Substance, History, and Politics: An Examination of the Conceptual Underpinnings of Alternative Approaches to the Life History Narrative

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Abstract
The aim of this article is to examine the relations between two approaches to the measurement of life history (LH) strategies: A traditional approach, termed here the biodemographic approach, measures developmental characteristics like birthweight, gestation length, interbirth intervals, pubertal timing, and sexual debut, and a psychological approach measures a suite of cognitive and behavioral traits such as altruism, sociosexual orientation, personality, mutualism, familial relationships, and religiosity. The biodemographic approach also tends not to invoke latent variables, whereas the psychological approach typically relies heavily upon them. Although a large body of literature supports both approaches, they are largely separate. This review examines the history and relations between biodemographic and psychological measures of LH, which remain murky at best. In doing so, we consider basic questions about the nature of LH strategies: What constitutes LH strategy (or perhaps more importantly, what does not constitute LH strategy)? What is gained or lost by including psychological measures in LH research? Must these measures remain independent or should they be used in conjunction as complementary tools to test tenets of LH theory? Although definitive answers will linger, we hope to catalyze an explicit discussion among LH researchers and to provoke novel research avenues that combine the strengths each approach brings to this burgeoning field.

Keywords
life history theory, human development, pubertal timing, sexual health, personality

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Therefore, we attempt to treat the same problem with several alternative models each with different simplifications but with a common biological assumption. Then, if these models, despite their different assumptions, lead to similar results we have what we can call a robust theorem which is relatively free of the details of the model. Hence our truth is the intersection of independent lies. (Levins, 1966, p. 423)

The major purpose of this article is to review two approaches to measuring human life history (LH) strategy. The first approach, termed the biodemographic approach, uses measures to study LH developed from early studies of population biology and behavioral ecology. Adherents of this perspective design studies that measure discrete developmental traits, for example, size at birth, growth patterns, age and size at maturity, number and size of offspring, age-specific reproductive investments, age-specific mortality schedules, and life span (Stearns, 1992). The second approach, termed the psychological approach, is a more recent method that uses measures developed from the work of Rushton (1985) who proposed that personality characteristics and social behavior are partially determined by a person’s LH. Rushton (1985) proposed Differential K Theory, which extended the scope of LH research to include discrete psychological traits, for example, intelligence, libido/sexuality, extroversion, altruism, rule governance, delinquency, family structure, socioeconomic status, and religiosity.
Although biodemographic and psychological approaches have spawned large bodies of research, they nevertheless remain relatively independent, with only a few studies examining the intersection of these two perspectives. Roff (1992), for example, noted that all traits—morphological, behavioral, physiological, and life historical—fit within an LH analysis; still, there remains a lot of work to be done in fusing the psychological and biodemographic measures used in contemporary LH research. Thus, we write this review to examine the history and relations between biodemographic and psychological measures of LH, which remains murky at best. In so doing, we consider basic questions about the nature of LH strategies such as what constitutes LH strategy (or perhaps more importantly, what does not constitute LH strategy)? What is to be gained or lost with the inclusion of psychological measures in LH research? Are these methods to remain separated or can they be used in conjunction as complementary tools to provide more robust tests of the tenets of LH theory? Although definitive answers to some of these questions will linger, we hope to catalyze explicit discussions among LH researchers and to provoke novel research avenues that combine the strengths and mutually shield the weaknesses that each approach brings to this burgeoning field.

**Measurement of LH Strategy**

As noted previously, the *biodemographic* approach is a traditional method of measuring LHs that has been in use for half a century or more (e.g., Cole, 1954; MacArthur & Wilson, 1967; Pianka, 1970; Roff, 1992; Stearns, 1976, 1992). The *psychological* approach to measuring LHs has been in use during last three decades (Rushton, 1985, 1987, 1988). We consider each approach below, briefly review the respective history of each, and review several contemporary developments in each area. We then describe challenges to integrating the two perspectives, recent attempts to do so, and critiques of psychological approaches to measurement of LH strategies.

**The Biodemographic Approach**

The biodemographic approach to studying LH developed from work on population dynamics, demography, and population ecology and is frequently used in evolutionary biology and anthropology research (e.g., Borgerhoff Mulder, 2009; Bribiescas, 2001; Ellison, 2003; Gurven, 2012; Hill & Hurtado, 1996; Hill & Kaplan, 1999; Kaplan, 1996; Mace, 2000; Stearns, Allal, & Mace, 2008). Central to this approach is the bioenergetics model of LH, which is reflected in the variables used, such as body size or growth rates.

Further, biodemographic researchers often use development models that permit measurement of bioenergetic trade-offs. In this view, LH traits compose a series of resource allocation decisions that influence and constrain subsequent allocation decisions (Ellis, Figueredo, Brumbach, & Schlomer, 2009; Worthman & Kuzara, 2005). Often, studies using the biodemographic approach attempt to explain how patterns of developmental traits and resource allocation decisions influence genetic fitness.

The following examples illustrate biodemographic influences on the study of LH and the kinds of questions that the approach helps to answer.

Walker et al. (2006) collated growth pattern data from 22 small-scale societies to test if selective pressures and nutrition, taken together, explain those patterns. To disentangle effects of nutrition and environmental stress, Walker et al. included adult body size, which provided estimates of nutrient availability, the probability of survivorship to 15 years, and life expectancy at that age, both of which provided estimates of environmental stress, that is, those conditions that are expected to accelerate development (Ellis et al., 2009). The probability of survivorship to 15 years corresponds to the concept of *juvenile morbidity–mortality* and that of life expectancy at 15 years corresponds to the concept of *adult morbidity–mortality*, as used in LH theory (Ellis et al., 2009). Walker et al. also used age at menarche and age at first reproduction as LH variables. Analyses of the data documented positive relations between adult body size, early, and fast rates of development, including age at menarche and first reproduction, in females. The same markers predicted both indicators of survivorship, with greater survivorship predicting slower and later development. Environmental stress—particularly juvenile morbidity–mortality—predicted accelerated growth and reproductive onset.

Kuzawa, McDade, Adair, and Lee (2010) examined relations between the rate of weight gain between birth and 6 months and male LH characteristics. They reported that rapid weight gain from birth to 6 months predicted greater testosterone levels and height, more lean mass, arm muscle, grip strength, and earlier sexual maturity. Rapid weight gain also predicted sexual relations at an earlier age and a greater number of lifetime sex partners. More recently, earlier puberty has been related to various phenotypic indicators of masculinization in boys, including higher adult body mass index, facial dominance, biceps circumference, systemizing, and mental rotation ability (Doll, Cárdenas, Burriss, & Puts, 2016). These results point to coordinated suite of developmental, somatic, endocrine, and behavioral events that occur in response to environmental cues (such as better nutrition) during a sensitive period of development.

Walker et al. (2006) and Kuzawa et al. (2010) primarily focused on biodemographic LH traits. A large body of research, however, incorporates concepts from psychological research but restricts measurement of LH traits to those consistent with Stearns (1992). Much of this research developed after Belsky, Steinberg, and Draper’s (1991) model, which merged previous work on father absence, LH theory, and child development/socialization. Their model opened a door to work examining how the detection of environmental cues influence and are influenced by psychological traits and behavior patterns, such as attachment, pair-bonds, and parental investment. Although Belsky et al. (1991) did not suggest that the internal working models are LH traits themselves, they characterized them as (adaptive) mediators, and explicitly suggested that these traits
predict LH characteristics (in this case, markers of reproductive strategy, p. 649) such as pubertal timing, sexual activity, and pair-bonding (Belsky, Steinberg, & Draper, 1991; see also Meckelmann, Pfeifer, & Rauh, 2013; Neberich, Penke, Lehmann, & Asendorpf, 2010; Sheppard, Garcia, & Sear, 2014; cf. Ellis, 2004; Rickard, Frankenhuysen, & Nettle, 2014).

