Evolutionary Psychology
2015: 1–21

DOI: 10.1177/1474704915593664
evp.sagepub.com
SAGE

Exploitative and Deceptive Resource Acquisition Strategies: The Role of Life History Strategy and Life History Contingencies

Joshua J. Reynolds[1] and Sean M. McCrea[1]

Abstract

Life history strategy (LHS) and life history contingencies (LHCs) should theoretically influence the use of exploitative and deceptive resource acquisition strategies. However, little research has been done in this area. The purpose of the present work was to create measures of exploitative strategies and test the predictions of life history theory. Pilot studies developed and validated a behavioral measure of cheating called the Dot Game. The role of individual LHS and LHCs (manipulated via validated story primes) on cheating was investigated in Study 1. Studies 2a through 2c were conducted to develop and validate a self-report measure called the Exploitative and Deceptive Resource Acquisition Strategy Scale (EDRASS). Finally, Study 3 investigated life history and EDRASS. Results indicated that while LHS influences exploitative strategies, life history contingences had little effect. Implications of these findings are discussed.

Keywords

life history strategy, life history environmental influences, exploitative and deceptive resource acquisition strategies

Date received: January 28, 2015; Accepted: June 5, 2015

Introduction

Acquiring resources is an essential activity for living organisms. Resources include food, shelter, mates, and (for humans in modern environments) man-made objects such as tools and currency (Gorelik, Shackelford, & Weekes-Shackelford, 2012). Buss and Duntley (2008) discuss three classes of strategies humans use to acquire reproductively relevant resources: individual resource acquisition strategies (e.g., tool making and solo hunting), cooperative strategies (e.g., social exchange and coalitional formation), and exploitative and deceptive strategies (e.g., coalitional warfare and free riding). Exploitative and deceptive strategies, the focus of this research, overlap somewhat with criminal behavior. For example, stealing money involves exploiting another's resources, and stealing (e.g, robbery) is against the law. In contrast, coalitional warfare may be state sanctioned (and thus not a criminal behavior) but would be an example of an exploitative and deceptive strategy. The defining feature of an exploitative strategy is the gaining of a reproductively relevant resource for the perpetrator, while simultaneously depriving the victim of the resource. Although considerable research has investigated behavior like stealing from a criminal behavior perspective, Buss and Duntley (2008) argue very little attention has been applied to adaptations for exploitative and deceptive behavior. Although the present research does not test for adaptations in the form of specific cognitive mechanisms for exploitation and deception, it does test the expression of exploitative and deceptive behavior as a function of life history strategy (LHS) and life history contingencies (LHCs). Thus, this research is aimed at understanding how an exploitative strategy is influenced by an individual's LHS and how it may further be influenced by certain environmental cues in the form of LHCs.

[1] Department of Psychology, University of Wyoming, Laramie, WY, USA

Corresponding Author:
Joshua J. Reynolds, Department of Psychology, University of Wyoming, Laramie, WY 82071, USA.
Email: jreyno14@uwyo.edu

Life History Theory

Life history theory (LHT) is a mid-level theory partially derived from evolutionary meta-theory (McArthur & Wilson, 1967). LHT originally focused on why some species (later called r-strategists) engaged in extreme amounts of reproduction and subsequently died, whereas other species (later called K-strategists) reproduced across the life span (Cole, 1954; Dobzhansky, 1950). The terms r and K selection were then applied to understand these differing strategies (McArthur & Wilson, 1967). Pianka (1970) extended this line of thought and described how different life history traits should fall on the r-K continuum as well as the role of density-dependent selection. Thus, LHT was originally focused on between species differences and density-dependent selection. LHT has also been applied to within species differences (e.g., Gadgil & Solbrig, 1972). Rushton (1985), for example, argued that individual differences in life history could parsimoniously explain many traits in humans.

Initially, there was great interest in the r/K continuum. However, research on density-dependent habitats failed to match LHT predictions in many cases and indicated that the theory was missing some key components (Stearns, 1992). One such component was the ''slow–fast'' continuum (Bielby et al., 2007; Promislow & Harvey, 1990; Roff, 1992; Stearns, 1983). The slow–fast continuum focused on the adaptive covariation in life history traits and, importantly, the effects of age-specific mortality rates. The present work is based on contemporary LHT that tends to consider both population density and differential mortality rates across age-groups to be influential (Figueredo, Vásquez, Brumbach, & Schnieder, 2004).

The core of LHT concerns the allocation of bioenergetic and material resources. As these resources are finite, resource allocation involves certain trade-offs (Figueredo et al., 2004, 2006; Figueredo, Vásquez, Brumbach, & Schnieder, 2005; Kaplan & Gangestad, 2005; Stearns, 1992). Specifically, LHT proposes a continuum of resource allocation ranging from somatic effort (resources devoted to the continued survival of the organism) to reproductive effort (resources for producing new organisms). Reproductive effort can be divided further into mating effort (resources for obtaining and retaining sexual partners), parental effort (resources for enhancing offspring), and nepotistic effort (resources for enhancing kin survival). Organisms that trade-off reproductive and mating effort over somatic and parental/nepotistic effort are referred to as having a fast LHS (FLHS). Organisms that trade-off somatic and parental effort over reproductive and mating effort are referred to as slow life history strategists (SLHS). LHT proposes that organisms will adaptively assort on traits and use strategies that allow them to pursue their particular LHS. It is important to note that neither strategy is inherently superior. Each strategy can be advantageous or disadvantageous depending on the environmental context.

The individual differences in LHS in humans have been shown to be heritable. For example, Figueredo, Vásquez, Brumbach, and Schnieder (2004) found, using the National Survey of Midlife Development in the United States (MIDUS), a single higher order factor (the K-factor) that explained the genetic correlations among the scales. This factor itself was also highly heritable. Figueredo, Vásquez, Brumbach, and Schnieder (2005) also identified 20 scales measuring cognitive and behavioral dimensions (e.g., sexuality, socioeconomic status, community participation, physical health, and parenting and relationship styles) theoretically linked to LHS. These measures formed a single construct, called the K-factor, accounting for 70% of the reliable variance in these measures. Research on the individual differences in LHS has found that a fast LHS is associated with short-term mating, low parental investment, low group altruism, higher criminal behavior, and higher risk taking (Ellis, 1988; Figueredo et al., 2004, 2005, 2006). Although the evidence mentioned earlier does suggest LHS is heritable, consistent with LHT, there are also specific environmental influences that shape the development of an individual's LHS.

LHCs

The variety of environmental contingencies that can shape an individual's LHS are collectively referred to here as LHCs. Ellis, Figueredo, Brumbach, and Schlomer (2009) extensively detail the variety of environmental influences that play a role in the evolution and development of LHS. The two main influences are harshness (externally caused morbidity–mortality) and unpredictability (spatial–temporal variation in harshness). Additional factors include population density, intraspecific competition, and resource scarcity. These are theorized by LHT to be dependent on each other, and the combination of some factors may lead to the development and evolution of a SLHS, whereas a slightly different combination may lead to a FLHS. For example, low harshness of the environment when combined with low population density, low resource scarcity, and low intraspecific competition should result in a FLHS. A reproductive over somatic effort trade-off is more advantageous in this case because the population is not near the carrying capacity. There are an abundance of resources available to the population, and so investing in somatic maintenance is not as valuable. Apportioning more energy and resources toward mating and reproduction effort, on the other hand, has valuable fitness effects. Additionally, high harshness and unpredictability is also predicted to lead to a FLHS. Finally, low harshness combined with high population density, high resource scarcity, and high intraspecific competition should result in a SLHS.

Empirical research using multiple species, including humans, supports the hypothesized effects of LHCs (see Ellis, Figueredo, Brumbach, & Schlomer, 2009). For example, research on populations of guppies in low versus high predation areas suggests that guppies in higher predation areas display a FLHS and have traits such as faster growth, earlier age at sexual maturation, and larger litter size than do those in lower predation areas (Reznick, 1982; Reznick & Ghalambor, 2005). The researchers also moved guppies in high predation areas to low predation areas. After 11 years and several

generations, the relocated guppies had shifted to a SLHS, displaying traits such as later age at maturity and fewer offspring per litter (Reznick, Rodd, & Cardenas, 1996; Reznick & Shaw, 1997).

There are many life history traits that are uniquely relevant to humans, such as criminal behavior and religiosity (Ellis, 1988; Figuerdo et al., 2005). Although studying LHCs by manipulating actual environments is more difficult to conduct in human populations, there is some evidence confirming predictions of LHT and arguing for the role of LHCs in determining these traits.

Demonstrating evidence of life history contingency effects in deviant social behavior, Brumbach, Figueredo, and Ellis (2009) examined data from the National Longitudinal Study of Adolescent Health. Results indicated that harshness and unpredictability experienced early in life were positively associated with social deviance. Additionally, harshness and unpredictability experienced in adolescence were related, either directly or indirectly, to the development of a FLHS in young adulthood.

Griskevicius, Delton, Robertson, and Tybur (2011) examined correlations between crime, socioeconomic status (SES), and reproductive timing. Consistent with LHT, results showed that violent crime was related to the age that people had children, even when controlling for SES. In areas with higher violent crime rates, people tended to have children sooner, consistent with a reproductive versus somatic effort trade-off. Griskevicius, Delton, et al. (2011) also manipulated harshness and unpredictability via story primes. In the mortality prime condition, participants read a supposed news article about the increasing violence in the United States and how there are many random violent deaths (e.g., shootings in residential and commercial areas). In the control prime condition, participants read a news article about losing and finding a set of keys. Participants were also asked about their perceived resources (e.g., if they felt they were wealthy compared to others) as children and at present. Results showed that the effects of the prime manipulation were moderated by perceived resource availability in childhood. The mortality cues lead participants to want to reproduce sooner but only among those who grew up relatively poor (see also Griskevicius, Tybur, Delton, & Robertson, 2011, concerning how mortality cues can influence risk and delayed rewards).

Work by Dunkel and colleagues also used manipulations of life history relevant information (Dunkel, & Mathes, 2011; Dunkel, Mathes, & Decker, 2010; Dunkel, Mathes, & Papini, 2010). In these studies, manipulations of LHCs were based on hypothetical vignettes. Specifically, participants imagined that they had 5 months, 5 years, or at least 50 years left to live. Dunkel, Mathes, and Decker (2010) found that, when participants imagined shorter life expectancies, they were more likely to show interest in short-term mating. Dunkel, Mathes, and Papini (2010) found these shorter life expectancies increased participants' inclination to express anger and be aggressive. Finally, Dunkel and Mathes (2011) found a relationship between a FLHS and increased willingness to engage in sexual coercion. This finding is consistent with Gladden, Sisco, and Figueredo (2008) who observed that a SLHS serves as a protective factor in decreasing sexual coercion. More importantly, Dunkel and Mathes (2011) found that shorter life expectancies increased participant's willingness to engage in sexually coercive behaviors. Thus, several studies demonstrate that manipulation of LHC information can affect a variety of relationships such as sexual coercion and aggression, both of which are related to exploitative strategies.

Life History and Exploitative Resource Acquisition Strategies

In addition to work on the effects of LHCs, there has been research on LHS and several constructs that have overlap with exploitive strategies. Although constructs such as antagonistic strategies overlap with exploitative strategies, they are conceptually different. Antagonistic strategies are those in which people see sexual interests of themselves and their partner as divergent or inconsistent, rather than mutualistic (Malamuth, 1996). Malamuth (1998) argued that FLHSs are more prone to adopt antagonistic sexual strategies that are consistent with short-term sexual strategies, rather than long-term relationships and biparental care. Figueredo and Jacobs (2010) extended this thinking from *sexually* to *socially* antagonistic strategies (see also Figueredo, Gladden, & Beck, 2012). Using structural equation modeling, Gladden, Figueredo, Andrzejczak, Jones, and Smith-Castro (2013) found evidence for a relationship between socially antagonistic strategies and LHS. Antagonistic strategy indicators in their work included psychopathy, Machiavellianism, aggression, mating strategy, and mating effort. Although exploitative resource acquisition strategies may be related to antagonistic social strategies, they are conceptually distinct. For example, antagonistic social strategies are far broader. They may include numerous behaviors that are not concerned with the acquisition of resources, nor are they necessarily exploitative. Furthermore, Gladden et al. (2013) did not investigate the role of LHCs in the use of antagonistic strategies.

