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Original Article

The slow and fast life histories of early birds and night owls: their future- or present-orientation accounts for their sexually monogamous or promiscuous tendencies

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ABSTRACT

In this study we tested the hypothesis that inter-individual variation in morningness–eveningness (i.e., chronotype) is associated with variation in a composite measure of life history (the mini-K) such that morning-types (i.e., early birds) exhibit traits typically associated with slow life histories while evening-types (i.e., night owls) exhibit traits typically associated with fast life histories. In addition, we tested the hypothesis that time perspective may be one of the psychological mechanisms mediating the relationship between chronotype and socio-sexuality. Study participants were 95 heterosexual young men, most of whom were university students. Chronotype, life-history traits, socio-sexuality, and time perspective were assessed with well-established self-report measures. Variations in chronotype and in life-history traits were significantly associated in the direction predicted by our hypothesis. Consistent with our second hypothesis, time perspective emerged as a significant mediator of the association between chronotype and socio-sexuality so that the future orientation of morning-types was associated with their long-term mating orientation and relatively low sexual experience, while the present orientation of evening-types was associated with their short-term mating orientation and greater sexual experience. Our study provides the first evidence that variation in chronotype may be adaptive and elucidates one of the psychological mechanisms underlying the life history and reproductive strategies of male early birds and night owls.

1. Introduction

Circadian rhythms are widespread across organisms, from bacteria to animals, have evolved independently multiple times, and have adaptive value that is bound to the cyclical variation of stimuli and resources necessary for survival and reproduction (DeCoursey, 2004). In humans there is considerable inter-individual variation in behavioral circadian rhythms, and such variation can be reliably identified with self-reported measures of diurnal activity patterns, such as wake/sleep times and the timing of peak cognitive performance (Horne & Östberg, 1976, 1977). Using this approach it has been shown that people's sleep patterns are normally distributed, with approximately 30% of individuals falling at the two extremes (Adan et al., 2012). At one extreme of the distribution, morning-types (or early birds) prefer early wake-up and sleeping times, reach maximum alertness soon after waking up, and have cognitive performance peaks early during the day. At the other extreme, evening-types (or night owls) are characterized by late wake-up and sleeping times and by their preference for being active in the evening. In a given population, approximately 70% of individuals have sleep pattern preferences intermediate between those of early birds and night owls (see Adan et al., 2012, for a review). Sleep pattern preferences, also known as chronotype, appear to be stable over time (Hur, 2007), are moderately heritable (Hur & Lykken, 1998; Klei et al., 2005), and are sexually dimorphic, as men tend to be overrepresented among evening types (Randler, 2007). The sex differences in chronotype are minimal before puberty and after women's menopause (Randler & Bausback, 2010; Roenneberg et al., 2004) and, similarly to other sexually dimorphic traits, may be under the influence of gonadal steroids (Hastings Hagenauer & Lee, 2012).

Many physiological, psychological, and behavioral differences have been reported between morning- and evening-types (see Adan et al., 2012, for a review). Physiologically, the melatonin peak, temperature nadir, and cortisol peak all occur at an earlier time in morning-types compared to evening-types (e.g., Kerkhof & Van Dogen, 1996). In terms of personality traits, evening-types generally score high in extraversion (Díaz-Morales, 2007; Matthews, 1988; Randler et al., 2012) and in the dark triad traits (i.e., Machiavellianism, secondary psychopathology and exploitive narcissism; Jonason, Jones, & Lyons, 2013), while morning-types appear to be more conscientious and agreeable (Tsaousis, 2010), more cooperative with others (Díaz-Morales, 2007), more persistent in accomplishing their goals (Caci et al., 2005), and score higher in the personality meta-trait of stability (DeYoung, Hasher, Djikic, Criger, & Peterson, 2007). Evening-types also score higher than morning-types in impulsivity, novelty-seeking, and risk-taking (Caci, Robert, & Boyer, 2004; Caci et al., 2005; Killgore, 2007; Maestripieri,

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2014; Muro, Gomá-i-Freixanet, & Adan, 2012; Tonetti et al., 2010). Finally, evening-types are less sociosexually restricted (in women: Jankowski, Diaz-Morales, Vollmer, & Randler, 2014) and report a higher number of life-time sexual partners than morning-types (in men: Piffer, 2010; Piffer, Gunawardane, & Custance, 2011; Randler et al., 2012). Although the functional significance of chronotype-related variation in physiological, psychological, and behavioral traits has not been systematically addressed, life history theory can potentially provide a powerful framework for understanding this variation from a functional and evolutionary perspective.

A large body of research guided by life history theory has shown that inter-individual variation in human growth and sexual maturation as well as in socio-sexual behavior and reproduction is far from random. Rather, much of this variation can be functionally explained in terms of distinct survival and reproductive strategies such as those collectively known as slow and fast life histories. Slow life histories are characterized by trade-offs favoring maintenance over growth, future over current reproduction (e.g., delayed sexual maturation), monogamous rather than promiscuous sexual relationships, and offspring quality over quantity (i.e., low offspring number and high parental investment) (e.g., Del Giudice, 2009; Del Giudice & Belsky, 2011; Ellis, 2004; Kaplan & Gangestad, 2005). In contrast, individuals who adopt fast life-history strategies are more likely to sexually mature and to start mating early in life, mate frequently, and invest relatively little in relationships and children (Belsky, Steinberg, & Draper, 1991).