Tither and Ellis (2008) similarly incorporated psychological measures and demographic events in a study of LH traits to determine whether patterns of paternal dysfunction and father absence are consistent with the prediction that they cause earlier onset of puberty in pairs of female siblings with divorced parents. Tither and Ellis measured paternal conditions as predictors because divorce and paternal psychopathology are theorized to signal a mortality risk to daughters. According to LH theory predictions (Ellis et al., 2009), these early life events are associated with adjustments in resource allocations away from growth and maintenance and toward reproductive capability. Thus, the LH trait under investigation was age at menarche. Tither and Ellis predicted that father absence accelerates reproductive development and that daughters who experienced more paternal dysfunction experience an exaggerated form of the effect. Tither and Ellis' analyses of the results supported their hypotheses, such that younger sisters within disrupted families (i.e., those with divorced or separated parents) experienced earlier onset of menarche relative to their older sisters. Additionally, serious paternal dysfunction predicted even earlier onset of menarche in younger sisters, who also experienced a severe level of dysfunction for a longer duration than their own older sisters.

More recently, Ellis, Schlomer, Tilley, and Butler (2012) extended the Tither and Ellis’s (2008) study, using the same sibling-exposure design. In this study, the authors measured harsh-coercive parenting and warmth and supportiveness designed to reflect the quality of mother–daughter and father–daughter relationships. They also asked for self-reports of the duration of time the daughters spent with their fathers before and after divorce or separation. These variables were selected as measures of environmental unpredictability, which was predicted to accelerate sexual development. The number of sexual partners and high-risk sexual activities (i.e., those that increased risk for sexually transmitted infections or pregnancy) served as LH outcome variables. In this study, they did not detect a relation between exposure to father absence and risky sexual behaviors, but higher quality father–daughter relationships predicted decreased risky sexual behavior in older, but not younger sisters, in biologically disrupted families. The relation was detected only when the sibling age gap was large; that is, the older siblings had a much longer experience with the father in an intact family than the younger, and only in the father–daughter, not the mother–daughter relationship. Thus, in this study, the quality of the relationship with the father predicted “fast,” in the LH sense, sexual behavior.

Belsky, Schlomer, and Ellis (2012) used a longitudinal design to examine relations among environmental harshness, unpredictability, and early LH strategies. They included measures of paternal transitions, household moves, and parental employment changes to reflect unpredictability and the income-to-needs ratio until the child reached 5 years of age selected to reflect harshness. The authors also measured maternal depression and sensitivity to examine the possibility that maternal functioning mediates relations between environmental conditions and sexual behavior at age 15 (their LH outcome variable). The results of their analyses were consistent with Ellis, Figueroed, Brumbach, and Schlomer’s (2009) predictions. The authors concluded that both maternal depression and sensitivity mediated environmental harshness and had negative relations with sexual behavior at age 15. Environmental unpredictability was directly and positively related to sexual behavior and was mediated by maternal condition. Thus, when an individual detects cues of instability, the child tends to accelerate development shift resource allocations toward reproduction.

The approach to tracking early adversity and environmental instability has been pursued with great success by several recent works (Copping & Campbell, 2015; Copping, Campbell, & Muncer, 2013; Doom, Vanzomeren-Dohm, & Simpson, 2015; Hill, Jenkins, & Farmer, 2008; Sheppard, Pearce, & Sear, 2016; Sheppard, Snopkowski, & Sear, 2014; Szepsenwol, Simpson, Griskevicius, & Raby, 2015). As indicated by these examples, the biodemographic approach to studying LH involves measuring discrete events, such as age at first birth or age at menarche; directly measurable variables, such as growth rates and body size; or behaviors that are directly predicted by LH theory, such as number of offspring representing parental effort. With this in mind, we turn to a more recently developed approach to studying LH: the psychological approach.

**Historical Context of the Psychological Approach**

Rushton (1985, 1987) was an early proponent of incorporating psychological and behavioral traits within an LH framework (see also Eisenberg, 1981). Drawing on r/K theory (MacArthur & Wilson, 1967), Rushton suggested that LH explains associations among developmental traits, personality, and social behavior. Specifically, he predicted that K would show associations with higher intelligence, greater altruism, less criminality, and lower sex drive (1985, p. 445). In 1987, Rushton supported his claim that K includes personality, intelligence, sexual, and social behavior with evidence of heritabilities for each trait. By this time, the scope of LH according to Rushton included, “... activity level, aggression, altruism, anxiety, criminality, dominance, extraversion, intelligence, locus of control, manic-depressive psychosis, political attitudes, schizophrenia, sexuality, sociability, values and vocational interests” (1985, p. 445). Essentially, Rushton extended the biological attributes that had been identified as characterizing K-selected (slow) and r-selected (fast) LH strategies to include psychological attributes that were expected to be consistent with and behaviorally supportive of the biological LH traits already identified to jointly constitute coherent and coadapted suites. Although his contrasts between slow and fast LH traits implied the
existence of trade-offs, Rushton did not explicitly describe trade-offs in his descriptions.

As Rushton held that an underlying $K$ dimension organized these traits, he predicted spurious correlations among all of them and that a factor analysis would show they share common variance; that is, that a single underlying factor ($K$) explains much of the variance in this constellation of traits. In 1988, Rushton, using data on multiple births, showed that mothers of dizygotic twins report earlier menarche, shorter menstrual cycles, more marriages, more sexual activity, more children out-of-wedlock, shorter interbirth intervals, greater fecundity, larger family size, and earlier menopause than mothers of singletons. Rushton reasoned that as dizygotic twinning was produced by superovulation on the part of the mother, it was more likely to occur in faster $K$ mothers, which was a prediction he empirically supported elsewhere (Rushton, 1985). In the same year, he argued that these conventional $K$ traits are associated with intelligence, social-rule following, personality, and temperament.

Ellis (1987) supported Rushton’s claim that $r/K$ theory explains variation in criminal behavior. In his review, Ellis documented that criminality is associated with large family size, disrupted families, being male between 12 and 30 years of age, short gestation length, early sexual debut, many extra-pair copulations, unstable pair-bonds, low parental investment, and short life expectancy.

Bogaert and Rushton (1989) collected data from Canadian university students to examine relations among $K$ traits that included among others, measures of brain size, cognitive ability, personality, sexuality (sex drive, genitalia size, and sexual attitudes), and delinquency. Bogaert and Rushton (1989) performed separate principal components analyses of male and female subsamples and compared the salient factor loadings on the first principal component extracted for each sex. The first principal component extracted for males included salient loadings on late sexual reproduction (.71), late maturation (.60), high reproductive effort (−.60), high infant mortality (−.47), and efficient energy use (.46). The first principal component extracted for females included salient loadings on parental investment (.71), altruism (.60), low social organization (−.58), high competition (.52), and high reproductive effort (−.41).