Exploitative strategies are also not the same as criminal behavior or social deviance. There are many behaviors (including mate poaching, free riding, and deception to get sex) that are exploitative but not criminal. Thus, there is no published study of which we are aware specifically concerning the relationship between exploitative strategies and LHS and LHCs. Although Dunkel and colleagues (2010, 2011) have shown effects of LHCs on mating and aggression for example, their manipulations of life expectancy only concerned harshness. As discussed previously, there are many more contingencies that are theorized to have effects on LHS, such as population density and resource scarcity. Thus, research is needed that examines exploitative strategies specifically as well as the effects of multiple LHCs.

Current Study Overview

The primary goal of the current research was to examine the role of LHS and experimentally manipulated LHCs in

determining the use of exploitative and deceptive strategies in an adult human population. In other words, the study aimed to answer the questions, ''Are adults of varying LHS sensitive to information concerning LHC information? Does this information modify resource acquisition strategies? Do adult LHS and LHCs interact when predicting the degree one uses this acquisition strategy?'' Researching these questions is important because LHT offers a potentially valuable perspective in understanding why and when someone might use exploitative strategies. Addressing these questions experimentally complements previous correlational studies of LHS and social deviance.

A second goal of the research was to develop and validate measures of exploitative and deceptive resource acquisition strategies. As discussed previously, exploitative strategies include numerous behaviors, such as mate poaching and free riding (Buss and Duntley, 2008). Measures that specifically target the behavior of interest are lacking. For example, Kruger, Reischl, and Zimmerman (2008) investigate resource exploitation but use items from the Monitoring the Future study (e.g., trespassing), which speak more toward delinquency. There are tasks that measure free riding (an example of exploitative behavior). However, many of these tasks are economic games and were not created with the goal of understanding exploitative strategies. Although this does not make the tasks unusable, it can limit the extent to which they measure an exploitative strategy. That is, they are not specific enough or do not replicate the context in which someone might exploit resources. A behavioral measure of cheating (i.e., taking a monetary resource) was chosen in order to construct an objective and practical instrument. Because the behavioral measure is narrow in scope, we also developed a self-report measure of exploitative strategies. This scale captures a wider variety of exploitative strategies. We first describe the development and validation of the cheating task.

Primes were used to communicate LHC information to participants. The FLHC prime was previously used and validated by Griskevicius, Delton, et al. (2011). We developed and validated a corresponding slow life history contingency (SLHC) prime. In Study 1, we examined the effects of LHC primes and participant's LHS on behavior on the cheating task. In Studies 2a through 2c, we developed and validated our self-report measure called the exploitative and deceptive resource acquisition strategy scale (EDRASS). Finally, in Study 3, we examined the effects of LHC primes and LHS on the EDRASS.

Development of the Dot Game Cheating Task

In order to measure exploitative strategies behaviorally, we first developed a cheating paradigm. Existing paradigms are not ideal for several reasons. Many cheating tasks are lab based, involve stealing money from the experimenter, and do not allow for altruistic responses (see e.g., Gino, Scheitzer, Mead, & Ariely, 2011; Mazar, Amir, & Ariely, 2008; Mead, Baumeister, Gino, Schweitzer, & Ariely, 2009). An essential feature of exploitative strategies is that they involve depleting potential or actual competitor's resources while enhancing one's own resources. Thus, stealing money from the experimenter is likely not as ecologically valid as stealing from a peer. Finally, altruistic behavior can be defined as a behavior that benefits another person but also presents a cost to the helper (Hamilton, 1964a, 1964b). Altruism and reciprocal altruism are part of cooperative resource acquisition strategies (Buss and Duntley, 2008). Lab-based tasks also restrict the type of sample that can be obtained. An online task allows for a broader sample of participants. For example, participants drawn from Amazon's Mechanical Turk (MTurk) tend to have more diverse characteristics including age (Buhrmester, Kwang, & Gosling, 2011). Thus, we sought to develop a task that allows for multiple resource acquisition strategies and could be conducted with an online sample.

Participants were recruited through MTurk and paid US$0.10, with a chance to earn a bonus of up to US$1.00. Twenty (12 male) participants (M_{age} = 30.70 years, SD = 8.61) read a description of the study and clicked a link taking them to the online experiment. This study and all others in this article were designed and given through Qualtrics. Participants answered several health and demographics questions and then completed the cheating task called the ''Dot Game.'' Participants were presented with a series of pictures with a white background and large black dots (a total of 20 pictures created using Adobe Elements 11). The task was to, as quickly as possible, count the dots, click the arrow in the bottom right of the screen, and choose (from a list of four multiple choice answers) the correct number of dots. The participants were told their reaction time would be measured and that they were competing against another participant for a US$1 bonus. They were also told that there were two roles in the game, the ''feedback player'' and the ''no feedback player.'' They would be randomly assigned to one of these roles. Specifically, they were told that ''If you are the feedback player, at the end of the game you will receive feedback on how many trials total each player has won. It is also up to you to distribute the money. The other player never receives feedback. If you are the no feedback player, you will never receive feedback on how many trials total you have won or lost.''

Participants then received further instruction reiterating the roles and how to actually play the game. The computer then ''randomly'' assigned them to one of the two roles. In reality, all participants were assigned to be the feedback player, and they were not actually playing with another person. After completing the game, participants were given feedback on how many trials in total each player won. All participants were told they won 10 trials, and the other player won 10 trials. Thus, if participants were fair, they should have allocated US$0.50 to themselves (half of US$1.00). Ten participants allocated more money to themselves than they should have based on the feedback. Nine participants allocated the money fairly (i.e., US$0.50) and one participant allocated US$0.10. Overall, participants tended to behave in a manner consistent with an exploitive or deceptive strategy (M = .66, SD = .25).

After allocating the money, participants were asked several questions to determine whether the task was understandable

and whether the deception was effective. All participants indicated that the instructions were clear, and all but one indicated that the feedback made sense. Difficulty ratings were low (measured using a 5-point Likert-type scale, 1 = *not at all difficult* to 5 = *very difficult*, $M = 1.40$, $SD = .503$). Only two participants indicated suspicion concerning whether they were really paired up with another person or of anything else in the Dot Game. Thus, the Dot Game appears easy to understand and believable to participants. Moreover, a fair number of participants engaged in exploitative and deceptive behavior on the task. That is, they exploited a limited resource by taking more for themselves, leaving less for the other person, than they should have.

Validation of the LHC Primes

The FLHC (i.e. mortality prime) and neutral primes for Study 1 were the "news stories" developed by Griskevicius, Delton, et al., (2011; see Appendix for all primes). A SLHC prime was constructed with three components in mind: food scarcity, increasing population, and competition in the dating market. The conclusion of the article was that people needed to invest in themselves in order to compete with other people. The SLHC prime was formatted to look like a *New York Times* article, consistent with the FLHC and neutral primes. We intended the FLHC prime to make people feel that the world is more dangerous, unsafe, uncertain, and unpredictable (i.e., communicating high harshness and unpredictability). The SLHC prime should make people feel that the population is increasing, they need to be more competitive, there is high intraspecific competition, and they must invest in themselves. However, they should not feel that the environment is harsh. In other words, the prime should communicate environmental contingences that result in a SLHS.

A pilot study was conducted to validate the primes to be used in the main study. Participants were 148 (41.9% male, 58.1% female, $M_{age} = 33.62$, $SD = 12.60$) people recruited through MTurk. Participants answered several health and demographics questions and then proceeded to the instructions for the primes. Participants were told they were about to read a news article recently published in the online Sunday section of the *New York Times* and that the story was chosen because the length makes it ideal for memory tasks. They were told to read the article carefully because they would be asked several questions about the story afterward. Participants were randomly assigned to read one of the three articles. They then answered a series of theory relevant questions rated on a 7-point Likert-type scale (1 = *not at all* to 7 = *very much*).

Planned contrasts compared the FLHC prime to the neutral prime. Participants indicated that the FLHC prime made them feel that the world is more dangerous, $t(145) = 6.006$, $p < .001$, $d = 1.216$, unsafe, $t(145) = 4.964$, $p < .001$, $d = 1.004$, unpredictable, $t(145) = 3.814$, $p < .001$, $d = .772$, and more uncertain, $t(145) = 4.464$, $p < .001$, $d = .903$, compared to the neutral prime. Planned orthogonal contrasts compared the SLHC prime to the neutral prime. Participants rated the SLHC prime as making them feel more competitive, $t(145) = 3.535$, $p = .001$, $d = .700$, that they wanted to invest in themselves more, $t(145) = 2.646$, $p = .009$, $d = .524$, and that the population is increasing, $t(145) = 7.215$, $p < .001$, $d = 1.429$. Importantly, the prime conditions did not significantly differ in emotional arousal, $F(2,145) = .055$, $p = .946$. It was therefore concluded the primes had their intended effects.

Study 1

Study 1 examined the role of LHS and experimentally manipulated LHCs in the use of exploitative strategies in an adult human population. The strategy of interest was cheating as measured by the Dot Game. Theoretically, actual environmental changes should have the greatest effect on behavior, and past work suggests that LHCs are more likely to influence younger individuals (Brumbach, Figueredo, & Ellis, 2009; Ellis et al., 2009). If it could be shown that a relatively minimal manipulation of environmental contingency information could alter the use of exploitative strategies even in adults, this would be strong evidence for the importance of LHCs. The following predictions were made based on the theorizing mentioned earlier.

Hypothesis 1: SLHSs will cheat less (i.e., take less money for themselves) relative to FLHSs.
Hypothesis 2: The FLHC prime will result in more cheating compared to the neutral prime.
Hypothesis 3: The SLHC prime will result in less cheating compared to the neutral prime.

Additionally, LHCs were tested for a possible moderating relationship between LHS and cheating, but no specific direction or magnitude was hypothesized.

Material and Method

Participants and Design

Participants consisted of 182 (44% male and 56% female, $M_{age} = 34.5$, $SD = 12.54$) people recruited through MTurk. All participants had to be located in the United States, have at least a 95% approval rating, and be at least 18 years of age in order to participate. Participants were paid US$0.50 for participating in the study and up to US$1.00 as a bonus on the Dot Game task. All studies in this work were approved by the institutional review board at the University of Wyoming. The experiment employed a between-participants design (LHC primes with LHS and self-report antisocial behavior/delinquency as additional predictors). Further descriptive participant characteristics included yearly income before taxes and current relationship status. Income: <10,000 (15.9%); 10,001–25,000 (19.2%); 25,001–40,000 (28%); 40,001–50,000 (9.9%); 50,000–75,000 (14.8%); 75,001–100,000 (6.6%); and >100,000 (5.5%). Relationship status: single (25.8%), dating (19.8%), cohabitating (10.4%), engaged (3.8%), married (34.6%), divorced/separated (4.9%), and widowed (0.5%).

Measures

Arizona Life History Battery. LHS was measured using the Arizona Life History Battery (ALHB; Figueredo, 2007). The ALHB was developed to measure the multifaceted nature of this construct, and as such, it is comprised of several subscales. The scale contains 199 items on eight separate inventories assessing behavioral and attitudinal manifestations of LHS, with higher scores indicating a SLHS. Inventories include *Mini-K short form measure of LHS* (20 items), *Insight, Planning and Control* (20 items), *Mother/Father relationship quality* (26 items), *Family Social Contact and Support* (15 items), *Friends Social Contact and Support* (15 items), *Experiences in Close Relationships* (36 items), *General Altruism* (50 items), and *Religiosity* (17 items), $\alpha = .88$.

Delinquency. The Delinquency Short Form (D-20; adapted from Charles & Egan, 2005; see also Figueredo et al., 2006) was used to measure trait delinquency/socially deviant behaviors ($\alpha = .84$). The scale asks participants to indicate the frequency with which they have engaged in a variety of behavior such as "Using a weapon" and "Fighting in the street."