Although life-history strategies refer mainly to growth- and reproduction-related traits, they also include a broad range of physiological, psychological, and behavioral traits, such as arousability and stress reactivity, personality, novelty-seeking and risk-taking, altruism and cooperation, and romantic attachment styles (e.g., Del Giudice, 2009, 2014; Del Giudice & Belsky, 2011; Kaplan & Gangestad, 2005). For example, Figueredo et al. (2006, 2005) identified a cluster of interrelated traits, in which conscientiousness, agreeableness and stability are positively correlated with restricted sociosexuality, high risk aversion, and prosocial behaviors, which appears to represent a slow life history strategy (the "K-factor").

Time perspective has been suggested to be central to life history strategies as it may influence the trade-off between current and future reproduction (Chisholm, Quinlivan, Petersen, & Coall, 2005). Individuals on a slow life history strategy are expected to be more future oriented, self-controlled, and to delay gratification, while individuals on a fast life history should be more present-oriented, be more impulsive, and seek immediate gratification (Del Giudice, 2014). Consistent with this view, the psychological construct of future time perspective developed by Zimbardo and Boyd (1999), which measures an individual's tendency to strive for future goals, has been found to mediate the relationship between the quality of the early socioecological environment and later tendencies toward risky behaviors, so that exposure to harsh early environments makes individuals more present-oriented; this in turn, increases their propensities to take risks (Kruger, Reischl, & Zimmerman, 2008; see also Nowack, Milfont, & van der Meer, 2013; Simons, Vansteenkiste, Lens, & Lacante, 2004, for other cognitive and motivational aspects of individual differences in time perspective).

Based on previous research on the physiological, psychological, and behavioral differences between morning- and evening-types as well as on the hypothesis that eveningness may have evolved to facilitate short-term mating (Piffer, 2010; see also Maestripieri, 2014), we hypothesize that the two distinct clusters of traits that are generally associated with morningness and eveningness are best understood as expressions of slow and fast life history strategies, respectively. From this hypothesis, we derived and tested the prediction that continuous variation in sleep pattern preferences (as assessed with a reliable self-report measure of chronotype, the reduced Morningness–Eveningness Questionnaire, or rMEQ; Adan & Almirall, 1991) should be significantly associated with a psychometric measure of life history such as the mini-K (Figueredo et al., 2005, 2006), so that the psychological and behavioral traits typical of slow life histories should be highest in morning-types, whereas the traits typical of fast life histories should be highest in evening-types.

One of the key behavioral differences between individuals on slow and fast life histories concerns their socio-sexuality. Consistent with the theory and with previous findings, restricted socio-sexuality is associated with slow life histories while unrestricted socio-sexuality is associated with fast life histories (Ellis, 2004). One of the predictions derived from our hypothesis, therefore, is that morning- and evening-types should exhibit restricted and unrestricted socio-sexuality, respectively (see Jankowski et al., 2014, for evidence that this is the case in women). Based on recent studies on the relationship between chronotype and time perspective, which show links between morningness and future orientation, and between eveningness and present orientation (Díaz-Morales, Ferrari, & Cohen, 2008; Milfont & Schwarzenthal, 2014; Stolarski, Ledzinska, & Matthews, 2013), we also hypothesized that time perspective may be the psychological mechanism underlying the link between chronotype and socio-sexuality. To test this hypothesis we conducted a mediation analysis to assess whether a well-established measure of time perspective, the Zimbardo's Time Perspective Inventory (ZTPI; Zimbardo & Boyd, 1999) could statistically mediate the association between a measure of chronotype (the rMEQ) and one of socio-sexuality (including short-term vs. long-term mating orientation), the Multidimensional Sociosexual Inventory (MSOI; Jackson & Kirkpatrick, 2007). The predictions tested with this analysis are that morning-types are more long-term mating oriented and more sociosexually restricted because they are more future-oriented, while evening-types are more short-term mating oriented and less sociosexually restricted because they are more present-oriented.

2. Methods

2.1. Participants and procedure

Participants were 96 young men (mean age = 22.40 years; SD = 3.89, SE = 0.39) recruited on the University of Chicago campus through fliers, mailing lists, or a human subject recruitment website (Sona System). The majority of the participants were students at the University of Chicago. All study participants completed a written informed consent form before participating in the study and were paid $20 after completion of the procedures. This study and the use of human subjects were approved by the Social Sciences Institutional Review Board of the University of Chicago. An initial demographic survey asked information about participants' age, ethnicity, sexual orientation, and marital or relationship status (single or in a relationship). One of the 96 participants reported a homosexual orientation and was excluded from data analyses. Of the 95 heterosexual participants, 61.5% were Caucasian, 10.4% were Hispanic, 9.4% were African-American, 7.3% Asian, and the rest were of other ethnicities. Ninety-three of the participants had never been married, while one was separated and one was divorced. Of the participants who reported their current relationship status (n = 86), 46% of them were currently involved in a romantic relationship, and the others were single. In terms of previous sexual experience, 15 out of the 95 participants (16%) never had sexual intercourse, 15 (16%) had intercourse with only one woman, and the others (68%) had intercourse with multiple women (range 2–100).

2.2. Measures

Following the demographic survey, other questionnaires were administered. For the purposes of this study, the following four questionnaires were considered:

Reduced version of the Morningness–Eveningness Questionnaire (rMEQ). We assessed chronotype with the reduced version of the Morningness–Eveningness Questionnaire (rMEQ) (Adan & Almirall,