Around the same time, Belsky et al. (1991) published their $K$ model of development that, as described earlier, suggested that early environment, parental investment, psychological, and behavioral orientations, in combination, predict tactics marking reproductive strategy (e.g., age of puberty, sexual activity, and pair-bonding). Belsky et al. suggested that early childhood, specifically the first 5−7 years, is a sensitive period during which a child evaluates environmental cues indicating, for example, resource availability, predictability, and quality of social relationships through internal working models such as attachment (Bowlby, 1969). This developmental pathway model begins within the family context and proceeds through child-rearing (infancy and early childhood), psychological behavioral development, somatic development, and, finally, reproductive strategy. The model takes the form of a conditional-probabilistic path model, which permits multiple paths leading to increasing probabilities of particular outcomes, given particular conditions (canalization, see Waddington, 1942). To illustrate, Belsky et al. (1991) provided the following pathway to an accelerated reproductive strategy: (1) individuals are born into families with high marital discord, family stress, and inadequate resources; (2) early child-rearing is characterized as harsh, rejecting, insensitive, and inconsistent; (3) psychological development includes insecure attachment, a mistrustful internal working model, an opportunistic interpersonal orientation, and sex differences in mental and behavioral health where males are likely to be aggressive and noncompliant and females are likely to experience anxiety and depression; (4) somatic development is accelerated, resulting in early puberty; and (5) faster reproductive strategies that include earlier sexual debut, short-term, unstable pair-bonds, and limited parental investment (p. 651).

This model of child development led other developmental psychologists to explore the utility of $K$ theory as a framework for understanding variation in human development. Chisholm (1992, 1996, 1999; Chisholm et al., 1993) was a key figure in this pursuit. By this time, the $r/K$ model, which focused primarily on density dependence, had been widely criticized and essentially replaced by a bet-hedging model that incorporated age-specific mortality schedules (Promislow & Harvey, 1990). Chisholm et al. noted this and focused on learning biases during early childhood that help the child detect cues to local mortality rates (socioassays of parental behavior, 1993, p. 8). Chisholm’s extension of Belsky et al. incorporated the concept of an evolved sensitivity to context, driven by perceptions of that context rooted in developmental demography through an evolved attachment system. These evolved systems ultimately play a central role in the allocation of effort toward alternative reproductive strategies.

Initially, Chisholm’s characterization of $K$ strategy deviated slightly from Belsky et al.’s work, describing a more inclusive reproductive strategy as a “...package of co-adapted phenotypic traits [that are] anatomical, physiological, psychological, etc.” (1992, p. 131). He suggested that,

...we might expect individual differences in patterns of cognitive, perceptual, and social-emotional development to co-vary with alternative investment strategies and to be developmentally contingent on the same socioeconomic factors as the observed behaviors that we used to define the alternative strategies in the first place. (p. 140)

In other words, the same environmental cues calibrate constellations of psychological and reproductive behavior.

It is not clear if Chisholm views these psychological patterns as a product of $K$ itself, but Chisholm urges a marriage of biological and psychological viewpoints, emphasizing the importance of linking psychocultural phenotypes to developmental phenomena to help us understand how environmental characteristics, for example, population density, resource availability, and morbidity–mortality, influence both. Moreover, he suggests that a failure to do so misses an “...important
dimension of the human phenotype” (1992, p. 143), emphasizing the theoretical and practical importance of examining both psychological and behavioral measures of sexuality to validate a construct of mating effort strategy (Chisholm, 1996; Chisholm et al., 1993). He also acknowledges problems with this approach, in that material goods such as kilocalories or number of offspring are easier to measure than intangible, psychological constructs such as satisfaction, fear, and pride (1992, p. 143).

Another key development in Chisholm’s work was the specification of relations between LH theory and attachment theory (e.g., 1996). He characterized attachment processes as an adaptive mechanism functioning to strategically allocate resources toward survival, growth, development, and reproduction. Chisholm argued that attachment is an evolved developmental system that predisposes offspring to detect, learn about, and remember the resources available to them. Moreover, he proposed that emotions (more properly, feelings; see LeDoux, 2015) are a primary source of information that detects environmental conditions, firmly setting a psychobiological mechanism within the purview of LH theory.

Before we move on, it is worth noting that the overlapping but distinct arguments Rushton, Belsky et al., and Chisholm provide key differences that we assert played a central role in the ways in which LH research programs diverged. Although all of these authors expanded the nomological network surrounding the fundamental LH traits to include perceptual, cognitive, social—emotional characteristics, only Rushton explicitly argued these psychological traits are indicators of LH itself. Whereas both Belsky et al. and Chisholm emphasized developmental environments and adaptive learning, Rushton emphasized the role of genes (see also Rowe, 2000). Additionally, although both the genetic and environmental perspectives note their respective ideas do not require the invocation of any kind of determinism, the developmental view objected to this most forcefully.

Rushton’s ideas were rekindled in the early 2000s with the work of Figueredo and colleagues (e.g., Figueredo et al., 2005, 2006; Figueredo, Vásquez, Brumbach, & Schneider, 2004, 2007; see also Templer, 2008). In 2004, Figueredo, Vásquez, Brumbach, and Schneider examined Rushton’s prediction that correlations among family structure, sexual behavior, intelligence, and personality reflect an underlying LH strategy (see also Figueredo et al., 2007). Moreover, they distinguished their approach from those that adhered to the developmental models proposed by Belsky et al., as well as Chisholm (e.g., Quinlan, 2003), who restricted measures of LH to traditional biodemographic variables. Furthermore, although the biodemographic approach also tends not to invoke latent variables, the psychological approach typically relies heavily upon them.

To test the existence of an underlying K-factor, the team developed a scale using data from the Midlife in the United States (MIDUS) survey, which was a longitudinal survey that included a wide variety of measures of life events. Of these, the team selected 20 scales they predicted reflect LH strategy, which included Mother Relationship Quality, Father Relationship Quality, Marital Relationship Quality, Children Relationship Quality, Family Support, Altruism Toward Kin, Friends Support, Altruism Toward Non-Kin, Close Relationship Quality, Communitarian Beliefs, Religiosity, Financial Status, Health Control, Agency, Advice Seeking, Foresight/Anticipation, Insight Into Past, Primary Control/Persistence, Flexible/Positive Reappraisal, and Self-Directedness/Planning as Rushton (1985) specified.

Although the team did not specify a rationale for using each particular scale, they did describe three theoretical criteria used to select items. For the LH measure, the team selected items that “…measured three broad facets that life history theory predicts will constitute complementary aspects of a coherent, unitary factor.” The first of these, Personal Function, included, “…cognitive and behavioral indicators of individual traits such as long-term thinking and reflective, deliberate, and thoughtful attitudes toward the past, present, and future indicative of high-K personal strategies.” The second, Familial Function, included:

…cognitive and behavioral indicators of parental and nepotistic effort, including quality relationships with one’s own parents, one’s romantic partner, one’s own children, and one’s extended kin, in the capacity of both giving and receiving altruistic benefits, indicating high-K familial strategies.

The third, Social Function, included “…cognitive and behavioral indicators of reciprocal altruism, including cooperative relationships with friends and associates in the broader community and social institutions, again in the capacity of both giving and receiving, indicating high-K social strategies.”