LHC primes. There were three primes, FLHC, SLHC, and a neutral prime. All primes were formatted to look like a *New York Times* article.

Procedure

Participants completed a health demographic questionnaire, ALHB, and the D-20. After completing these questionnaires, participants read one of three primes (FLHC, SLHC, or neutral). Participants then read instructions for the Dot Game, played the game, and allocated the bonus money. Finally, participants were debriefed.

Results

Data Screening

No missing values were identified, and variables were adequately normally distributed (skew < 2.0, kurtosis < 3.0). LHC manipulation showed even splits (FLHC prime = 58, SLHC prime = 61, and neutral prime = 63). There were no univariate outliers (i.e., *Z*s > 3.29). One multivariate outlier was detected based on Mahalanobis distance >20.515 for a chi-square distribution with five predictors and $p \leq .001$ (Case # 176). This case was removed from the data set, reducing the sample size to $N = 181$. No problematic collinearity was detected. There was sufficient linearity and homogeneity of variance ($F_{max} = 1.67$). The residual plot indicated that residuals were normal and independently distributed.

Cheating

Cheating on the Dot Game was present ($M = 0.68$, $SD = 0.25$). Scores ranged from US$0.00 to US$1.00. Thus, some people acted altruistically and took less, whereas others took the maximum amount, leaving nothing for the (nonexistent) other player. Approximately 47.5% of people allocated more to themselves than was fair, demonstrating exploitative and deceptive behavior. Additionally, a bivariate correlation between cheating scores and the D-20 showed a positive association, $r(179) = .178$, $p = .016$. Participants who scored higher on the measure of delinquency/deviant behavior tended to cheat more on the Dot Game. The means and *SD*s for cheating in each experimental condition are presented in Table 1.

Table 1. Means for Cheating.

	Mean	*SD*
Overall cheating	.68	.25
FLHC prime	.77	.22
SLHC prime	.60	.23
Neutral prime	.67	.28

Note. FLHC = fast life history contingency; SLHC = slow life history contingency.

Multiple regression was used to test the effect of LHS, LHCs, and their interaction. The LHC primes were dummy coded with the neutral prime as the reference group. The standardized solution is presented. The overall model was significant, $F(5, 175) = 7.079$, $p < .001$; $R^2 = .168$, CI_{95} [0.061, 0.247]. Thus, this combination of predictors is expected to account for between 6.1% and 24.7% of the variability of cheating in the population. LHS significantly predicted cheating, $\beta = -.297$, $t(175) = -4.243$, $p < .001$. Specifically, as LHS increased (indicating a SLHS) by 1 *SD*, there was a −.297 *SD* decrease in cheating, and LHS uniquely accounted for 8.6% of the variance with a CI_{95} of [0.026, 0.172]. The FLHC prime also predicted cheating, $\beta = .163$, $t(175) = 2.053$, $p = .042$. This uniquely accounted for 2% of the variance in cheating, CI_{95} [0, 0.079]. The SLHC prime was not significant, $\beta = -.141$, $t(175) = -1.79$, $p = .075$, nor was the interaction between LHS and the SLHC prime, $\beta = .009$, $t(175) = .121$, $p = .903$, nor the interaction between LHS and the FLHC prime, $\beta = .049$, $t(175) = .587$, $p = .558$.

Discussion

The results of this study provide preliminary evidence for LHS and LHCs in predicting exploitative and deceptive behavior (specifically, nonviolent theft of monetary resources). Consistent with LHT, SLHSs cheated less than FLHSs. The relationship between LHS and exploitative behavior has until now only been tested through related constructs, such as criminal behavior, psychopathy, and social deviance indicators including Machiavellism (Ellis, 1988; Ellis et al., 2009; Gladden, Figueredo, & Jacobs, 2009). These findings are consistent with the evidence that FLHSs, compared to slow, tend to engage in more criminal behavior (Ellis, 1988). Thus, the current research extends past findings to exploitative behavior which is not criminal or socially deviant, providing converging evidence for LHT. Moreover, the present study extends past work

by directly observing exploitive behavior. Most of the research in the area of LHS and criminal behavior has involved reports of past behavior (e.g., Brumbach et al., 2009). Our research showed LHS to be associated with an observed instance of exploitation.

This study also provided support for the role of LHCs in exploitative behavior. Specifically, the FLHC prime resulted in more cheating compared to the neutral prime. Thus, the results of this experiment converge with the findings of Brumbach et al. (2009). However, although a FLHC was associated with more exploitative behavior, a SLHC was not associated with a significant decrease. Furthermore, the effect size for the FLHC prime was very small, and the confidence interval on the effect size included zero. Thus, it is unclear whether the effect of LHCs on cheating is a reliable effect. Replicating the current study should help determine this. There was also no interaction between LHS and either the FLHC or the SLHC prime. Therefore, the relationship of LHS to exploitative and deceptive behavior did not depend on LHCs. Nonetheless, these results tentatively suggest that even adult humans may be sensitive to LHC information and that this information influences resource acquisition strategies. This study also further validates the Dot Game as a measure of exploitative behavior that can be easily administered in lab settings and over the Internet. This feature gives researchers greater flexibility in recruiting diverse samples.

Although this study provides some support for the relationship of LHS, LHCs, and exploitative behavior, one limitation of this study is the scope of the measure of exploitative and deceptive resource acquisition strategies. Specifically, the cheating task captures only one of the tactics that theoretically makeup an exploitative strategy. For example, Buss and Duntley (2008) also discuss free riding and mate poaching as examples of an exploitative strategy. In addition, there are other tactics (e.g., using violence) or other resources (e.g., mates) that were not measured with the Dot game. Therefore, the Dot Game is limited in breadth. To address this, in Studies 2a through 2c, we develop and validate a self-report measure that captures multiple behaviors that are part of an exploitative strategy.

Study 2a

To develop the items for the self-report measure, a total of 22 scenario-based questions were written to capture behaviors that would be theorized to have evolutionary implications. For example, infidelity is hypothesized to be an important cue to when a male kills his intimate partner (Daly & Wilson, 1988). Other items that have evolutionary implications included mate poaching and free riding. Pilot data indicated that phrasing items in terms of how tempted individuals would be to engage in the behaviors (rather than how likely) resulted in higher item endorsement and so this phrasing was used. The items were written to capture many different tactics (e.g., violence, threat of violence, deception) and many different resources (e.g., money, mates, a job). Group-level tactics such as coalitional warfare were not included. The items were written with just enough detail to allow participants to imagine or simulate the situation (see Table 2).

Material and Method

Participants

Data from 241 (42% male, 58% female, $M_{age} = 36.69$) MTurk participants were collected. All participants had to be located in the United States, have at least a 95% approval rating, and be at least 18 years of age in order to participate. Participants were paid US$0.20.

Measures and Procedure

Participants completed a health and demographic form, the D-20 (adapted from Charles & Egan, 2005; see also Figueredo et al., 2006), and answered the 22 items of the EDRASS (items were presented 1 per page). Interspersed within the EDRASS were four questions adapted from the unethical decision-making scale (Detert, Treviño, & Sweitzer, 2008). In order to show discriminant validity, these items did not contain ethical dilemmas or exploitative behavior. An example of a nonethical dilemma question is, "Your professor/boss asks you to complete a voluntary survey. How tempted would you be to NOT do it because you're just too busy?" We also included these items to show that similarly worded items would nonetheless differ from the EDRASS. Participants responded to the EDRASS items and the adapted items from the unethical decision-making scale using a 7-point scale (1 = *extremely untempted* to 7 = *extremely tempted*).

Results

Data Screening

Data were screened prior to analysis, all values were in range and plausible, and no missing values were identified. For outliers (based on Z score ≥ 3.29, $p \geq .001$), one participant's data were excluded based on $Z = 5.4288$ for the EDRASS Item 9. Two subjects were excluded based on $Z = 5.2147$ for the EDRASS Item 21. This reduced the sample size from $N = 241$ to 238. Most items demonstrated acceptable skew and kurtosis. However, because EDRASS Item 1 was negatively skewed and demonstrated a significantly larger mean ($M = 4.62$) than did the other items, it was removed from analysis. Because of problematic univariate distribution (skew = 3.65 and kurtosis = 14.25), EDRASS Item 2 was also removed. This left 20 items for factor analysis, and a case to variable ratio of greater than 11 to 1.

Factor Analysis

An initial exploratory factor analysis (EFA) was conducted on the remaining 20 items. Principal axis factoring was utilized, as the goal was to identify the underlying latent construct (Gorsuch, 1983). A promax rotation was chosen to allow

Table 2. EDRASS Questions.

Study 2a	Studies 2b and 2c
EDRASS 1: You are walking through the park very early in the morning and you find a wallet. You open up the wallet and see $100 dollars cash. How tempted would you be to take the money?	EDRASS 1A: You are interested in pursuing a relationship with an attractive man/woman, however, this person is already in a relationship. How tempted would you be to threaten this other person to get him or her to break up with the attractive man/woman so you would be free to pursue them? *(Coercion for sexual resources)*
EDRASS 2: It is late in the evening and you come across a car that is unlocked and the keys are on the front seat. No one is around. How tempted would you be to steal the car?	EDRASS 2A: It is late at night and you and your girlfriend/boyfriend are being intimate, however, your girlfriend/boyfriend changes her or his mind and does NOT want to proceed to have sex. How tempted would you be to physically bully him or her into having sex with you anyway? *(Coercion for sexual resources)*
	EDRASS 3: A coworker has just finished a big assignment, however, he or she does not have time to give it to your mutual boss because of a meeting, so he or she ask you to hand it in. When handing in the assignment, how tempted would you be to take partial credit for it? *(Deception and manipulation for monetary resources)*
	EDRASS 4: You are in charge of buying food for an event and each member of the group puts in US$10 dollars to contribute (including yourself). While collecting the money, one person accidentally gives you a US$20 dollar bill instead of a US$10 dollar bill and does not notice. How tempted would you be to say nothing to this person and keep the money for yourself? *(Deception and manipulation for monetary resources)*
	EDRASS 5: You are on your first date with someone that you recently met. Both of you have enjoyed the evening and are back at your place. Your date has had a little too much to drink and passes out. How tempted would you be to do anything sexual to your date while they are passed out? *(Coercion for sexual resources)*
	EDRASS 6: You have just come home to the apartment you share with your girlfriend/boyfriend. You hear noises coming from the bedroom so you approach the bedroom door. As you get closer, you see your partner having sex with someone. How tempted would you be to kill either or both of them? *(Retaliatory violence)*
EDRASS 7: While at a singles event at a local bar you start a conversion with an attractive man/woman. While talking with this person, someone else (a stranger to you) tries to interfere and competes for the attractive man's/woman's attention. The stranger excuses himself or herself for a moment, to get another drink. How tempted would you be to insult this stranger or claim you know something negative about the stranger?	EDRASS 7A: Suppose you are currently having a sexual relationship with two different people. However, one of them desires a long-term relationship and asks you to break it off with the other person. How tempted would you be to pretend to break it off and continue to have sex with both people? *(Deception and manipulation for sexual resources)*
	EDRASS 8: While hanging out with several close friends, an acquaintance that you dislike very much comes over and yells at you and insults you. How tempted would you be to attack this person? *(Retaliatory violence)*
	EDRASS 9: You and your girlfriend/boyfriend have recently had an argument because you suspect him or her of cheating on you. You ask him or her if he or she wants to have "make up sex" and he or she gives a very forceful, "No!" How tempted would you be to force him or her to have sex with you anyway? *(Coercion for sexual resources)*
EDRASS 10: You are in a grocery store and you only need 1 item but you realize you forgot your wallet. How tempted would you be to steal the item?	EDRASS 10A: At a social event you become sexually interested in an attractive man/woman who during conversation describes the qualities he or she is looking for in the perfect romantic partner (e.g., financial stability and sexual faithfulness). However, you do not resemble his or her perfect romantic partner at all. How tempted would you be to lie and claim to have all the qualities the person desires? *(Deception and manipulation for sexual resources)*
	EDRASS 11: At a sports bar you bet on a football game with one of the other patrons. After you win, the other person refuses to pay you. How tempted would you be to forcefully take the money? *(Retaliatory violence)*
	EDRASS 12: You meet an attractive man/woman at the mall and become highly sexually interested in this person. How tempted would you be to pursue a sexual relationship with this person even if he or she was not interested in you at all? *(Deception and manipulation for sexual resources)*
	EDRASS 13: While out at an event with a group you compete for the affection of an attractive man/woman with another member of the group. The attractive man/woman clearly prefers this other person to you. How tempted would you be to sexually assault the attractive man/woman or physically assault the other person later? *(Coercion for sexual resources)*

