is given a limited budget that cannot fully satisfy all of the following needs—buying food, eating in restaurants, buying gasoline, visiting doctors, and taking a trip. What does one do? The person probably will make trade-offs among the different activities, by allocating a greater proportion of the budget to the things that the person prioritizes as essential and reducing the proportion for activities deemed less important. For example, the person may change an international trip into a domestic one to have sufficient funds to buy food.

This budgetary example serves to illustrate the trade-off concept of LHT, where LH traits representing different developmental needs are being traded off or prioritized because of a limited energetic budget. Similarities and patterns derived from individual LH trade-offs are called LH trade-off strategies or, simply, LH strategies, which maximize survival and competition at the individual level. However, there are two points that require clarification. First, why is there a limited energetic budget and why are not all developmental needs fully attended to? The answer touches on a fundamental assumption of evolution, which is that there will always be more lives than there are resources to support them. The result is constant intra- and interspecies competition in which the fittest survive. The competition takes place at the individual or organism level (and at the gene level). For example, competition takes place among individual people. An individual's life, however, is made of parts or LH traits. The limited resources and the competition over them are then converted into a limited energetic budget to support the different LH traits or developmental needs of the individual. Allocation of the energetic budget results in different LH trade-offs, similarities and patterns derived from which form LH strategies. The second point is that, unlike budgetary decisions, which are made consciously, LH trade-off strategies are unconscious, enacted by the coordinated tuning of multiple physiological (e.g., endocrine) and psychological (e.g., cognitive and even attitudinal) systems, which constantly assess budgetary constraints and calculate energetic allocation accordingly. To put it more simply, LH strategies are derived

from observable physical and mental responses known as LH trade-offs that are directed by unobservable and unconscious internal regulatory systems. Psychologists and biologists are more interested in the observable LH trade-offs and their patterns as LH strategies than in the unobservable regulatory systems.

Among various LH trade-offs, the essential one is that between somatic energy or effort (e.g., growth and development, body repair and maintenance, and learning and acculturating) and reproductive energy or effort, which includes the additional trade-off between mating, resulting in offspring quantity, and parenting related to offspring quality. Calibrated in terms of fitness or reproductive success, all trade-offs can also be summarized as balances between current or early reproduction and future or delayed reproduction. When the reproductive schedule is aligned with the LH, early reproduction is associated with fast development, early maturation, high fertility, more mating effort relative to the life span, and low parenting effort, whereas delayed reproduction is associated with late maturation, delayed reproduction, low fertility, slow development, and a long life span. These LH traits associated with delayed reproduction facilitate amassing resources, learning, and developing skills that are later converted into parenting to raise fewer, high-quality offspring. These and other specific trade-offs form LH strategies along a fast–slow, early–late, present–future reproductive schedule. A fast LH strategy consists of the aforementioned trade-offs characterized by early maturation and reproduction, and high mating and low parenting. The opposite trade-off characteristics form the slower end of the fast–slow LH strategic continuum. Similar individual differences in personality and behavior vary along the fast–slow LH strategic continuum. Fast strategies are associated with boldness, aggression, high activity, impulsivity, risk-taking, and low sociability, whereas emotional stability, conscientiousness, agreeableness, and aspects of extroversion and openness are associated with slow strategies. Many mental disorders may also be classified as fast versus slow spectrum conditions. Externalizing disorders such as antisocial behavior, conduct, and attention deficit hyperactivity disorders are said to be behavioral manifestations of fast LH strategies. Putative slow spectrum disorders include autism spectrum disorders and obsessive–compulsive personality disorder.

Resource and Risk in Shaping LH Strategies

One may think that a slow LH strategy looks better than a fast one; indeed, it is in many developed and highly stable economies. Because LH strategies are energetic allocations for optimizing an individual's chance for competition and survival, they respond to and are in fact shaped by the environment in which individuals live. The aforementioned slow versus fast LH strategy characteristics are shaped by the environment in which one lives. The reason people may prefer slow over fast strategic characteristics is that the people live in, and are therefore more familiar with, the environment that produces them. Specifically, fast–slow variations of LH strategies are the result of two sets of environmental conditions. One overarching condition related to LH strategies is the resource condition relative to the population density and the extent of intra- and interspecies competition over these resources. When fluctuating resources become suddenly abundant, sufficient to support sparsely populated populations who therefore face little competition, individuals living in such an environment tend to freely exploit these rich resources for fast development and early reproduction. They produce large numbers of offspring who receive and need little parental investment in terms of teaching and learning but who continue to thrive in the resource-rich and competition-free environment. These characteristics constitute a fast LH strategy. When the high reproductive rate increases, population density also increases to the point where resources are no longer abundant and competition over resources intensifies. Species then shift to a slow LH strategy. The LH strategies shift from fast growth and high levels of mating to slow growth and high levels of

parenting to raise few, high-quality offspring who need, and are given, the training and skills needed to compete for the diminishing resources. Although resource conditions and population density affect the LH strategies of all animals, in human evolution, intraspecies competition represents the major force in shaping LH strategies with increasing competition leading to slower LH strategies. Developed economies such as the United States and Hong Kong are characterized by high competition that drives slow LH strategies, especially in terms of heavy investment in parenting and education.