Upon factor analyzing these scales, the team found that a single common factor explained 72% of the reliable variance. Unlike Bogaert and Rushton (1989), Figueredo, Vásquez, Brumbach, and Schneider (2004, 2007) used the common factor model rather than principal components, meaning that factors were extracted based on prior communality estimates that eliminated the unreliable or nonreplicable (error) portions of the variance of each indicator from the analysis. To further test Rushton’s hypotheses, the team also constructed a common factor, termed Covitality, that reflects mental and physical health, as well as Personality factor using scales from the Big Five, ran a factor analysis on these three factors (K, Covitality, and Personality), and found that the analysis supported the existence of a higher order factor they termed Super-K, a factor that itself explained “…virtually all” of the reliable variance in the three lower order factors. They also identified significant heritability in both the lower order factors and the Super-K factor.

In 2005, Figueredo et al. tested another set of constructs they predicted reflects an underlying K-factor, also partially driven by Rushton’s hypotheses. These included child attachment, parental investment from a biological or nonbiological father figure, adult attachment, mating effort, risk-taking, and opportunism. The factor analysis produced a single common factor that explained 92% of the reliable variance. In addition, the team collected personality data that they used to construct three
common factors: neuroticism, extroversion, and psychoticism. When they tested the relations among the K-factor and the personality factors, the K-factor negatively predicted psychosis. Figueredo et al. also found a negative correlation between the K-factor and biological sex, such that males scored lower than females on the factor. The team interpreted this latter finding as reflecting well-documented sex differences in reproductive strategies.

In 2006, Figueredo et al. published a comprehensive review of the research program, based on Rushton’s ideas, they had developed since 2004 to extend the scope of LH to include psychosocial characteristics. Whereas their earlier work may have been more tentative about claiming psychosocial traits as measures of LH itself, by 2006, the team had firmly planted themselves on Rushton’s side based upon this accumulation of evidence. This transition followed a series of studies reported by Figueredo et al. that provided support for their 2004 K-factor (e.g., Brumbach, Walsh, & Figueredo, 2007; Sefcek, Figueredo, & Miller, 2005; Tal, Hill, & Figueredo, 2006). They also presented an integrative model of development that began with genes, bolstered by their findings on heritabilities of traits related to the K-factor, and described brain mechanisms and endocrine functions that then contribute to the behavioral phenotype. According to this view, all of these developmental components are part and parcel of LH strategy and, taken together, represent the most inclusive view of LH strategy to that date.

In 2007, Figueredo and colleagues introduced the Arizona Life History Battery (ALHB) based on their work with the MIDUS “K-factor” (Figueredo et al., 2004, 2007) and their independent psychometric work with several convergent indicators of human LH (e.g., Figueredo et al., 2005). The 199-item ALHB represented human LH strategy as the common factor underlying differential patterns of resource allocation among several domain-specific areas of investment for bioenergetic and material resources (e.g., self, parents, partner, kin, friends, community, and religiosity) and also included the “Mini-K” as a 20-item short form for the ALHB. Figueredo et al. (2014) later supported the psychological approach by stating that “...the fact that LH theory is essentially a resource allocation model based on tradeoffs between these different fitness components...justifies a psychological approach” (p. 3). Moreover, they state that “...biological parameters have important psychosocial implications,” such that, for example, fast LH strategists who experience earlier ages of puberty, sexual debut, first child, and more children are also likely to be involved in violence, criminal, and risk-taking activities; abusing substances; and report lower sexual satisfaction in relationships, intentions toward infidelity, a tendency toward short-term relationships, and more promiscuity (p. 3).

The Expansion of Psychological LH Research

An expansion of the LH framework to include proximal psychological traits and more distal social features of LH strategies spawned a large body of LH research in evolutionary, social, and developmental psychology. For example, Dunkel, Mathes, and Decker (2009) used the Mini-K and the Zimbardo Time Perspective Inventory to examine short- and long-term mating preferences, as life expectancy is manipulated. The results showed that future time perspective (FTP) and the Mini-K are negatively associated with short-term mating preferences for each life expectancy condition. The Mini-K, but not the FTP, however, positively correlated with long-term mating preferences. Using median splits, Dunkel et al. created high and low groups for the Mini-K and FTP. In testing the relations among these variables and sex and short-term mating preferences, they demonstrated a relation between longer life expectancy and lowered preferences for short-term mating. Males and low groups for the Mini-K and FTP reported higher preferences for short-term mating; positive associations were found among long-term mating preferences, life expectancy, being female, and individuals who scored highly on the Mini-K.

Koehler and Chisholm (2009) used documented LH tradeoffs and mate choices to predict that early psychosocial stress should lead females to prefer mates who display more masculine traits and males to prefer mates who display more feminine traits. Their rationale was based on research suggesting that more masculinity (in men) and femininity (in women) reflect higher quality genes, which implies that individuals who indicate a preference for these extremes may engage in a gene-capture strategy that prioritizes current over future reproduction. Koehler and Chisholm then dichotomized early stress into above- and below-the-mean groups. The results showed a difference between above- and below-the-mean stress men in the predicted direction, but only for least-preferred faces.

Dunkel and Decker (2010) asked participants to complete five psychological measures of LH: (1) the Mini-K, (2) the High-K Strategy Scale (HKSS), (3) Expected Life Span (1 item), (4) a Short-Term Mating Orientation (STMO) Scale, and (5) FTP, along with measures of the Big Five personality traits, which were used to compute a single higher order factor (the General Factor of Personality [GFP]; Rushton, Bons, & Hur, 2008). To test the relations among the five psychological measures of LH, Dunkel and Decker calculated correlations among them and conducted a factor analysis to determine whether these factors load on to a single higher order factor. All correlations were significant and in the predicted direction and the factor analysis indicated moderate to significant factor loadings for each scale: Mini-K = .88, HKSS = .79, Expected Life Span = .56, FTP = .55, and STMO = −.56.

Griskevicius, Delton, Robertson, and Tybur (2010) and Griskevicius, Tybur, Delton, and Robertson (2011) conducted a series of studies examining relations among resource scarcity, mortality cues, reproductive timing (2010), and risk-taking (2011). Griskevicius and colleagues reported that early childhood resource scarcity predicts accelerated LH-relevant traits in the face of mortality cues. In the 2010 series of studies, they showed that per capita income predicts the age at reproduction while violent crime (but not property crime) predicts a decrease in age at reproduction. Griskevicius and colleagues also measured childhood and current/future expected socioeconomic...
status (SES) and presented participants with mortality cues to examine relations among SES and changes in attitudes toward early reproduction under the influence of mortality cues. Individuals who experienced lower resource availability in childhood showed a marginally significant increase in positive attitude toward earlier reproduction following a mortality prime (compared to control); those with higher childhood SES showed a marginally significant decrease in the same attitudes. This pattern of results persisted when the outcome variable was the age at which participants wanted their first child, the age at which participants wanted to get married, and desires to start a family at the expense of furthering one’s career and education (2010). In 2011, Griskevicius and colleagues found the same pattern for risk-related outcomes, generally showing that individuals who experienced early resource scarcity and primed with mortality cues value the present at the expense of future; that is, they were more willing to gamble for a large, immediate financial reward. Individuals who did not experience early resource scarcity and who were primed with mortality cues valued the future at the expense of the present, preferring instead to choose safer and more certain, but lower rewards. Griskevicius et al. (2013) extended their 2011 work on the role of reward orientations in LH strategies, specifically predicting impulsivity, accepting risk to receive a reward, and short-time horizons are characteristics of fast LH strategists, while thoughtfulness, accepting certainty to receive a reward, and long-time horizons are characteristics of slow LH strategists. Following their previous work, Griskevicius et al. (2013) showed that lower childhood SES was associated with a preference for immediate and more risky rewards whereas higher childhood SES is associated with preferences for delayed and less risky rewards, confirming the authors’ predictions. In a second study, Griskevicius et al. showed that people with lower childhood SES approached images of luxury brands more quickly than those with higher childhood SES; people with higher childhood SES approached images of luxury brands more slowly than those with lower childhood SES, but no differences were found for time to avoid images. A third study systematically replicated the methods used in Study 2 using a risk-taking task involving measures of performance on a Balloon Analogue Risk Task (BART)—a computer-based task that asks participants to inflate a series of balloons for a monetary reward. If the balloon pops, the participants receive no monetary reward. Following completion of this task, Griskevicius et al. collected urine samples to measure oxidative stress, which measures chronic exposure to environmental toxins or distress. Individuals with low levels of oxidative stress (i.e., less exposure to environmental toxins or distress) were less willing to take risks in the BART than those with high levels of oxidative stress following a recession prime, while those with high levels of oxidative stress (i.e., greater exposure to environmental toxins or distress) were more willing to take risks in the BART than those with low levels of oxidative stress following a recession prime.