(continued)

Table 2. (continued)

Study 2a	Studies 2b and 2c
	EDRASS 14: Someone from your work/school owes you money. Although this person has the money, they refuse to pay you back. How tempted would you be to use physical force to get your money? *(Retaliatory violence)*
	EDRASS 15: You are on your third date with someone and this person says he or she wants to have sex with you, but only if you are interested in a long-term relationship. You are not interested in a long-term relationship with this person and will immediately stop seeing him or her after you have had sex with him or her. How tempted would you be to lie to him or her and have sex anyway? *(Deception and manipulation for sexual resources)*
	EDRASS 16: You borrow US$50 dollars from an acquaintance who expects you to pay back the money within 6 months. How tempted would you be to pretend to forget the debt, and NOT pay the person back? *(Deception and manipulation for monetary resources)*
	EDRASS 17: A friend of yours does you a favor and helps you with an important assignment. How tempted would you be to NOT return this favor? *(Deception and manipulation for monetary resources)*
	EDRASS 18: An acquaintance of yours has recently come into some money. How tempted would you be to use your relationship with this person to emotionally manipulate him or her into giving you some of this money? *(Deception and manipulation for monetary resources)*
	EDRASS 19: You are very interested in an attractive man/woman, however, this person is in a relationship. Although this person is in a relationship you find out that he or she is also interested in being with you. How tempted would you be to engage in a sexual relationship with this person? *(Deception and manipulation for sexual resources)*
	EDRASS 20: Recently, a family member of yours was badly injured and although you know who did it, the police cannot arrest him or her. How tempted would you be to kill the person who attacked your family member? *(Retaliatory violence)*
	EDRASS 21: A new job has recently opened up at your work. This new job would pay a lot more money and is highly prestigious, however, there is another person who is competing for the job and they are more qualified than you. How tempted would you be to use violence or the threat of violence to intimidate him or her to back off from the job? *(Coercion for sexual resources)*
EDRASS 22: You have a date with a highly attractive man/woman at an expensive restaurant, however, you don't have clothing that is fancy enough and your clothing will not impress your date. How tempted would you be to steal some expensive clothing for the date?	EDRASS 22A: You are interested in an attractive man/woman, however, an acquaintance of yours also desires this person. How tempted would you be to claim you knew something negative about the attractive man/woman in order to persuade your acquaintance to not pursue him or her? *(Deception and manipulation for sexual resources)*

Note. Corresponding factors are in parentheses. EDRASS = Exploitative and Deceptive Resource Acquisition Strategy Scale.

underlying factors to correlate, as the underlying latent construct is assumed to encompass a correlated set of exploitative and deceptive tactics. The Kaiser–Meyer–Olkin measure of sampling adequacy was .868, and Bartlett's test of sphericity was significant, $\chi^2(190) = 2{,}091.960$, $p < .001$, suggesting the data were factor analyzable. Examination of the scree plot highly suggested a four-factor solution. Examination of the pattern matrix yielded several problematic items. Item EDRASS 7 was removed due to its highest loading (on the fourth factor) of .286. Item EDRASS 22 was removed due to it not loading greater than .5 on any one factor and having consistent cross loadings greater than .2. Item EDRASS 10 was removed due to the low communality estimate (.251) and no factor loading greater than .4. The final iteration of the EFA contained 17 items.

Principal axis factoring with a promax rotation was used, and the scree plot once again highly suggested a four-factor solution (see Figure 1). Kaiser–Meyer–Olkin measure of sampling adequacy was .848, and Bartlett's test of sphericity was significant, $\chi^2(136) = 1731.651$, $p < .001$. The pattern matrix with factor loadings and communality estimates for the final solution are presented in Table 3. As shown in the table, primary loadings were greater than .40, and there were no substantial cross loadings.

Construct Validity

To provide construct validity for the relationships of the total EDRASS (with all 17 items in order to conserve tests) with the D-20, sex and the single item, "have you ever been arrested?" were tested. EDRASS and the D-20 were positively correlated, $r(236) = .387$, $p < .00$; EDRASS and the item "have you ever been arrested" were positively correlated, $r(236) = .197$, $p = .002$; and EDRASS and sex (0 = *Female*, 1 = *Male*) were

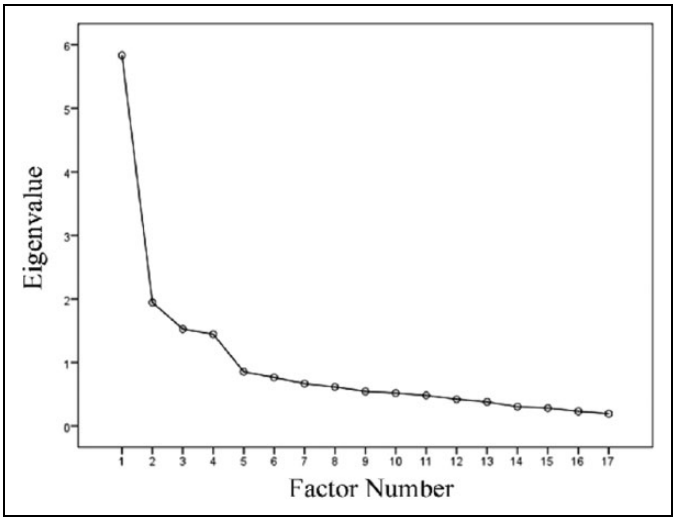

Figure 1. Scree plot from the final solution for Study 1.

Table 3. Factor Loadings and Communality Estimates for 17 Items From the EDRASS, Study 1.

	Factor 1	Factor 2	Factor 3	Factor 4	Communality Estimates
EDRASS 13	.92				.76
EDRASS 9	.91				.78
EDRASS 21	.68				.59
EDRASS 5	.59				.41
EDRASS 8		.77			.49
EDRASS 20		.68			.41
EDRASS 14		.68			.58
EDRASS 6		.62			.37
EDRASS 11		.62			.58
EDRASS 16			.90		.71
EDRASS 18			.66		.43
EDRASS 17			.64		.43
EDRASS 4			.57		.40
EDRASS 3			.42		.54
EDRASS 15				.96	.86
EDRASS 19				.61	.35
EDRASS 12				.47	.30

Note. Factor loadings less than .3 are suppressed. $N = 238$. EDRASS = Exploitative and Deceptive Resource Acquisition Strategy Scale.

positively correlated, $r(236) = .171$, $p = .008$. Therefore, having higher scores on the EDRASS was associated with greater delinquency/criminality, having been arrested, and being male. There was a small correlation between scores on the EDRASS and the nonethical items, $r(236) = .193$, $p = .003$.

Discussion

Through principal axis factoring, the initial 22 items were reduced to 17 items. The remaining items showed a clear four-factor solution. However, several factors had less than 5 items, which according to Gorsuch (1983) is the minimum recommended number of items per factor. Therefore, new items were generated that could relate to these factors, and a new sample was collected.

Study 2b

In Study 2b, 5 new items were generated, making a total of 22 items. A new sample was collected and the analyses from Study 2a repeated.

Material and Method

Using MTurk, 236 (60% female) participants were recruited, $M_{age} = 34.72$. All participants had to be located in the United States, have at least a 95% approval rating, and be at least 18 years of age in order to participate. Participants were paid US$0.20 for participating. Measures and procedure were the same as Study 2a.

Results

Data Screening

Data were screened prior to analysis, and all values were in range and plausible, no missing values were identified, and items approximated normality (skew ≤ 3.0; kurtosis ≤ 8.0; Kline, 2005). Several outliers on items were identified based on $Z > 3.29$. Seven scores were identified as outliers (6 scores of $Z = 3.82$ and 1 score of $Z = 4.87$) for EDRASS Item 13. Case #186 ($Z = 4.87$) was removed from the data set, reducing the sample size to $N = 235$, however, the other six cases were retained as these scores were part of a continuous distribution. That is, there was no clear break between these scores and the rest of the distribution. Although outliers were detected for other items, all represented a continuous distribution and Zs were < 4.2. As no items required removal, this left 22 items for factor analysis and a case to variable ratio of greater than 10.6:1.

Factor Analysis

An EFA was conducted on the 22 items, and, as in Study 2a, principal axis factoring was used with a promax rotation. The Kaiser–Meyer–Olkin measure of sampling adequacy was .903, and Bartlett's test of sphericity was significant, $\chi^2(231) = 2{,}721.385$, $p < .001$. The scree plot once again suggested a four-factor solution.

The pattern matrix with factor loadings and communality estimates are presented in Table 4. Primary loadings were greater than .35, and there were no substantial cross loadings. Although several items had factor loadings below .40, these items were in the previous EFA in Study 2a and had loadings greater than this threshold, added to conceptual interpretation, and did not show substantial cross loadings. Additional solutions were explored, but none led to a more interpretable solution.

It should also be noted that separate factor analyses were conducted for male and female participants. The results were

Table 4. Factor Loadings and Communality Estimates for 22 Items From the EDRASS.

	Factor 1	Factor 2	Factor 3	Factor 4	Communality Estimates
EDRASS 13	.87				.69
EDRASS 2A	.84				.73
EDRASS 9	.84				.63
EDRASS 1A	.78				.70
EDRASS 21	.77				.65
EDRASS 5	.77				.64
EDRASS 14		.76			.65
EDRASS 11		.74			.59
EDRASS 8		.65			.43
EDRASS 20		.64			.41
EDRASS 6		.57			.34
EDRASS 19			.78		.49
EDRASS 7A			.75		.66
EDRASS 15			.75		.56
EDRASS 10A			.66		.54
EDRASS 12			.37		.30
EDRASS 22A			.35		.40
EDRASS 16				.77	.54
EDRASS 4				.74	.53
EDRASS 17				.72	.51
EDRASS 18				.64	.54
EDRASS 3				.40	.46

Note. Factor loadings less than .3 are suppressed. $N = 235$. EDRASS = Exploitative and Deceptive Resource Acquisition Strategy Scale.

very consistent across sex. Specifically, each analysis showed a four-factor pattern, with similar initial eigenvalues, and the same items loading on the same factors. Because separating the analyses would substantially reduce the case to variable ratio, and there was no strong evidence to suggest a different factor solution for men and women, subsequent analyses were conducted for the whole sample.

The four extracted factors were examined and the following labels were generated: First factor—coercion for sexual resources, second factor—retaliatory violence, third factor—deception and manipulation for monetary resources, and fourth factor—deception and manipulation for sexual resources. On all factors and the total score, higher scores indicated greater item endorsement. Moderate correlations between each factor are presented in Table 5. Composite scores were created for each factor and the total scale. Descriptive statistics including reliability estimates are presented in Table 6. The total EDRASS was normally distributed and highly internally consistent.

Construct Validity

Construct validity was assessed by testing for a relationship with the D-20, sex (0 = *Female* and 1 = *Male*), and the single item, ''Have you ever been arrested.'' EDRASS and the D-20 were positively correlated, $r(235) = .335$, $p < .001$. The EDRASS and sex were positively correlated, $r(235) = .229$, $p < .001$. EDRASS scores and the item, ''have you ever been arrested'' were not significantly correlated, $r(235) = .053$, $p = .418$. Therefore, having higher scores on the EDRASS was associated with greater delinquency and being male but not a criminal record. This provides some convergent validity to the ERASS.

Table 5. Correlation Matrix for the Four Factors of the EDRASS, Study 2b.

	(1)	(2)	(3)	(4)
(1) Coercion for sexual resources	—			
(2) Retaliatory violence	0.46	—		
(3) Deception and manipulation for sexual resources	0.52	0.57	—	
(4) Deception and manipulation for monetary resources	0.58	0.38	0.58	—

Note. EDRASS = Exploitative and Deceptive Resource Acquisition Strategy Scale.