The other environmental condition relevant to LH strategies is extrinsic risk resulting in environmental unpredictability. Unpredictability refers to mortality and morbidity from extrinsic risks, such as predation, disease, war, and other natural or man-made disasters, all of which are independent of an individual's survival effort. The key idea of extrinsic risk is that it is unpredictable and beyond the control of an individual. Merely working hard, planning well, learning more skills, or being more conscientious and cautious cannot help one escape a pandemic, for example. Slow strategies such as learning skills and planning for the future therefore do not work. What works in the face of extrinsic risks is to accelerate growth to initiate early reproduction before extrinsic mortality and morbidity hit. Therefore, environmental unpredictability drives fast LH strategies. The opposite effect is seen with environment stability resulting from low mortality and morbidity, which drive slow LH strategies. Predictability–unpredictability is further defined by variations of extrinsic risk. Risk variations may further differ among or within generations, which should result in different kinds of fast or hedging strategies. Without going into the details, which are beyond the scope of this entry, different LH strategic variants resulting from finer grains of environmental unpredictability all center on fast growth and early reproduction to hedge against unpredictable mortality and morbidity. Other strategic characteristics for hedging against environmental unpredictability are risk taking and future discounting—both of which benefit the present at the expense of a future that may not exist because of mortality and morbidity. Also characteristic of unpredictability is reduced parenting and learning because either the parent or the child may not live long enough to deliver or receive its benefits. All of these characteristics constitute a fast LH strategy.

Developmental Research Within the LH Strategic Framework

Within this framework, evolutionary and developmental psychologists have conducted a large number of empirical studies to test LH predictions. Most of these studies have focused on extrinsic risk or environmental unpredictability, but not on resources and competition, as the driver of LH strategies, partly because resources do not approach the depleting end of their continuum in developed economies where most of the studies have been conducted. Environmental unpredictability has been measured by a number of contemporary living condition proxies. These include rundown neighborhood conditions, abandoned housing and vandalism, the presence of drug addicts or gangs, and exposure to violence and crime. These indicators of environmental unpredictability have, in various ways, been associated with fast LH strategies or behaviors predictive of fast life histories. Studies focusing on the early childhood environment have examined frequencies of residential change, change of parental figures and absence of the father, family chaos and disruptive family relations, and harsh and coercive parenting as indicators of unpredictability in affecting fast LH strategies. Together, these correlational studies portray behavioral profiles of fast versus slow LH strategists. Fast LH people may reach sexual maturity early, be more sexually active and promiscuous, have more short-term relationships, take more risks and have more antisocial behavioral problems, procrastinate, and be more prone to using alcohol and drugs, whereas slow LH people tend

to be good students who can focus attention on, or have more interest in, learning, to plan for the long term, to be able to delay gratification, to be better planners, to have secure attachment and more stable long-term relationships, and to be good parents who exert more parenting, compared with mating, effort.

A few studies have taken an experimental approach by priming threats of unpredictable mortality and morbidity (e.g., news stories about crimes and homicide, and disease and pandemics). After priming, participants showed an increased desire for having romantic relationships and for having children, both representing fast LH strategies. Other experimental studies suggest that the effect of mortality priming depends on the childhood socioeconomic status (SES). Under a mortality threat, participants who had a low childhood SES expressed a desire for having children early while delaying their education or career development (fast strategies), whereas those with a high childhood SES reacted to mortality threats in the opposite manner. Participants who had a low childhood SES also responded to mortality threats by choosing riskier investment options (e.g., different stock packages) and by demonstrating shorter time preferences (e.g., spending more now and saving less for the future), whereas participants who had a high childhood SES showed increased risk avoidance and longer time preferences. Other research has shown that real death-causing events such as hurricanes and the 9/11 attack are associated with increases in local birth rates and lottery purchases—both representing fast LH events.