Sherman, Figueredo, and Funder (2013) also sought to expand psychological approaches to the study of LH beyond self-report measures and to address the problem of normativeness in psychological LH research. Normativeness is a concept that reflects good psychological adjustment and a tendency to follow social norms, meaning collective value judgments regarding proper behavior. Sherman et al. argued that normativeness and slow LH strategies may be confounded for several reasons, including the fact that prosociality (a purportedly slow LH trait) is a socially desirable trait and that, by virtue of being favored, leads slow LH strategists to be overrepresented among rule-enforcers within a society which overrepresents social norms.

The authors used three data sets: two of which included direct behavioral observation and the third of which used retrospective self-reports of behaviors over the previous 24 hr. Using the Q-sort method with the California Adult Q-set (CAQ), the authors asked graduate student and faculty experts at the University of Arizona (current first and second authors included) to construct a theoretical template for a slow LH personality. To control for normativeness, the authors also created a distinctive slow LH measure that correlated residual profiles (i.e., after the mean CAQ, or normativeness, was statistically removed) with the slow LH template. Finally, the authors included previously collected observational data from three 5-min dyadic interactions (unstructured, cooperative, and competitive) that were coded using the Riverside Behavioral Q-set. Analyses of these data showed distinct patterns of results for the overall and distinctive slow LH profiles. For example, in the unstructured condition, overall slow LH was positively associated with likeability, cheerfulness, having social skills, and smiling and negatively associated with expressing criticism, irritability, talking at one’s partner, and hostility (p. 878). With normativeness controlled, however, slow LH was positively associated with fearful or timid behavior, expressing insecurity, and activating reserved and negatively associated with expressiveness and controlling and dominating behavior (p. 878). This pattern of data was similar for the remaining two interaction settings. A second study used behavioral observations and semi-structured interviews to compare the overall and distinctive slow LH profiles. They found that the overall slow LH profile did not replicate across Study 1 and Study 2 while the distinctive slow LH profile did.

The authors conducted also work count analyses on the interview transcripts and compared overall and distinctive slow LH. In this case, word count and slow LH were highly correlated, but there were some differences: Distinctive slow LH was associated with using filler words; more tentative words; more words related to work, school, and achievement; and more words with six or more letters. Negative associations (i.e., purported characteristics of fast LH individuals) included emotionally charged words; talking about themselves and other people; more swearing; and using words related to sex, sexuality, death, and dying (p. 881). In the final study, the authors analyzed participants’ behavioral reports of the previous 24 hr. Similar to the two prior studies, distinctive slow LH differed slightly from overall LH, such that distinctive slow LH was still positively associated with an array of socially desirable
behaviors (e.g., displaying ambition, expressing agreement) but also with behaving fearfully or timidly and expressing sympathy. Negative correlations (i.e., “fast LH”) included condescension and hostility expression but also initiating humor, talking, expressing sexual interest, and exhibiting social skills (p. 883).

In perhaps the most comprehensive quantitative analysis of a psychological measure of LH—specifically the Mini-K—Figueredo et al. (2014) sought to examine the convergent validity of the Mini-K with other psychological measures of LH strategy and to construct and test a nomological validation of psychological measures of LH and those psychological constructs theoretically predicted to be associated with them. The sample included objective test and self-report data from 7,078 English-speaking North American undergraduate college students, drawn from 19 published research articles and 15 unpublished studies. The authors used meta-analytic methods to estimate mean effect sizes among the 150 convergent and related measures identified in the study as well as 13 theoretically specified constructs. The meta-analytic results showed the Mini-K significantly and positively associated with the ALHB Indicators, Non-ALHB Indicators, Romantic Partner LHS, Covitality, GFP, Mututalistic Social Strategies, Emotional Intelligence, Executive Functions, General Mental Ability, and Evaluative Self-Assessment. The Mini-K was also significantly and negatively associated with Antagonistic Social Strategies, while there was no association with Pro-Environmental Behavior. Thus, these findings supported their hypotheses regarding both (1) psychological measures of LH strategy and (2) the nomological network surrounding psychological measures of LH strategy.

**Integrating the Biodemographic and Psychological Approaches**

Figueredo et al. (2006) wrote that

*...a fundamental guiding this integrated theoretical model is ‘consilience’...the optimal course toward minimizing causal uncertainty of human behavior involves an interfield alliance of scientific endeavors...[researchers] ought to share the common goal of synthesizing knowledge to create a common platform of information. (p. 268)*

This article serves as a modest response to that call. It is, of course, not so simple. Challenges to integration, however, must be explicitly considered if there is any hope of surpassing them. We examine possible points of contention that are worth addressing in what follows.

**Challenges**

There is one unspoken (and unpalatable) concern that may create wedges between biodemographic and psychosocial researchers, and a further schism between biologists and psychologists. Both Rushton (1985) and Belsky et al. (1991) presented some of the earliest descriptions of psychosocial and behavioral processes in LH research. Although several research groups pursued the Belsky et al.’s views, until Figueredo and colleagues revived it in the early 2000s, Rushton’s work on LH largely remained Rushton’s throughout the 1980s (e.g., Bogaert & Rushton, 1989; Rushton, 1987, 1988, 1990; Rushton & Bogaert, 1987, 1988). There are a few plausible explanations for this.

Some might argue that it was Rushton’s use of the r–K dimension that, even at the time of his publication, had been heavily criticized. As Stearns (1992) writes,

*In the five years starting with 1977, there were on average 42 references to r and K-selection per year in the set of papers accessible to the BIOSIS literature search service. In the five years starting with 1994, there were on average 16 such references. (p. 207)*

Thus, perhaps lack of representation of Rushton’s work in the wider literature is due to his using a framework that was not congruent with the Zeitgeist (although for valid theoretical reasons; however, see also Reznick, Bryant, & Bashey, 2002).