To provide discriminant validity, the mean of the EDRASS ($M = 2.33$, $SD = .93$) and the mean of the nonethical items ($M = 4.89$, $SD = 1.18$) were compared and found to be significantly different, $t(235) = 26.58$, $p < .001$. This suggests participants responded to the items from the EDRASS and the nonethical items differently. Additionally, there was no correlation between the EDRASS and the nonethical items, $r(235) = .037$, $p = .574$.

Discussion

Through principal axis factoring, all 22 items showed a clear and interpretable four-factor solution of moderate to high reliability. Although men score higher on the EDRASS than do women, there was no evidence of sex differences in the factor structure. This does not imply that there are not meaningful sex differences in exploitative strategies. For example, there are probably resources that only men or only women try to acquire. However, as an empirical matter, our data did not show a significantly different factor pattern for male versus female participants. The factor pattern discovered as a result of Studies 2a and 2b was tested in a confirmatory analysis in Study 2c.

Study 2c

The purpose of Study 2c was to test the hypothesized four-factor structure of the EDRASS identified in the two previous studies as well as to further validate the measure. In particular, we were interested in examining the relationship between the EDRASS and the mating effort. Mating effort scale (MES) and the EDRASS both measure the attainment of sexual partners, thus it is of interest to see to what extent they overlap.

Material and Method

Participants and Design

The sample consisted of 237 MTurk participants (51.6% male and 48.4% female, $M_{age} = 32$) who were paid US$0.20 each.

Table 6. Descriptive Statistics for the Four Factors and Total EDRASS, Study 2b.

	No. of Items	*M* (*SD*)	Skewness	Kurtosis	Cronbach's α	% of Variance
Coercion for sexual resources	6	1.50 (.95)	2.07	3.30	.92	36.03
Retaliatory violence	5	2.85 (1.40)	0.60	−0.40	.81	8.40
Deception and manipulation for sexual resources	6	2.73 (1.27)	0.39	−0.63	.83	6.32
Deception and manipulation for monetary resources	5	2.30 (1.19)	0.77	−0.31	.81	3.61
EDRASS total	22	2.33 (.90)	0.63	−0.32	.91	54.37

Note. EDRASS = Exploitative and Deceptive Resource Acquisition Strategy Scale.

All participants had to be located in the United States, have at least a 95% approval rating, and be at least 18 years of age in order to participate.

Measures

Participants completed a health and demographic form, the MES, and the EDRASS. The MES is measure of how much mating effort one allocates, with higher scores indicating greater mating effort (Rowe, Vazsonyi, & Figueredo, 1997). There is a male ($\alpha = .76$) and female version ($\alpha = .69$) both with 10 items. An example item from the male version is, "I would rather date several girls at once than just one girl."

Procedure

Participants answered the health and demographic form and then based on their answer to the question concerning their sex, they were automatically presented with either the male or the female version of the MES. Finally, participants completed the EDRASS (1 item per page).

Results

Data Screening

Values were in range and plausible, and no missing values were identified. Although items approximated normality, there was some positive kurtosis greater than 2.00 on several items (skew ≤ 3.0, kurtosis ≤ 8.0; Kline, 2005). One outlier was identified based on $Z > 3.29$ for EDRASS Item 21 ($Z = 4.49$). This participant was removed, reducing the sample size to $N = 236$. No additional participants were removed, and other potential cases represented a continuous distribution ($Z < 4.2$). The case to variable ratio was 10.72:1.

Analytic Strategy

A four-factor model was specified, with 6 items for coercion for sexual resources, 5 items for retaliatory violence, 6 items for deception and manipulation for sexual resources, and 5 items for deception and manipulation for monetary resources. Latent factors were allowed to covary, and no items were selected as marker indicators. As several items showed some kurtosis, a robust estimator (Satorra-Bentler, MLM) was used. Indices of model fit were root mean square error of approximation (RMSEA), standardized root mean square residual (SRMR), comparative fit index (CFI), and Tucker–Lewis index (TLI). Based on Bentler (1990) and Kline (2005), the following values were considered as criterion for adequate model fit: RMSEA (values less than .08), SRMR (values less than .10), and CFI and TLI (values greater than .90). Additionally, based on Hu and Bentler (1999), the following values were considered close fit: RMSEA (values less than .06), SRMR (values less than .08), and CFI and TLI (values greater than .95). Analyses were conducted using MPlus version 6.

Confirmatory Factor Analysis

The initial model of the hypothesized four-factor structure was significant, $\chi^2(203) = 378.06$; $p < .001$, and provided the following fit indices: RMSEA = .060 (CI_{90} = [.051, .070]), SRMR = .061, CFI = .910, and TLI = .897. Thus, RMSEA and SRMR values suggested close fit, whereas CFI and TLI values suggested adequate or near adequate fit. All indicators showed substantial association with their respective latent factors ($\lambda = .55$ to .80), and no complex loadings were observed. Modification indices suggested improvement in the model through allowing error variances for 2 items to covary (EDRASS Item 11 and EDRASS Item 14). Only one error covariance was indicated, and both items were indicators for the same factor. Output indicated that by respecifying the model and allowing covariance between these errors, there would be a significant improvement in the model fit, $\Delta\chi^2 = 24.56$. Thus, the model was respecified. This model demonstrated improved fit, χ^2 (202) = 356.11; $p < .001$, RMSEA = .057 (CI_{90} = .047, .066), SRMR = .063, CFI = .920, and TLI = .909. These results suggest adequate to close fit on all indices. Factor loadings and standard errors are presented in Table 7, and latent factor correlations are presented in Table 8. Means, standard deviations, skewness, kurtosis, and reliability estimates are provided in Table 9.

Construct Validity

To further demonstrate construct validity, the overlap of mating effort with the total EDRASS score was assessed. We also examined the relationship with the deception and manipulation for sexual resources factor, as this factor is theoretically most similar to mating effort. Using bivariate correlation, EDRASS and sex (0 = *Female*, 1 = *Male*) were positively correlated, $r(235) = .239$, $p < .001$. A regression model with the MES and sex as predictors was used in order to determine the unique

Table 7. Factor Loadings for the Final CFA Model, Study 2c.

	Loading	Std. Error	Std. Loading
Coercion for sexual resources			
EDRASS 5	1.00	0.00	0.75
EDRASS 13	0.87	0.08	0.75
EDRASS 2A	1.04	0.12	0.80
EDRASS 9	0.91	0.08	0.79
EDRASS 1A	0.85	0.10	0.72
EDRASS 21	0.73	0.90	0.72
Retaliatory violence			
EDRASS 6	1.00	0.00	0.69
EDRASS 8	0.95	0.92	0.70
EDRASS 11	0.85	0.10	0.65
EDRASS 14	0.90	0.10	0.67
EDRASS 20	0.93	0.08	0.66
Deception and manipulation for sexual resources			
EDRASS 12	1.00	0.00	0.58
EDRASS 15	1.46	0.14	0.78
EDRASS 19	1.22	0.14	0.64
EDRASS 7A	1.29	0.13	0.78
EDRASS 10A	1.16	0.14	0.68
EDRASS 22A	1.08	0.12	0.62
Deception and manipulation for monetary resources			
EDRASS 3	1.00	0.00	0.56
EDRASS 4	1.16	0.17	0.55
EDRASS 16	1.19	0.17	0.66
EDRASS 17	1.20	0.14	0.74
EDRASS 18	1.08	0.17	0.60

Note. EDRASS = Exploitative and Deceptive Resource Acquisition Strategy Scale.

Table 8. Latent Factor Correlations for the Four Factors of the EDRASS, Study 2c.

	(1)	(2)	(3)	(4)
(1) Coercion for sexual resources	—			
(2) Retaliatory violence	.41	—		
(3) Deception and manipulation for sexual resources	.68	.59	—	
(4) Deception and manipulation for monetary resources	.78	.35	.68	—

Note. EDRASS = Exploitative and Deceptive Resource Acquisition Strategy Scale.

relation of each predictor with the EDRASS. MES significantly predicted total EDRASS score, $\beta = .741$, $t(233) = 8.16$, $p < .001$. Thus, higher mating effort was related to greater reported use of exploitative strategies. Further, MES uniquely accounted for 20.9% of the variance in total EDRASS scores. Sex did not significantly predict scores on the EDRASS, $\beta = .172$, $t(233) = 1.524$, $p = .129$.

MES significantly predicted scores on the deception for sexual resources factor, $\beta = .867$, $t(233) = 6.846$, $p < .001$, uniquely accounting for 15.5% of the variance in this factor. Sex also significantly predicted scores on the deception for sexual resources factor, $\beta = .378$, $t(233) = 2.046$, $p < .017$, uniquely accounting for 1.9% of the variance. Thus, men and those reporting higher mating effort scored higher on the deception for sexual resources factor.

Table 9. Descriptive Statistics for the four factors and EDRASS total, Study 2c.

	M (*SD*)	Skewness	Kurtosis	Cronbach's α
Coercion for sexual resources	1.80 (1.05)	1.58	2.13	.89
Retaliatory violence	3.39 (1.35)	0.14	−.68	.82
Deception and manipulation for sexual resources	3.14 (1.30)	0.17	−.86	.84
Deception and manipulation for monetary resources	2.65 (1.16)	0.44	−.60	.75
EDRASS total	2.73 (0.95)	0.51	− .13	.91

Note. EDRASS = Exploitative and Deceptive Resource Acquisition Strategy Scale.

Discussion

Study 2c confirmed the hypothesized four-factor structure of the previous studies. Specifically, this study supports the hypothesis that these factors are an interrelated set of goals and tactics, constituting aspects of an exploitative resource acquisition strategy. The coercion for sexual resources factor has the goal of either directly or indirectly acquiring mates. The tactics are violence or the threat of violence. The retaliatory violence factor has the goal of retaliation due to the use of an exploitive and deceptive strategy by a conspecific. The means involve violence. The deception and manipulation for sexual resources factor has the goal of sex or sexual resources. The tactic is nonviolent deception and manipulation. The deception and manipulation for monetary resources factor has the goal of attaining monetary resources. The tactic, like the previous factor, is deception and manipulation. As there is a moderate relationship between the factors, individuals are likely use multiple strategies to exploit others.

Although men are more likely to score higher on the EDRASS, sex did not uniquely predict scores on the EDRASS with mating effort in the model. This suggests that mating effort may be driving the relationship between EDRASS and sex. Although there is a male and female version of the MES, we did not control for sexual orientation. We expect the effect of mating effort and the EDRASS to hold for both heterosexual and homosexual relationships. More importantly, it does not appear that the EDRASS and MES are measuring the same construct. Rather, there is likely a close relationship between the use of exploitative strategies and mating effort, which would be predicted by LHT. Further analysis, preferably using structural equation modeling, will be necessary to determine the nature of the relationship of these constructs and other life history traits.

Because each factor represents a different goal and tactic, it could be argued that the factors should be analyzed separately, rather than using a total score for the EDRASS. However, researchers may not be interested in differences in individual's exploitative and deceptive behavior on one specific factor or may wish to conserve tests. In this case, it could be argued that the total score on the EDRASS should be used. An advantage of using the total score on the EDRASS is that the full scale is more internally consistent and normally distributed than any one factor. Considering these arguments and that the factors are only moderately correlated does not suggest a strong position either way.

Three separate samples suggested a four-factor structure, provided consistently strong reliability estimates, and produced evidence for construct validity for the EDRASS. Therefore, the evidence suggests the EDRASS to be a valuable measure, meeting one of the primary goals of this research. The final study returned to the question of whether LHS and LHCs influence the use of exploitative strategies as measured by the EDRASS.

Study 3

The purpose of Study 3 was to further examine whether LHS, LHCs, or their interaction predict how tempted adults would be to engage in a variety of exploitative and deceptive behaviors. As in Study 1, primes were used to manipulate LHCs. The sample included only adults. The following predictions were made.

1. SLHSs will have lower scores on the EDRASS factors, relative to FLHSs.
2. The FLHC prime will result in higher scores on the EDRASS factors, compared to the neutral prime.
3. The SLHC prime will result in lower scores on the EDRASS factors, compared to the neutral prime.

