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A Cascade Model of Sociodevelopmental Events Leading to Men's Perpetration of Violence Against Female Romantic Partners

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Abstract

Conceptually driven by life history theory, the current study investigated a hypothesized hierarchy of behaviors leading to men's perpetration of violence in intimate relationships. Using a series of hierarchical regressions, we tested a causal cascade model on data provided by 114 men in a committed romantic relationship. The results supported the hypothesized hierarchy of sociodevelopmental events: (1) men's childhood experiences with their parents' parental effort predicted men's life history strategies; (2) men's life history strategies predicted men's behavioral self-regulation; (3) men's self-regulation predicted men's perceptions of partner infidelity risk; (4) perceptions of infidelity risk predicted men's frequency of engagement in nonviolent mate retention behaviors; (5) men's mate retention behaviors predicted men's frequency of partner-directed violence. The overall cascade model explained 36% of variance in men's partner-directed violence.

Keywords

life history theory, self-regulation, partner infidelity risk, mate retention behaviors, intimate partner violence

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Previous research investigating the predictors of intimate partner violence (IPV) has broadly proceeded from one of two theoretical perspectives. The standard social science perspective has focused on the roles of the proximate environment and socialization on the development of antagonistic behaviors in intimate relationships, as expressed in feminist theory, social learning theory, and ecological theories (see Ali & Naylor, 2013, for review). An evolutionary psychological perspective has focused on the ultimate or evolutionary predictors of such behaviors, providing evidence that men's violence against their female partners may be a manifestation of sexual jealousy evolved in response to the adaptive problem of paternity uncertainty (Buss & Duntley, 2011; Kaighobadi et al., 2009; Shackelford et al., 2006; Wilson & Daly, 1993).

In response to these two independent and sometimes contrary perspectives, life history (LH) theory was introduced to provide a framework that synthesizes proximate with evolutionary predictors of IPV to build a comprehensive model of men's violence against intimate partners (see Figueredo et al., 2017, for a review). Figueredo et al. (2017) situated IPV within the more general context of interpersonal aggression toward both male and female targets by both male and female perpetrators. A structural equation model with cross-sample equality constraints showed complete configural invariance and a marginally acceptable degree of parametric invariance across five cross-cultural samples. This model specified LH strategy as the sole exogenous factor that, through various indirect effects, predicted about 75% of the variance in interpersonal aggression. Based on these results, it is a straightforward prediction that men's violence against their female partners should be

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influenced by their LH strategy. The aim of the current study is to advance evolutionary psychological theories of IPV by integrating the LH theory into a developmental cascade model of events that lead to men's violence against their female partners.

Evolutionary Psychological Theories of IPV

Evolutionary psychology addresses the design and function of evolved psychological mechanisms or adaptations. Evolutionary psychologists may be especially interested in understanding the function of behaviors that are costly to both the actor and recipient, but prevalent nevertheless, such as violence, in general, and IPV, in particular.

Previous evolutionary psychological research has established strong associations between male sexual jealousy, nonviolent male mate retention (MR) behaviors (Buss & Shackelford, 1997), and men's violence against female partners (Buss, 2000; Daly & Wilson, 1988; Kaighobadi et al., 2008). These researchers hypothesized that male sexual jealousy evolved in response to the adaptive problems of female sexual infidelity and subsequent cuckoldry, or unwitting investment in genetically unrelated offspring (Kaighobadi et al., 2009; Thornhill & Thornhill, 1992; Wilson & Daly, 1992). The reproductive costs of cuckoldry, including loss of time, energy, resources, and alternative mating opportunities, are potentially so great that men are hypothesized to have evolved psychological mechanisms that function to motivate anti-cuckoldry tactics. MR behaviors are one such class of anti-cuckoldry tactics. These behaviors vary in the costs inflicted upon partners, ranging from subtle manipulation to outright physical violence (Buss & Shackelford, 1997). Female-directed violence is a more severe class of anti-cuckoldry tactics that functions to keep a partner invested in the current relationship and to prevent her from sexual infidelity (see Kaighobadi et al., 2009, for review). Thornhill and Thornhill (1992) hypothesized that forced sex in the context of an intimate relationship may be an anti-cuckoldry tactic designed over human evolutionary history in response to the specific problem of sperm competition. Sperm competition occurs when the sperm of two or more males simultaneously compete for fertilization of a female's ovum or ova (Parker, 1970). According to this hypothesis, by forcing their partners to have sex, men who are suspicious of their partner's infidelity introduce their own sperm into their partner's reproductive tract and thereby decrease the risk of cuckoldry (Thornhill & Thornhill, 1992).

Whereas much evolutionary psychological research has addressed ultimate causes of IPV and sexual coercion, other research has been dedicated to understanding individual differences or proximate correlates of men's perpetration of IPV. Previous research has identified links between men's partner-directed violence and men's personality traits, including antisocial tendencies (Dutton, 1994; Dutton & Starzomski, 1993), self-centeredness (Dean & Malamuth, 1997), lack of emotional regulation (McNulty & Hellmuth, 2008), and impulsivity (Stuart & Holtzworth-Munroe, 2005). LH theories have integrated both ultimate and proximate predictors of IPV into a single, overarching framework (see Figueredo et al., 2017, for review).

LH Strategies and IPV

The LH theory describes the adaptive allocation of physiological and material resources among different components of fitness, including trade-offs between somatic and reproductive efforts (Chisholm, 1993). Somatic effort refers to the time, energy, and resources invested in survival. Reproductive effort refers to the time, energy, and resources invested in reproduction. The reproductive effort is anchored on one end by mating effort and on the other end by parental effort (PE; Clutton-Brock, 1991). According to LH theory, organisms differ in effort allocated to mating versus parenting. These differences, in turn, are explained, in part, by the stability and predictability of the developmental environment (Shennan, 2002).