A review of the literature following Rushton’s 1985 manuscript, however, tells a different story. A Scopus search for articles citing this article between 1985 and 1999 produces 35 articles, 16 of which include Rushton as an author or coauthor. Of those 16 articles, 15 discuss race differences. Of those, Rushton did not author or coauthor eight reference race. This leaves us with a combined total of 23 articles that proposed, tested for, or criticized Rushton’s work with specific reference to race differences. None criticized his work solely on the basis of using the r–K dimension or LH theory to study individual differences; one rejected his application of the r–K dimension but discussed it in the context of Rushton’s predictions about individual differences among races. Rushton spent the next two decades studying and arguing in favor of applying r–K selection and LH theory to racial variation, including his 1995 book, *Race, Evolution, and Behavior.* His work was widely criticized on methodological grounds (e.g., Anderson, 1991; Brace, 1996; Graves, 2002) and was personally accused of being racist (e.g., Dobratz, 2000; Fairchild, 1991; Knudson, 1991). Although Rushton received some support from his peers, several of them too were personally denigrated for their work on race and intelligence (e.g., Arthur Jensen, Hans Eysenck, and Richard Lynn).

Perhaps Rushton’s conceptualization of a latent factor model of LH strategy was ignored largely due to the content of his work on race and intelligence (Figueredo, Cabeza de Baca, & Woodley, 2013). Public distancing by academics of researchers who study controversial topics is surprisingly common; it appears even more common on an informal level (see, e.g., Belsky, 2001; Rider, 2008; Smith, 2008) often to no good effect.

Public and personal distancing, shaming, and other forms of altruistic punishment (e.g., Jacobs, Sisco, Hill, Malter, & Figueredo, 2012) appear to have had far-reaching consequences affecting even more recent LH research. We do not
intend this observation to act as if we advocate for the validity or invalidity of research findings on race differences—a topic that is not within the scope of this article. Nor does it serve as a defense for racism or bigotry. Instead, we note patterns of behavior among scientists who, because they appear to occasionally split on ideological grounds, reject legitimate and important scientific methods and, based on the specific content of the approach, censure the scientist who devised or described them. Rushton’s work on race differences was controversial to be sure, but there are neither a priori nor ideological reasons why his hypotheses about LH underlying personality and other behaviors should be disregarded.

Another challenge is to address a long-standing conflict between sociobiology and evolutionary psychology, which is acerbated by differences between biology and anthropology. Chisholm (1992) wrote,

...if many anthropologists are concerned, as Barkow put it, with the ‘distance between genes and culture’ (Barkow, 1984), they might take heart from those biologists concerned with the ‘distance’ between genes (the organism’s endowment of genetic possibilities) and any phenotypic trait (the actualization of a genetic potential in a particular environment). (p. 126)

Although Darwin’s (1869) principles of natural selection united various fields in many ways, as Dobzhansky wrote in 1964, the application of those principles to specific topics caused a splintering of ideas and fervent debates about the nature of selection and adaptations, among other things. Two related topics are relevant to sociobiology and evolutionary psychology: (1) a distinction between fitness maximizers and adaptation executers (Barkow, Cosmides, & Tooby, 1992) and (2) the Sociobiological Fallacy (Buss, 1995). The first point takes issue with the sociobiological view of organisms as fitness maximizers, the idea that all behavior can be interpreted through the lens of optimizing fitness outcomes. Proponents of this view argue that natural selection acts on behavior shaped over time to maximize fitness. This says nothing, however, about psychological adaptations, which, by nature, cannot maximize fitness due to the framing problem. The framing problem refers to “the consistent inability of systems without sufficiently rich and specialized frames to solve real problems” (Barkow et al., 1992, p. 106). Moreover, ontogenetic and phylogenetic lag may preclude any feedback mechanism or adaptation that might facilitate achieving maximal fitness outcomes. The alternative view, that humans are adaptation executers, asserts that human evolution produced domain-specific mechanisms to solve adaptive problems. In this case, nothing must be maximized; instead, behaviors, as products of established adaptive mechanisms, over evolutionary time improved fitness.

Buss (1995) drew from this debate a concept he termed the Sociobiological Fallacy which “...conflates a theory of the origins of mechanisms (inclusive-fitness theory) with a theory of the nature of those mechanisms” (p. 10). In other words, although natural selection may have shaped adaptive mechanisms, the execution of those mechanisms may or may not increase fitness in modern environments. Because of this fallacy, sociobiology excluded cognitive and affective psychology entirely, moving instead from evolutionary principles directly to observable behaviors such as social organization and mating systems (Buss, 1995).

The arguments against psychological approaches to LH research are, in part, recycled versions of old criticisms of evolutionary psychological approaches to understanding behavior. Copping, Campbell, and Muncer (2014) provide the most recent example of recycling when they questioned the use of psychological measures as “...proxies for life history strategy” because those measures “...have not been validated against objective measures derived from contemporary life history theory and when their status as causes, mediators, or correlates has not been investigated” (p. 200). Although the paper points to numerous theoretical and methodological problems (for a comprehensive rebuttal, see Figueredo et al., 2015), we agree that the relations among psychological and biodemographic variables should be explored and tested.

Despite the overwhelming volume of data and theory Figueredo and colleagues presented, a conspicuous omission remained. Within that research program, none of the studies tested if the K-factor did or did not show associations with traditional LH traits such as those Stearns (1992) identified. It is not clear why that may have been the case, but, according to some development- alists, the marriage of biodemographic and psychological traits did not bode well. Ellis (2004) stated that, in his review of the literature, he was unable to substantiate claims that pubertal timing was associated with psychological measures of mating effort such as sociosexual orientation, the stability of pair-bonds, and parental investment. He concluded that, based on extant evidence, only developmental, sexual, and reproductive timing variables such as age at first sexual intercourse, age at first pregnancy, and age at first birth were empirically supported as sequelae of pubertal timing. Ellis based his view on several earlier studies on the relations among developmental markers and psychological characteristics, the most notable of which was Hoier (2003). She demonstrated the age of menarche is associated with other onset variables (e.g., sexual activity) but not with mating and parenting variables such as inclination toward choosing partners of poor match, socio- sexual orientation, preference for a mate who displays indicators of good parenting, preference for a mate who displays indicators of good genes, attitudes toward sexual fidelity, idealization of romantic relationships, desired number of future sexual partners over the next year, desired number of future sexual partners over the next 10 years, desired number of future sexual partners over the rest of one’s life, and attitudes toward investment in children. (as cited in Ellis, 2004, p. 947)

That is, she demonstrated that no statistically significant relations exist between traditional mating and parenting variables and the kinds of variables Figueredo and colleagues used to construct the K-factor as identified by the ALHB.
Figueroa et al. (2014), however, take issue with the view that biodemographic variables represent more valid indicators of LH relative to psychological variable measures, and thus benchmarks for criterion validity, stating that contemporary conditions may not match ancestral environments. This mismatch may lead to distorted explanations of biodemographic data due to, for example, technological and medical advances (e.g., birth control). In such a case, fast LH strategists may not be identified using biodemographic measures only (e.g., number of offspring). To avoid this problem, it makes sense to study predicted psychosocial and behavioral adaptations, “…rather than merely monitoring fitness consequences that might or might not ensue, contingently upon environmental conditions” (pp. 4–5). They address questions about the relations among psychological and biodemographic measures, such as whether psychological and biodemographic variables are tangentially related or related at all to LH, by refocusing the argument on the goals of evolutionary psychologists, who view humans and other organisms as adaptation executers rather than fitness maximizers (Buss, 1995; Tooby & Cosmides, 1990).