As in Study 1, we tested whether LHCs moderated the relationship between LHS and exploitative strategies, though no specific direction or magnitude was hypothesized.

Material and Method

Participants

Participants were 187 (42.8% male and 57.2% female, M_{age} = 34.1, SD = 11.93) people recruited through MTurk and paid US$0.20 for participation. Additional descriptive participant characteristics include family income growing up and current relationship status. Family income growing up: <10,000 (8.0%); 10,001–25,000 (18.2%); 25,001–40,000 (23.5%); 40,001–50,000 (12.8%); 50,0001–75,000 (16.0%); 75,001–100,000 (13.4%); and >100,000 (8.0%). Relationship status: single (37.4%), dating (13.4%), cohabitating (7.5%), engaged (5.9%), married (27.3%), divorced/separated (7.5%), and widowed (1.1%).

Design and Procedure

This study employed an experimental design with one between-participant factor (LHC primes). Participants completed a health and demographic questionnaire and the Mini-K measure of LHS. After completing the questionnaires, participants read one of three primes (FLHC, SLHC, or neutral) and then completed the EDRASS.

Measures

The Mini-K (a part of the ALHB) is a measure of LHS and was chosen for its brevity (Figueredo, 2007). The Mini-K correlates well with the full ALHB (r = .77) and is reliable (α = .80). The EDRASS was also administered as a measure of the different tactics and goals used in an exploitative and deceptive strategy (α = .90).

LHC primes. The same primes as in Study 1 were used here.

Results

Data Screening

No missing values were identified, and variables were adequately normally distributed (skew < 2.0 and kurtosis < 4.0). LHC manipulation showed even splits (FLHC prime = 66, SLHC prime = 59, and neutral prime = 62). There was one univariate outlier (Z = 4.22), on the coercion for sexual resources factor of the EDRASS based on Z > 3.29. However, this represented a continuous distribution. No multivariate outliers were detected based on Mahalanobis distance > 18.467 for a chi-square distribution with four predictors and $P \leq .001$. No problematic collinearity was detected. There was sufficient linearity and homogeneity of variance (F_{max} = 1.16). Residual plots were examined and indicated the residuals were normal and independently distributed.

Main Analyses

Multiple regression with dummy coding was used. Dummy codes were used to contrast the prime conditions, with the neutral prime as the reference group. A regression model was run for each of the factors of the EDRASS, with the following predictors in the model: LHS, two LHC dummy codes, the interaction between LHS and the FLHC prime, and the interaction between LHS and the SLHC prime.[1] Each variable in the model was standardized.

Coercion for sexual resources. The overall model was significant, $F(5, 181) = 2.413$, $p < .001$; $R^2 = .062$, CI_{95} [0, .117]. Thus, this combination of predictors is expected to account for between 0% and 11.7% of the variability of this factor in the population. The LHS significantly predicted coercion factor scores, $\beta = -.182$, $t(180) = -2.49$, $p = .013$. Specifically, as LHS increased (indicating a SLHS) by 1 SD, there was a −.182 SD decrease in the coercion factor. LHS uniquely accounted for 3.24% of the variance with a CI_{95} of [.001, .094].

The FLHC prime was not significant, $\beta = .059$, $t(180) = .702$, $p < .483$. The SLHC prime was not significant, $\beta = -.053$, $t(180) = -.641$, $p = .523$, nor was the interaction between LHS and the SLHC prime, $\beta = -.127$, $t(180) = -1.449$, $p = .149$,nor the interaction between LHS and the FLHC prime, $\beta = -.074$, $t(180) = -.892$, $p = .373$.

Retaliatory violence. The overall model was not significant, $F(5, 181) = 1.574$, $p = .169$; $R^2 = .042$. LHS did not significantly predict retaliatory violence scores, $\beta = -.073$, $t(180) = -.985$, $p = .326$. The FLHC prime was not significant, $\beta = -.118$, $t(180) = -1.379$, $p = .170$. The SLHC prime was not significant, $\beta = .046$, $t(180) = .537$, $p = .592$, nor was the interaction between LHS and the SLHC prime, $\beta = -.132$, $t(180) = -1.479$, $p = .141$, nor the interaction between LHS and the FLHC prime, $\beta = .024$, $t(180) = .284$, $p = .777$.

Deception and manipulation for sexual resources. The overall model was significant, $F(5, 181) = 2.757$, $p = .020$; $R^2 = .071$, CI_{95} [.001, .129]. Thus, this combination of predictors is expected to account for between 0.1% and 12.9% of the variability of this factor in the population. LHS significantly predicted deception for sexual resources scores, $\beta = -.256$, $t(180) = -3.493$, $p = .001$. Specifically, as LHS increased by 1 *SD*, there was a −.256 *SD* decrease in deception for sexual resources and LHS uniquely accounted for 6.3% of the variance with a CI_{95} of [.012, .135].

The FLHC prime was not significant, $\beta = -.036$, $t(180) = -.428$, $p = .669$. The SLHC prime was not significant, $\beta = -.035$, $t(180) = -.415$, $p = .679$, nor was the interaction between LHS and the SLHC prime, $\beta = -.089$, $t(180) = -1.012$, $p = .313$,nor the interaction between LHS and the FLHC prime, $\beta = -.037$, $t(180) = -.447$, $p = .655$.

Deception and manipulation for monetary resources. The overall model was significant, $F(5, 181) = 3.325$, $p = .007$; $R^2 = .084$, CI_{95} [.007, .146]. Thus, this combination of predictors is expected to account for between 0.7% and 14.6% of the variability of this factor in the population. LHS significantly predicted deception for monetary resources scores, $\beta = -.288$, $t(180) = -3.961$, $p < .001$. Specifically, as LHS increased by 1 *SD*, there was a −.288 *SD* decrease in deception for monetary resources, and LHS uniquely accounted for 8.0% of the variance with a CI_{95} of [.019, .155].

The FLHC prime was not significant, $\beta = -.031$, $t(180) = -.377$, $p = .707$. The SLHC prime was not significant, $\beta = -.030$, $t(180) = -.357$, $p = .722$, nor was the interaction between LHS and the SLHC prime, $\beta = -.058$, $t(180) = -.668$, $p = .505$, nor the interaction between LHS and the FLHC prime, $\beta = -.009$, $t(180) = -.114$, $p = .909$.

Discussion

Results indicated that SLHSs scored lower on average than did FLHSs on most, but not all, factors of the EDRASS. Specifically, FLHSs scored higher on coercion for sexual resources, deception and manipulation for sexual resources, and deception and manipulation for monetary resources but not retaliatory violence. In all cases, the effect sizes were small but consistent with LHT. Fast LHSs are more tempted to engage in exploitative behavior to acquire sexual or monetary resources, and they are more likely to use deception and coercion. However, LHS did not significantly predict retaliatory violence scores. The retaliatory violence factor of the EDRASS is different than the other three factors in that the use of this tactic is in response to someone else's exploitative behavior. Thus, at least in this sample, FLHSs did not report being more tempted than were SLHSs to use violence in response to exploitation, only choosing a violence-based tactic to gain sexual resources. This does not imply that fast and slow LHSs engage in similar levels of retaliatory violence in all contexts or that there are no meaningful differences in the expression of retaliatory violence. This finding does imply that acquiring resources versus protecting resources is a meaningful distinction.

There was no evidence to conclude the FLHC prime or the SLHC prime influenced scores on any factor of the EDRASS. Thus, whether participants were shown environmental information for the development of fast or slow life histories did not have an effect on people's temptation to engage in exploitative behavior. In addition, there was no evidence that LHS and exploitative strategies depended on LHCs.

General Discussion

The present studies extend past research by developing new measures of exploitative strategies and testing the predictions of LHT. The Dot Game is a behavioral measure of exploitative strategies that can be used online or in a lab setting. The EDRASS demonstrates the variety of tactics and goals that can be pursued in an exploitative strategy. Moreover, the EDRASS has been shown to be a reliable, flexible, and valid measure of these behaviors. Thus, one of the primary goals of this research was accomplished.

The second purpose of this research was to test whether LHS and LHCs influence exploitative strategy use. There were consistent results with LHS. First, FLHSs were found to deceptively take more money in a competitive limited resource game. This finding extends past work by directly observing exploitive behavior, rather than relying on retrospective reports of past behavior as most previous studies have done (e.g., Brumbach et al., 2009). Second, we found that FLHSs are more tempted to engage in coercion for sexual resources and deception for sexual and monetary resources. These findings confirm that life history strategists assort on traits, allowing them to pursue their particular reproductive strategy.

Effects of LHCs

In contrast to associations with LHS, there were inconsistent effects of LHCs on the use of exploitative strategies. There was a reliable but very small increase in cheating on the Dot Game in the FLHC prime condition, compared to the neutral prime condition, in Study 1. However, this effect was not replicated in

Study 3 for any factor of the EDRASS. Moreover, there was no effect of the SLHC prime in either study. There may be several explanations for the small or nonsignificant effects of the primes.

The first possibility is that the primes were too minimal of a manipulation. That is, there may be a true effect of LHCs on exploitative strategy use, but the manipulation was not strong enough to reliably produce such an effect. The primes were designed to communicate relevant LHC information to participants in a news report that participants could simply read. This was a useful approach for an online study. However, these stories could have seemed too abstract to be very effective. The primes did not involve actual environmental changes. In their predictions concerning the effects of environmental harshness and unpredictability, Ellis et al. (2009) assume actual environmental changes (e.g., real changes in the population density and mortality rates). Although the primes were designed to communicate that same information, this is a rather indirect manipulation. Minimal manipulations can be very useful by demonstrating that even a small manipulation can produce an effect (Prentice & Miller, 2003). Because a very small effect was found for only one of the primes in Study 1, one could conclude that the primes were indeed too minimal. An additional consideration is that an effect was observed in Study 1 because a more spontaneously generated exploitative behavior was utilized, rather than asking participants to consciously reflect on scenarios describing exploitative behavior.

A second possibility is that the effect of LHCs could be limited to juveniles. Certain environmental information may be relevant to exploitative strategies but only during certain ages. Because the current studies were conducted with adult participants, we may not have observed reliable effects of the primes. In studying reproductive timing and life history, Griskevicius, Delton, et al. (2011) suggested that childhood may be a sensitive period in which environmental contingencies alter life history parameters. Evidence showing that stress and health vary according to childhood SES, but not current SES, is consistent with the view that there may be periods in development in which individuals are sensitive to LHCs (see Cohen, Doyle, Turner, Alper, & Skoner, 2004). In investigating the effects of harshness and unpredictability and LHS, Brumbach et al. (2009) hypothesized and found evidence that individuals who experience these conditions in adolescence were more likely to develop a FLHS in adolescence and early adulthood. Therefore, exploitative and deceptive behavior may by modified by LHCs but not in adulthood. This question is worthy of investigation. Similar experiments as used in this research but with a sample of juveniles would shed light on the importance of age when LHCs are experienced.

Research by Dunkel and colleagues found that LHC manipulations can affect willingness to be aggressive and sexually coercive. Importantly, they found these relationships in a college population (M_{age} being around 21). This may indicate that LHC effects on exploitative strategies are reduced among older individuals.

Implications and Future Directions

As the primes may have been too subtle, future studies should use stronger manipulations of LHC information. For example, researchers could develop a more realistic, impactful video that contains the relevant LHC information. Another direction could be to develop a measure of exploitative strategies in which the LHC information is embedded into the task. For example, participants could play a game in which they have the option of cooperating with or exploiting other players. The degree of harshness and unpredictability in the game could be manipulated to measure which strategies are exhibited. This approach has the advantage of directly connecting LHCs to resource acquisition strategies.

Future research should also develop measures of other exploitative strategies. For example, measures of coalitional warfare and other group-related tactics would expand upon the present work. Modifying the EDRASS or developing new measures to capture behaviors specific to males and females may be useful. On the other hand, we observed the same factor pattern for males and females in our studies.