Perhaps the most convincing example showing how both these two environmental conditions influence the fast–slow LH strategies is the timing of menarche. Secular changes in menarche suggest the influence of resource conditions, while a large number of studies conducted by developmental psychologists document the effect of environmental unpredictability. Multigenerational secular trends show a decline in age of menarche that is associated with subsistence improvement over the past two centuries. In Western European and Scandinavian countries, menarchal age declined from around 17–18 years in the mid-19th century to the present population means of 12 or 13 years. The same decline has been observed in other parts of the world. One study estimated that the age of menarche in China and Japan declines by 3.5 months every 10 years, which is also consistent with data from South Korea showing a decline from 17 years in 1920 to 12–14 years in 1985. A similar rate of decline was observed in African populations. The secular decline in menarchal age is also consistent with historical and cross-cultural data suggesting that, across historical societies in Europe and Asia, girls from higher social classes, who have access to more resources, experienced earlier pubertal timing than did girls from lower social classes living in impoverished conditions. In addition to the nutritional effect, which is itself contingent on resources, these statistics support the LH prediction that improved resources lead to a fast LH strategy. Data from adoptees further bolster the prediction that sudden resource change accelerates growth and maturation to capture the windfall opportunity for early reproduction. Girls adopted from orphanages in India and Bangladesh into high-income Scandinavian households entered puberty as early as 7 years of age. The effect is not merely nutritional because girls who were adopted at older ages, and therefore spent more time malnourished, entered puberty the earliest upon resource improvement. The lack of an easily measured maturational marker in males has made it difficult to carry out similar studies or find similar effects among adolescent boys.

Paralleling these secular observations are empirical studies that examined the unpredictability dimension of the environment in relation to sexual maturation and sexual activities. In these studies, early environmental unpredictability was approximated by microenvironmental indicators more proximate and relevant to children. These include the family SES, residence

changes, disruptive and coercive family relationships, a maternal history of psychopathology, harsh and punitive parenting, divorce, absence of the father, stepfather presence, and the presence of an unrelated male in the family. The results are overwhelmingly supportive of the LH prediction that these indicators of environmental unpredictability are either directly or indirectly related to a fast LH trajectory by resulting in early menarche, frequent sexual activities, early birth of the first child, and teenage pregnancy. The effect of an absent father on menarche seems to be the most evident when fathers left their daughters before the age of 7. The presence of stepfathers and other unrelated adult men seems to have a similar effect. The effect also seems to be quantitatively accumulating, as several studies have found that the length of the absence of the father and the amount of time girls are exposed to unrelated adult men at home are both correlated to the timing of menarche. However, the effect size of these studies is moderate in the order of 2–3 months on average. One of the longest longitudinal studies of this kind reported a positive correlation between mothers' reports of conflictual family interactions, measured when the daughters were 7 years old, and the daughters' report of menarchal age 8 years later. Other studies showed that absence of the father or mother, low parental care, and frequent residence changes during childhood all predicted an earlier age of birth of the first child. A study comparing neighborhoods in England showed that women in the lowest SES neighborhoods gave birth to their first child 8 years earlier than women in the highest SES communities did. Similar findings were reported by another earlier study of Chicago neighborhoods, where women's age when giving birth to their first child was positively correlated with the homicide rate of the neighborhood, another indicator of environmental unpredictability.

Conclusion

These studies confirm the LHT principle that the environment activates LH strategies, which direct physiological and psychological outputs of an individual. Individuals capture energy from the environment and allocate it for different life tasks and functions. Infinite competition over finite resources in the environment results in a limited energetic budget that forces trade-offs among different LH traits and needs within an individual. Different LH trade-offs follow two prioritizations or strategies—a fast, present-oriented LH strategy that prioritizes early reproduction over development and parenting and a slow, future-oriented strategy that prioritizes delayed reproduction and parenting at the expense of fecundity or offspring quantity. These two primary LH trade-off strategies are activated in response to environmental conditions. Windfall resource abundance or unpredictable extrinsic risk, both of which are insensitive to an individual's survival effort, activate the faster end of the fast–slow LH strategic continuum. Physical and behavioral manifestations include early maturation and active mating, future discounting and risk taking, and externalizing and impulsivity, all of which focus on the present to capitalize on the windfall opportunities before mortality and morbidity hit. Low resources or high competition, or low extrinsic risk and high environmental predictability, trigger a slower and future-oriented LH strategy manifested by such future-oriented behaviors as parenting and learning, delaying gratification and future planning, and conscientiousness. Although the mechanism underlying the environmentally contingent LH trade-off is species general and selected in the evolutionary past, its human-specific effect is operated throughout our life span by the environment in which we currently reside.

See also Evolutionary Theory; Mortality; Pubertal Timing; Risk-Taking; Sexual Behavior; Socioeconomic Status

- life histories
- menarche
- reproduction
- mortality
- morbidity
- trade
- maturation

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Further Readings

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