Figueroa et al. (2014) note the difference between outcome and process variables, where biodemographic LH variables represent outcome processes (i.e., distal achievements, p. 4) and psychological LH variables represent immediate processes. More specifically, psychological adaptations “…monitor different allocations (relative degrees of effort or investment) of bioenergetic and material resources among different components of fitness, and therefore represent what Brunswik (1955, cited in Petrinovich, 1979), called ‘functional means,’ presumably in the execution of adaptations” (p. 4). Further, they argue that both psychological and biodemographic measures represent unique components of “…different and presumably successive stages of a causal process” (p. 4).

Finally, after finding support for their hypotheses, such that the theoretically specified measures of LH converge on one another and the theoretically specified nomological net was supported, Figueredo et al. write that alternative explanations for their findings are unlikely to explain the entire network of relations, or even components of it, without ad hoc theoretical explanations. They state that viewing the Mini-K as a valid self-report measure of LH is “…the most parsimonious and efficient explanation” (p. 28).

Figueredo et al. (2014) addressed the general criticisms of using psychological methods to study LH by arguing that LH theory at its most basic level is a resource allocation model. That is, the theory describes individual- and population-level differences in the strategic allocation of bioenergetic and material resources—including those resources that produce psychosocial and behavioral phenomena—toward achieving genetic fitness. In framing LH theory beginning with this assumption, we are better able to see those aspects which the biodemographic and psychological perspectives have in common (see also Black, Figueredo, & Jacobs, 2016). First, as stated above, both approaches begin with the assumption that humans are allocating resources toward survival and reproductive goals, which implies that there are trade-offs between different components of fitness (such as longevity and fecundity) that might be made differently under different circumstances. Second, both the biodemographic and psychological approaches agree that humans have evolved adaptive traits in response to relatively stable (over evolutionary time) dimensions of environmental risk, particularly environmental harshness and unpredictability. In spite of these fundamental similarities, the two approaches to studying LH theory use their own sets of constructs and measures which have led to the relatively independent research programs apparent with even a cursory examination of the field. Although not exhaustive, Table 1 summarizes the general pattern of differences between these two approaches.

We contend that all human behavior, be it physiological, psychological, verbal, overt, or otherwise, expends material and bioenergetic resources. If true, then the question becomes, what dimensions are most relevant to understanding evolutionary and developmental LH strategies? This is perhaps why some insist upon carefully testing the role of psychological indicators within a developmental sequence, rather than using a common-factor model describing constellations of slow LH strategies that encompasses a broad swathe of behaviors not yet firmly integrated with biodemographic variables or clearly nested within coherent developmental patterns.

### Previous Integrative Studies

Several researcher groups have conducted research that incorporates both psychological and biodemographic measures of LH. Ellis (2004) provided an extensive review of four alternative theories on the role of LH in pubertal development in girls: (1) energetics theory, (2) stress suppression theory, (3) psychosocial acceleration theory, and (4) paternal investment theory. Ellis (2004) described all four in detail and then evaluated each using extant empirical evidence. He concluded by...
rejecting them on empirical grounds and proposing child development theory.

In proposing child development theory, Ellis acknowledged that all five theories predict that earlier age of puberty is associated with earlier sexual debut and first reproduction and that the empirical evidence generally supports this prediction. He did not, however, find support for the prediction, based on psychosocial acceleration theory or paternal investment theory, that pubertal timing and psychosocial aspects of sexual activity are associated. Specifically, the evidence was either mixed or directly contradicted the prediction that age of puberty and variables such as number of sex partners, infidelity, sociosexual orientation, mate preferences for genes or cues of good parenting, attitudes toward fidelity, romantic relationships, and investment in children, or desired number of sexual partners in various time intervals are associated. In summary, the evidence Ellis (2004) described supports the inference that childhood experiences adjust the timing of sexual development, and that long-term inferences about future conditions are not required to explain changes in pubertal timing. Rather, qualities of parental investment and other local social resources calibrate a female child’s development.

Neberich, Penke, Lehnart, and Asendorpf (2008) tested three of the four psychosocial models Ellis (2004) evaluated as well as the polygyny indication model (Kanazawa, 2001). Neberich et al. concluded that Ellis’ (2004) child development theory was supported by data indicating that age of menarche predicted another age of onset variable but not psychological measures of reproductive strategy; however, the age of onset variable for sexual debut predicted psychosocial measures of reproductive strategy. Further, two key results of this study seem to reflect the Ellis et al. (2009) prediction that stable environments favor a slower LH strategy. First, having a father figure present after age 7 predicted delayed age at menarche, which in turn predicted delayed age of sexual debut. Second, environmental conditions (intact family structure until age 7, parental socioeconomic status) positively predicted educational level, which in turn predicted delayed age at sexual debut. A third key finding—relevant to the marriage between biodemographic and psychological approaches—showed that later age of sexual debut predicted a more restricted sociosexual orientation. Taken together, Neberich et al. concluded that Ellis’ (2004) child development theory was supported on the basis that age of menarche could not be considered “...the crucial, generative mechanism through which experiences in the family influence reproductive strategies” (p. 20).

Gurven, von Rueden, Stieglitz, Kaplan, and Rodriguez (2014) collected personality data and examined relations among them to several fitness indicators. Recall that Rushton (1985, 1987) and Figueredo and colleagues (2004, 2005, 2006, 2007) predicted that LH theory explains personality variation and identified a higher order GFP and its relationship to K and covitality (i.e., mental and physical health). Gurven et al. compared scores of Tsimane forager-horticulturists, who were administered the Big Five Inventory, to several biodemographic outcomes: fertility; offspring survivorship; number of sex partners before and after marriage (among men); conflict frequency; time spent on productive tasks, parenting, and visiting others; body mass index; urinary cortisol; hemoglobin; C-reactive protein; erythrocyte sedimentation rate; and leukocyte and eosinophil counts.

These authors also identified two higher order personality factors specific to the Tsimane: prosociality and industriousness. Their analyses showed that males who were more extroverted, open, and conscientious and lower in neuroticism had greater fertility and more surviving offspring. These traits did not predict earlier age at first birth, while industriousness did. Individual differences were not associated with the percentage of live births that resulted in death before age 15. Males who were more extroverted, agreeable, and open had more sex partners, and there was a marginally significant effect of prosociality on nonmarital sex partners. Among females, the only significant finding was that higher conscientiousness predicted fewer children dying before age 15. More open males and more agreeable women spent less time on childcare. With regard to relations among personality factors and health indicators, the authors found that individuals who were more extroverted, open, prosocial, and industrious and less neurotic were generally more healthy. More recently, Gurven has been working with a team of psychometricians to estimate a GFP in the Tsimane data and compare it parametrically with those found in Western culture samples. The GFP is one of the three lower order factors of the Super-K factor within the latent hierarchical structure of LH strategy found using the psychological approach (Figueredo & Rushton, 2009; Figueredo et al., 2004, 2007).