Future research should also continue the validation of the EDRASS. For example, although the relationship of the EDRASS with mating effort and criminal behavior was assessed, there are many more constructs that could be associated with scores on the EDRASS. The dark triad (Machiavellianism, narcissism, and psychopathy) would be one such example. Jonason, Li, Webster, and Schmitt (2009) found that measures of Machiavellianism, narcissism, and psychopathy formed a single latent factor that they labeled "exploitative social style." They further found this factor to be related to a short-term mating strategy. Recall that in Gladden et al. (2013) the indicators of antagonistic social strategies included two traits from the dark triad (Machiavellianism and psychopathy) as well as mating strategy. This raises the question of whether an exploitative social style and/or an exploitative resource acquisition strategy are part of an antagonistic social strategy. It would not be surprising if the EDRASS, the dark triad, mating effort, and mating strategy formed a single latent construct. However, there is a loss of specificity when focusing on these larger factors. If the goal is to specifically understand exploitative strategies or adaptations for exploitative strategies, we argue a more useful approach would be to use measures such as EDRASS that were designed to measure them directly. Additionally, unlike measures of psychopathy, the EDRASS can be used in experimental designs because it is not based on past behavior. Rather, it asks participants to consider how they feel at the moment and how tempted they would be to engage in hypothetical behavior.

A final future direction could be determining the mechanisms that mediate changes in resource strategy use. Then these mechanisms could be modeled with other life history traits to see how they function together. Dunkel, Mathes, and Beaver (2013) have examined self-control with relation to LHS, LHCs, and criminal behavior. Indeed, self-control is a prime candidate for mediating the role between LHCs and a variety of behavior

including exploitative strategies. That is, LHCs may affect self-control, which, in turn, may regulate exploitative strategies.

Conclusion

Although there were limitations to the present studies, significant contributions include the development and validation the Dot Game and the EDRASS. The present research is also notable for using controlled experimental manipulation of multiple LHCs, adding to the LHT literature. Finally, the present work expands the literature on LHS and adaptations for the exploitation of resources. Most work in this area has focused on criminal or socially deviant behavior and LHS. However, an exploitative resource acquisition strategy need not be criminal. Acquiring different kinds of resources (e.g., mates and food) and deciding which tactics to use (e.g., solo hunting and coercive exploitation) is an important problem to solve and one faced by many species. How resource procurement and related tactics are affected by trade-offs in somatic versus reproductive effort is an important question. The conclusions drawn from the present studies are that life history trade-offs of reproductive over somatic effort and mating over parental effort result in greater use of coercion and deception for sexual and monetary resources. On the other hand, there is not enough evidence to conclude that LHCs affect exploitative resource procurement among adults.

Appendix

Fast Life History Contingency Prime

Jonathan Pierce died at 5:37 am last Tuesday in the quiet predawn hours at Memorial Hospital. The cause—a gunshot wound. Just last night, Jon was driving home from work. Suddenly, in the middle of a seemingly safe intersection that he had crossed hundreds of times, he was shot 6 times by a gunman in a nearby car. Police have no motive for the shooting, chalking it up to yet another random act of violence.

The staff at the police station is worried. They are astonished at the exponential increase in deaths from random acts of violence. ''Ten years ago, these kinds of deaths accounted for maybe 30 or 40 deaths a year,'' Joan Michaels, a captain at the police station, recalls. ''Two years ago we had over 200. This year it's tripled to over 600. The fluctuations are amazing. You just don't know what tomorrow is going to bring.''

Michaels is shocked by the senselessness of many of these deaths. ''It seems that at least half of these attacks occur for no reason. An innocent young man just happens to be wearing the wrong colored shirt and is gunned down by gang members. A young woman is waiting for a bus, and she's assaulted by a group of men she's never seen before. What really gets me is that the person who dies is often not even the target. The person was just standing nearby, minding his own business. Anyone is a potential victim for this new wave of violence.''

The high prevalence of random violence is also being seen in emerging studies from Harvard Medical School. Dr. Douglas Kenrick, head of the research project, notes a worrisome pattern: ''Comparing violent crime across the last century, we find that it is very difficult to predict what's going to happen from year to year. For example, people today are at a much higher risk of being violently assaulted and killed than people merely a few years ago.'' The evidence shows that our cities, neighborhoods, workplaces, and schools are essentially under attack. ''This has important implications,'' Dr. Kenrick points out. ''Because you never know what's going to happen and how the environment is going to fluctuate, people will need to take this into account when they're deciding how to behave.''

The risks associated with random acts of personal violence only exacerbate the terrorism threat that has been growing over the past few decades. Patricia Wharton of the Federal Bureau of Investigations points out that people mistakenly believe foreign attacks, such as 9/11, to be the only terrorism threat facing our nation. ''It is certainly true that Islamic terrorism poses a grave threat to Americans' safety. Another hijacking, radioactive dirty bombs, or a rogue nuclear weapon stolen from Iran or Pakistan could kill thousands or millions of Americans with little to no warning.''

''But what people forget is that the vast majority of terrorist acts are committed by Americans. It is our own neighbors who are killing us.'' Take several examples. The Oklahoma City bombings from the last decade were committed by Timothy McVeigh, an individual from New York who many thought was a normal person. The Olympic Bombings in Atlanta were committed by Eric Rudolph, a person born in Florida. The 2001 anthrax attacks were carried out by Bruce Ivins, a man from Ohio. The 2002 Washington D.C. sniper shootings that killed over a dozen people in several weeks were committed by two Americans. These are just a few of the countless examples in which American citizens carried out lethal attacks against random, innocent compatriots.

The random nature of violence is clearest in schools and universities across the world. Just a few years ago, it was almost unheard of that someone would be shot at school or at work. Today, this is part of normal life. ''The Police can't be at every corner of every street,'' notes captain Joan Michaels. ''We know that even video cameras do little because most of these violent individuals have no regard for their own lives. More and more, citizens find themselves injured or even dying on the street for reasons beyond their control, hunted down for no discernible purpose.''

As Jonathan Pierce waits to be buried after being the latest victim of random violence, we can't help but be reminded about the unpredictability of the world in which we live. Whether it is random acts of violence, outbreaks of new diseases, or the uncertainty of Mother Nature, the ability to predict what next year—or even tomorrow—will bring is impossible. People need to brace themselves for a new reality in this unpredictable and dangerous world.

Slow Life History Contingency Prime

Life in the 21st century presents a unique set of challenges. It is not hard to look around and understand the enormous

differences between life in the present and life in the past for humans. But what are the unique challenges that we face? Dr. Douglas Kenrick from Harvard Medical School discusses how, according to emerging studies, there are three specific challenges we face. These challenges are high population density, competition, and food scarcity. ''There has never been a time in all of human history where there were more people on this planet compared to today. Even in relatively small rural towns, we are seeing populations growing exponentially.'' One does not have to look far to see the extent of high population density with overcrowding in schools, city congestion, and the sheer number of people living in the Unites States, which according to the latest U.S. census is over 316,000,000 people and one birth every 8 seconds. Dr. Kenrick says that the other two challenges, competition and food scarcity, are most likely related to the high population density in modern America but that each challenge presents its own unique consequences.

As Dr. Kenrick and others have explained, in today's world there is more competition than there has ever been. Back in the 1950s, I remember a bachelor's degree being like gold, nowadays a 4-year college education is practically required. Nick Henderson, professor of economics at Harvard University, says, ''Education is one way in which we can compete for jobs with more education being equal to more competitive ability. However, apart from education there are numerous abilities and competencies that if invested in, can give someone the competitive advantage. Jobs in today's world require increasing amounts of skills and because there are more people than there have ever been, the competition is fierce.''

Psychologist Mary Oldsworth, at Duke University, extends these challenges to relationships and the ''dating market.'' Dr. Oldsworth says, ''Competition in the dating market means men and women need to invest in themselves and their abilities if they are to acquire a partner. Additionally, because we are now reasonably good at predicting future trends in this market, we know that this level of competition although very stable, will continue for many years into the future.'' In other words, invest, invest, invest.

Finally, food scarcity presents another challenge that may also be related to increasing population density. It is becoming more and more difficult to find healthy food at reasonable prices, and this will likely continue in the future. People have to travel longer distances for quality food, and the hunger situation faced in America is a growing concern. Interestingly, Dr. Henderson says, ''The competition we are seeing and will continue to see in America has implications for food, because those that invest in themselves and their community will have a competitive advantage in finding food as well as getting the best jobs.''

Although we are facing these challenges in the 21st century and will continue to face them far into the future, the challenge of high population density comes at the same time as some good news. ''Although there is an increasing number of people present and high competition, we are seeing less personal violent crime than ever before. With less people becoming the victim of interpersonal violence and science being able to better predict violence, the harshness of our environment is less and will continue to be less than it has in the past,'' says Dr. Kenrick.

The challenges of high population density, competition, and food scarcity are present in the 21st century and thanks to better and better prediction methods we know these will continue to be challenges. However, this is combined with less interpersonal violence and crime in general. Therefore, although there are challenges, people can build up their abilities to meet these challenges head on.

Neutral Prime

Imagine that it's Tuesday afternoon during the semester. Your classes are pretty difficult this semester and you've been getting pretty stressed out about everything that you need to do. You're hanging out at home doing homework, but its getting boring and you're feeling tired. You know that you still have to go to the supermarket before it is too late, so you decide to call it a night and go to the store.

As you go to get your keys from the counter, you don't see them there. The keys are nowhere in sight. Thinking that it's a little awkward, you feel your pockets. No keys in there either. You try to think back to where you last saw the keys, but you can't remember. You know you had them earlier yesterday, and you're usually pretty good about leaving your keys right on the counter.

You sometimes put your keys in your backpack so that seems the logical place to look. You search through your bag. Books, folders, pens, but no keys. You turn the bag upside down and shake it. Nothing but junk. Now you start getting a little annoyed and a little worried. Where the heck are your keys?

You decide to search around the house. You look all around your desk. You open the drawers. You search deep in the drawers. But they're not anywhere. You look through your bedroom floor, but all you find is junk.

Getting more desperate, you look through the laundry. Maybe they're in another pocket somewhere? You find some pieces of paper but no keys. Feeling angrier, you go into your closet and start throwing things to the floor. No keys. You run to the kitchen and start looking on the counters. You open all the cupboards and drawers. You have no idea why the keys would be there, but you need to look somewhere. In 15 min, your kitchen looks like a disaster area. But still no keys!

You're feeling really frustrated at this point. Your hands start to shake a little. You think back to when you last remember having the keys and try to retrace your steps. You clearly remember having them earlier, but you just don't know where you put them.

Remembering that you had gone outside to take out the garbage earlier, you run out into the driveway. Maybe the keys fell out there? You look in the grass, the bushes, and underneath cars. You see nothing. You think to yourself: Did I really lose my keys? As you walk back inside the house in complete frustration, you feel as though you're ready to pull your hair

out. Your keys have disappeared. You knew this was coming sometime, but why now? You start thinking about what you need to do when someone loses their keys. It's so annoying. You just wanted to go to the store.

You plop onto your living room couch in disgust. Sighing, you look back to the counter where you normally put your keys. To your astonishment, there they are. Your keys are on the counter! How could you have missed them? You run over there to check it out. You can't believe it. Something like this always happens to you.

You sit back down to take a breather, shake your head, and put your hand on your chest. Wiping the sweat that was beginning to form on your forehead, you begin to laugh. You don't think you've ever felt so relieved in your life. It was just keys but you had gotten so upset. Your relief quickly turns into elation. You only found your keys, but it's as though you won the lottery. You think back to all those times you lost your keys before. You smile because you realize so much frustration in life comes from insignificant events and yet how happy one can be when overcoming such insignificant events. You think, maybe it was a good thing you lost your keys because you got to enjoy the feeling of overcoming it. In a fantastic mood, you leave the house to finally go to the store.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

Note

1. Sex and the moderating effect of sex on LHS and the primes were also tested. Only the main effect of sex was ever significant, consistent with sex differences in factor scores in Studies 2a through 2c. For this reason, and it was not directly relevant to the hypotheses, sex was excluded as a predictor from the main analyses. Nonetheless, future research on sex and exploitative strategies would be beneficial.