Finally, Dunkel, Summerville, Mathes, and Kessler (2015) used data from a 30-year longitudinal study (Block & Block, 2006) to examine relations among psychological measures of LH and biodemographic LH variables (age of sexual debut, number of sex partners since last measurement period, number of sex partners in the last year, frequency of sex in the past year, number of abortions or suspected abortions, age at first birth, number of offspring—all at ages 23, 32, or both when appropriate). Psychological LH was measured using California Q-sort at ages 14, 18, and 23, with the first two time points completed by independent examiners and the last time point consisting of examiner report and self-report. They also constructed a composite LH measure from the Q-sort results at all time points. Finally, they included participant responses reporting the presence of venereal disease. The results showed modest correlations between Q-sort LH data at 14, 18, and 23, ranging from .47 (between 14 and 23) to .69 (between 18 and 23).

All Q-sort measures of LH showed a positive relationship with age of sexual debut, such that slower LH predicted later sexual debut. Generally, the composite LH score predicted fewer sex partners since age 23 and in the last year as well as the number of abortions. Although the sample size was smaller, Q-sort LH was positively associated with the age of first birth (marginally significant) and negatively associated with the number of children. The results also showed that individuals with slower Q-sort LH are less likely to report having a venereal disease.
Considerations for Future Integrative Research

One outstanding problem in Figueredo et al.’s (2015) proposed integration between biodemographic and psychological approaches resides in the proposition that biodemographic and psychological variables fit comfortably in a causal process as Figueredo et al. claim they do. Characterizing psychological variables exclusively as process variables and biodemographic variables exclusively as outcome variables disregards both the functional implication of biodemographic LH traits as a series of sequential trade-off events and the organizational effects of successive developmental nodes (Ellis et al., 2009). According to the developmental view, each developmental node closes some developmental trajectories and opens others, canalizing developmental outcomes and producing coherent sets of LH strategies over the life span. A view of a causally linked developmental process is not at odds with a view that takes genetic effects on LH traits into account. Although measuring rates of development includes items about discrete events, such as age of puberty, they may be better characterized as proxy variables for a cascade of causally related hormonal, neurological, physiological, and biochemical events that may or may not reflect those underlying processes well. Similarly, age of sexual debut and number of sexual partners might also be proxies for behavioral processes. Thus, Figueredo et al.’s dichotomy might not be so simple, as one fitness outcome might causally influence one or more subsequent ones, and thus be part of a continuing developmental process. In contrast, the model proposed by Figueredo and colleagues views these various LH traits as convergent indicators of a latent common factor, and not necessarily existing in any causal relations to each other. We believe that a more reasonable and comprehensive model might include the hypothesized developmental sequences as well as the existence of a highly heritable latent common factor exerting a common influence on LH traits at every successive stage of development. Such an integrative model would combine the complementary roles of evolved adaptations and ecologically contingent mechanisms in shaping LH strategy.

Second, Figueredo et al. state that, as a consequence of environmental mismatch, “...these [biodemographic] outcome measures may be less indicative of evolved and thus heritable life history strategies” (p. 5). This is true, but the same problem afflicts psychological measures. Indeed, a general theme in their description of the limitations of biodemographic approaches involves the difficulties of measuring LHs in light of possible environmental mismatches. For example, modern conveniences can distort the pattern of LH tactics, such as when access to birth control may decrease the number of offspring of a fast LH strategist, assuming the effective use of birth control. However, number of offspring is not the only measure of LH that might be so distorted: Psychological indicators of LH strategy might also be subject to the same problems of mismatch. For example, some subscales of the ALHB measure LH traits based on predictions stemming from environmental conditions favoring the evolution and development of slow LH strategies, such as resource reliability and social stability.

Finally, the notion that potential mismatch of evolved adaptations with modern environments preclude this kind of test is misplaced; technological, medical, and societal advances do not preclude one from studying how psychological and biometric measures of LH relate, they just make such tests more difficult. Measuring environmental conditions more explicitly and with greater precision is therefore essential for understanding how LH strategies might be influenced by modern environments over the life span. One such detailed study was performed by Meij and colleagues (2009), examining LH trade-offs in the absence of the mismatch with ancestral conditions produced by contemporary levels of affluence in Western societies. This permitted them to document the trade-off between fertility and offspring survival experienced by women living under conditions of environmental adversity in Northern Ghana. Furthermore, just as Figueredo et al. describe a set of biodemographic characteristics of fast LH strategies and a set of psychological characteristics, it is reasonable to examine relations between these sets empirically.

Ultimately, as Figueredo et al. (2015) state:

The biometric approach to life history assessment is therefore in no way incongruent with the psychological approach, but rather complementary. Both approaches utilize the general principles of modern life history theory and seek to disentangle the bioenergetic and material allocation tradeoffs organisms make (e.g., somatic effort versus reproductive effort) that produce strategic constellations of physiological, behavioral, and psychological traits to maximize fitness returns within a given environment. (p. 303)

Moreover, identifying clusters of heritable, psychological adaptations that serve to coordinate and execute LH strategies expands the realm of possible LH research within the context of novel environmental conditions. This is evident in the various applications of the psychological method in LH research reviewed above.

Conclusions

As noted at the beginning of this article, we aimed to address some of the substantive, historical, and political reasons why two major approaches to the study of LH remain relatively segregated as well as to offer suggestions for moving forward.

We have found that it is difficult to answer the question of what constitutes LH strategy, and perhaps more importantly, what does not constitute LH strategy. If LH theory is a theory about resource allocation, and all human behavior is derived from biological processes subject to that allocation, then the organization of all observable human behavior is in some respect a product of LH strategies. This is perhaps of little consolation to scholars in the field of LH research who work to distinguish evolutionary from developmental aspects of LH theory for important modern-day problems ranging from health to societal issues, up to and even including social policy.
With that said, the question might be best answered from a practical standpoint. As a researcher, what measures permit us to gain a clear understanding of how humans allocate resources in the service of fitness? Perhaps the answer depends on the outcome of interest. Figueredo et al. (2015) argued that it may be more informative in the initial stages of studying relationships between psychological and biodemographic measures of LH to select variables from the same domain, such as mating effort only, and to expand the nomological network only after those relations have been firmly established. This is an excellent direction for future research. It will, however, be difficult to take this approach when using a measure like the Mini-K, which is a “... direct measure of the latent common factor (K)” (Figueredo et al., 2014, p. 6). In other words, the Mini-K is designed to measure several dimensions of LH simultaneously. This multifaceted approach may limit its ability to predict, or be associated with, specific biodemographic indicators (Copping, Campbell, & Muncer, 2014).

In exploring the complex relations between the Mini-K and other similar psychological measures of LH with biodemographic measures, we recommend that both sets of variables sampled be carefully selected from similar as well as complementary domains. For example, one might use the biodemographic approach to measure developmental characteristics like birthweight, gestation length, interbirth intervals, pubertal timing, and sexual debut, then apply the psychological approach to measure a suite of cognitive and behavioral traits such as altruism, sociosexual orientation, personality, mutualism, familial relationships, and religiosity. Drawing on previous theoretical work on the fundamental dimensions of environmental risk, these measures can then be tested in conjunction with scales assessing the stability of early environmental conditions, including event-based measures defined with respect to an external referent, and measures of the internal cognitive schemata that represent the predicted psychological sequelae of early events. This kind of methodological integration suggests exciting new directions for future researchers who seek to reconcile the two approaches.

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Notes
1. We should note there are alternative psychological measures, such as the High-K Strategy Scale (HKSS; Giosan, 2006), but they have not been as widely used or tested as the Arizona Life History Battery (ALHB). Additional alternative measures will be reviewed in subsequent sections.

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