References

Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin*, *107*, 238–246.

Bielby, J., Mace, G., Bininda-Emonds, O. R. P., Cardillo, M., Gittleman, J. L., Jones, K. E., . . . Purvis, A. (2007). The Fast-Slow continuum in mammalian life history: An empirical reevaluation. *The American Naturalist*, *169*, 748–757. doi:10.1086/516847

Brumbach, B., Figueredo, A., & Ellis, B. J. (2009). Effects of harsh and unpredictable environments in adolescence on development of life history strategies: A longitudinal test of an evolutionary model. *Human Nature*, *20*, 25–51. doi:10.1007/s12110-009-9059-3

Buhrmester, M., Kwang, T., & Gosling, S. D. (2011). Amazon's Mechanical Turk: A new source of inexpensive, yet high-quality, data?. *Perspectives on Psychological Science*, *6*, 3–5. doi:10.1177/1745691610393980

Buss, D. M., & Duntley, J. D. (2008). Adaptations for exploitation. *Group Dynamics: Theory, Research, and Practice*, *12*, 53–62. doi:10.1037/1089-2699.12.1.53

Charles, K., & Egan, V. (2005). Mating effort correlates with self-reported delinquency in a normal adolescent sample. *Personality and Individual Differences*, *38*, 1035−1045. doi:10.1016/j.paid.2004.06.021

Cohen, S., Doyle, W. J., Turner, R. B., Alper, C. M., & Skoner, D. P. (2004). Childhood socioeconomic status and host resistance to infectious illness in adulthood. *Psychosomatic Medicine*, *66*, 553–558. doi:10.1097/01.psy.0000126200.05189.d3

Cole, L. C. (1954). The population consequences of life history phenomena. *The Quarterly Review of Biology*, *29*, 103–137.

Daly, M., & Wilson, M. (1988). *Homicide*. Hawthorne, NY: Aldine de Gruyter.

Detert, J. R., Treviño, L. K., & Sweitzer, V. L. (2008). Moral disengagement in ethical decision making: A study of antecedents and outcomes. *Journal of Applied Psychology*, *93*, 374–391. doi:10.1037/0021-9010.93.2.374

Dobzhansky, T. (1950). Evolution in the tropics. *American Scientist*, *38*, 208–221.

Dunkel, C. S., & Mathes, E. (2011). The effect of individual differences and manipulated life expectancies on the willingness to engage in sexual coercion. *Evolutionary Psychology*, *9*, 588–599.

Dunkel, C., Mathes, E., & Decker, M. (2010). Behavioral flexibility in life history strategies: The role of life expectancy. *Journal of Social, Evolutionary, and Cultural Psychology*, *4*, 51–61. doi:10.1037/h0099301

Dunkel, C. S., Mathes, E., & Beaver, K. M. (2013). Life history theory and the general theory of crime: Life expectancy effects on low self-control and criminal intent. *Journal of Social, Evolutionary, and Cultural Psychology*, *7*, 12–23. doi:10.1037/h0099177

Dunkel, C. S., Mathes, E., & Papini, D. R. (2010). The effect of life expectancy on aggression and generativity: A life history perspective. *Evolutionary Psychology*, *8*, 492–505.

Ellis, L. (1988). Criminal behavior and r/K selection: An extension of gene-basedevolutionary theory. *Personality and Individual Differences*, *9*, 697–708. doi:10.1016/0191-8869(88)90059-1

Ellis, B. J., Figueredo, A., Brumbach, B. H., & Schlomer, G. L. (2009). Fundamental dimensions of environmental risk: The impact of harsh versus unpredictable environments on the evolution and development of life history strategies. *Human Nature*, *20*, 204–268. doi:10.1007/s12110-009-9063-7

Figueredo, A. J. (2007). *The Arizona life history battery* [Electronic Version]. Retrieved from http://www.u.arizona.edu/ajf/alhb.html

Figueredo, A. J., Gladden, P. R., & Beck, C. A. (2012). Intimate partner violence and life history strategy. In T. K. Shackleford & A. T. Goetz (Eds.), *The Oxford handbook of sexual conflict in humans* (pp. 72–99). New York, NY: Oxford University Press.

Figueredo, A. J., & Jacobs, W. J. (2010). Aggression, risk-taking, and alternative life history strategies: The behavioral ecology of social deviance. In M. Frías- Armenta & V. Corral-Verdugo (Eds.),

Biopsychosocial perspectives on interpersonal violence (pp. 3–27). Hauppauge, NY: Nova Science.

Figueredo, A. J., Vásquez, G., Brumbach, B. H., & Schneider, S. M. R. (2005). The K-Factor, covitality, and personality: A psychometric test of life history theory. *Human Nature*, *18*, 47–73. doi:10.1007/BF02820846

Figueredo, A. J., Vásquez, G., Brumbach, B. H., & Schnieder, S. M. R. (2004). The heritability of life history strategy: The K-factor, covitality, and personality. *Social Biology*, *51*, 121–143. doi:10.1080/19485565.2004.9989090

Figueredo, A. J., Vásquez, G., Brumbach, B. H., Schnieder, S. M. R., Safcek, J. A., Tal, I. R., . . . Wenner, C. J. (2006). Consilience and life history theory: From genes to brain to reproductive strategy. *Developmental Review*, *26*, 243–275. doi:10.1016/j.dr.2006.02.002

Gadgil, M., & Solbrig, O. T. (1972). The concept of r and K selection: Evidence from wild flowers and some theoretical considerations. *American Naturalist*, *106*, 14–31.

Gino, F., Scheitzer, M. E., Mead, N. L., & Ariely, D. (2011). Unable to resist temptation: How self-control depletion promotes unethical behavior. *Organizational Behavior and Human Decision Processes*, *15*, 191–203.

Gladden, P. R., Figueredo, A. J., Andrzejczak, D. J., Jones, D. N., & Smith-Castro, V. (2013). Reproductive strategy and sexual conflict slow life history strategy inhibits negative androcentrism. *Journal of Methods and Measurement in the Social Sciences*, *4*, 48–71.

Gladden, P. R., Figueredo, A. J., & Jacobs, W. J. (2009). Life history strategy, psychopathic attitudes, personality, and general intelligence. *Personality and Individual Differences*, *46*, 270–275. doi:10.1016/j.paid.2008.10.010

Gladden, P. R., Sisco, M., & Figueredo, A. J. (2008). Sexual coercion and life-history strategy. *Evolution and Human Behavior*, *29*, 319–326. doi:10.1016/j.evolhumbehav.2008.03.003

Gorelik, G., Shackelford, T. K., & Weekes-Shackelford, V. A. (2012). Resource acquisition, violence, and evolutionary consciousness. In T.K. Shackelford & V. A. Weekes-Shackelford (Eds.), *The oxford handbook of evolutionary perspectives on violence, homicide, and war* (pp. 506–523). New York, NY: Oxford University Press.

Gorsuch, R. L. (1983). *Factor analysis* (2nd ed.). New York, NY: Psychology Press Taylor and Francis Group.

Griskevicius, V., Delton, A. W., Robertson, T. E., & Tybur, J. M. (2011). Environmental contingency in life history strategies: The influence of mortality and socioeconomic status on reproductive timing. *Journal of Personality and Social Psychology*, *100*, 241–254. doi:10.1037/a0021082

Griskevicius, V., Tybur, J. M., Delton, A. W., & Robertson, T. E. (2011). The influence of mortality and socioeconomic status on risk and delayed rewards: A life history theory approach. *Journal of Personality and Social Psychology*, *100*, 1015–1026. doi:10.1037/a0022403

Hamilton, W. (1964a). The genetical evolution of social behaviour. I. *Journal of Theoretical Biology*, *7*, 1–16. doi:10.1016/0022-5193(64)90038-4

Hamilton, W. (1964b). The genetical evolution of social behaviour. II. *Journal of Theoretical Biology*, *7*, 17–52. doi:10.1016/0022-5193(64)90039-6

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, *6*, 1–55.

Jonason, P. K., Li, N. P., Webster, G. D., & Schmitt, D. P. (2009). The dark triad: Facilitating a short-term mating strategy in men. *European Journal of Personality*, *23*, 5–18. doi:10.1002/per.698

Kaplan, H. S., & Gangestad, S. W. (2005). Life history theory and evolutionary psychology. In D. M. Buss (Ed.), *The handbook of evolutionary psychology* (pp. 68–95). Hoboken, NJ: John Wiley.

Kline, R. B. (2005). *Principals and practice of structural equation modeling* (2nd ed.). New York, NY: Guilford Press.

Kruger, D. J., Reischl, T., & Zimmerman, M. A. (2008). Time perspective as a mechanism for functional developmental adaptation. *Journal of Social, Evolutionary, and Cultural Psychology*, *2*, 1–22. doi:10.1037/h0099336

Malamuth, N. M. (1996). The confluence model of sexual aggression: Feminist and evolutionary perspectives. In D. M. Buss & N. M. Malamuth (Eds.), *Sex, power, conflict: Evolutionary and feminist perspectives* (pp. 269–295). New York, NY: Oxford University Press.

Malamuth, N. M. (1998). The confluence model as an organizing framework for research on sexually aggressive men: Risk moderators, imagined aggression, and pornography consumption. In R. G. Geen & E. Donnerstein (Eds.) *Human aggression: Theories, research, and implications for social policy* (pp. 229–245). San Diego, CA: Academic Press.

Mazar, N., Amir, O., & Ariely, D. (2008). The dishonesty of honest people: A theory ofself-concept maintenance. *Journal of Marketing Research*, *45*, 633–644. doi:10.1509/jmkr.45.6.633

McArthur, R. H., & Wilson, E. O. (1967). *The theory of island biogeography*. Princeton, NJ: Princeton University Press.

Mead, N. L., Baumeister, R. F., Gino, F., Schweitzer, M. E., & Ariely, D. (2009). Too tired to tell the truth: Self-control resource depletion and dishonesty. *Journal of Experimental Psychology*, *45*, 594–597. doi:10.1016/j.jesp.2009.02.004

Pianka, E. R. (1970). On r- and K-selection. *American Naturalist*, *104*, 592–596.

Prentice, D. A., & Miller, D. T. (2003). When small effects are impressive. In A. E. Kazdin (Ed.), *Methodological issues and strategies in clinical research* (3rd ed., pp. 127–137). Washington, DC: American Psychological Association.

Promislow, D. E. L., & Harvey, P. H. (1990). Living fast and dying young: A comparative analysis of life-history variation among mammals. *Journal of Zoology*, *220*, 417–437. doi:10.1111/j.1469-7998.1990.tb04316.x

Reznick, D. N. (1982). The impact of predation on life history evolution in Trinidadian guppies: Genetic basis of observed life history patterns. *Evolution*, *36*, 250.

Reznick, D. N., & Ghalambor, C. K. (2005). Selection in nature: Experimental manipulations of Natural populations. *Integrative and Comparative Biology*, *45*, 456–462.

Reznick, D. N., & Shaw, F. H. (1997). Evaluation of the rate of evolution in natural populations of guppies (Poecilia reticulata). *Science*, *275*, 1934–1937.

Reznick, D. N., Rodd, F. H., & Cardenas, M. (1996). Life-history evolution in guppies (Poecilia reticulata), 4: Parallelism in life-history phenotypes. *American Naturalist*, *147*, 319–338.

Roff, D. (1992). *The evolution of life histories: Theory and analysis*. New York, NY: Chapman and Hall.

Rowe, D. C., Vazsonyi, A. T., & Figueredo, A. J. (1997). Mating effort in adolescence: Conditional or alternative strategy? *Journal of Personality and Individual Differences*, *23*, 105−115. doi:10.1016/S0191-8869(97)00005-6

Rushton, J. P. (1985). Differential K theory: The sociobiology of individual and groupdifferences. *Personality and Individual Differences*, *6*, 441–452. doi:10.1016/0191-8869(85)90137-0

Stearns, S. C. (1983). The influence of size and phylogeny on patterns of covariation among life-history traits in the mammals. *Oikos*, *41*, 173–187.

Stearns, S. C. (1992). *The evolution of life histories*. Oxford, England: Oxford University Press.