The LH theory has been extended to address individual differences in biological and behavioral traits in humans (Chisholm, 1993; Belsky et al., 2012; Figueredo et al., 2006; Griskevicius et al., 2011). According to LH theory, for example, unstable and unpredictable developmental environments produce in the individual perceptions of a shorter life expectancy. Perceptions that life is brief, in turn, motivate the individual to adopt a fast LH strategy (see Figueredo et al., 2006, for review). Previous research has linked a fast LH strategy with high mating effort and low parenting effort (Figueredo et al., 2021). A fast LH strategy has been linked to greater risk-taking, lower behavioral self-regulation, greater sexual promiscuity, and greater disregard for social rules (Figueredo et al., 2006). A slow LH strategy, in contrast, has been linked to monogamy, greater parenting effort, greater behavioral self-regulation, future orientation, and greater and more attentive regard for social rules (Figueredo et al., 2015; MacDonald et al., 2016). The LH strategy, therefore, is hypothesized to predict individual differences in mating effort (and, conversely, parenting effort), including but not limited to partner-directed violence and sexual coercion.

There are a number of theories linking a fast LH strategy to IPV and sexual coercion (Figueredo et al., 2010, 2012; Thornhill & Palmer, 2004). Thornhill and Palmer (2004) argued that sexual coercion may be a by-product of a fast LH strategy, such that traits associated with a fast LH strategy, including high mating effort, high-risk-propensity, and lack of self-regulation, may facilitate the use of violence and sexual coercion in intimate relationships (Thornhill & Palmer, 2004). Figueredo et al. (2010, 2012) argued that because of a fast LH strategy, high mating effort men (relative to slow LH strategy, low mating effort men) are unlikely to commit to a monogamous relationship and concomitant parenting effort, their mating strategies may be more often in conflict with women's mating strategies. This conflict may result in negative attitudes toward women and lower relationship satisfaction. Gladden et al. (2010) documented a link between the LH strategy and perceived mate value, or value as a prospective mate on the "mating market." Individuals with a slow LH strategy perceived

that they had a higher mate value, whereas individuals with a fast LH strategy perceived that they had a lower mate value. Furthermore, Gladden et al. (2009) reported relationships between a fast LH strategy and low executive functioning, high impulsivity, and low behavioral self-regulation. Figueredo et al. (2012) also reported similar structural relations among the slow LH strategy, behavioral regulation, emotional intelligence, and both short-term and long-term sociosexual orientation. Thus, because a fast LH strategy has been linked to (1) risk-taking, impulsivity, and lower behavioral self-regulation; (2) lower perceived mate value; and (3) greater sexual conflict with women, a fast LH strategy may predict men's partner-directed violence and sexual coercion.

Consistent with this hypothesis, Gladden et al. (2008) documented a link between a single cluster of slow LH strategy traits and lower sexual coercion in a sample of male college students. Moreover, Figueredo et al. (2010) predicted a relationship between the LH strategy and men's partner-directed violence mediated by men's perceived mate value. The results indicated: (1) a relationship between the slow LH strategy and higher perceived mate value; and (2) a relationship between the higher perceived mate value and lesser partner-directed violence. In other words, the slow LH strategy is indirectly associated with lower partner-directed violence; this relationship is mediated by men's perceived mate value. In sum, the LH strategy predicts men's IPV and sexual coercion, affording an evolutionary framework for explaining individual differences in the performance of these costly behaviors. Guided by the LH theory, the current study investigated the causal chain of IPV predictors in the order of (1) developmental environment (identified by experiences with father and mother's PE); (2) LH strategy; (3) self-regulatory behaviors; (4) perceived partner infidelity risk; and (5) nonviolent MR behaviors, leading to IPV and sexual coercion.

Experiences with PE in Childhood Predicts LH Strategy in Adulthood

The LH strategy constitutes a set of biological, psychological, and behavioral traits predicted by an individual's resource-allocation decisions throughout development. These interdependent resource-allocation decisions reflect a combination of genetic variation and phenotypic plasticity in response to variations in the developmental environment, including social conditions (see Ellis et al., 2009, for review).

Experiences with PE as a child may be a proximate cue to environmental stability and predictability (Ellis et al., 2009). Thus, the amount of PE invested by the child's parents may affect the LH strategy as an adult (Sotomayor-Peterson et al., 2013; Cabeza de Baca et al., 2014). The first step of the cascade model investigates the relationship between early experiences with PE and LH strategies, such that greater combined PE may predict a slower LH strategy.

LH Strategy Predicts Self-Regulation

One important component of the LH strategy is executive functioning in terms of emotional and behavioral self-regulation. In unstable, unpredictable environments, the ability to act immediately, without deliberation, may be appropriate. For example, in a dangerous situation, it may not be appropriate or useful to engage in extensive deliberation; instead, risk-taking may be the appropriate behavior. However, in stable, predictable environments, a slow LH strategy that includes deliberate thought and measured, non-risky behavior is likely to have facilitated ancestral survival and reproduction. Slow LH individuals depend on their social networks and relationships within those networks; thus, it is appropriate in such contexts to engage in deliberate thought and behavioral self-regulation. Enhanced executive functioning and behavioral self-regulation represent a fitness trade-off, because these can be costly in some environments and beneficial in others (Figueredo et al., 2011).

Wenner et al. (2013) documented that slow LH predicts executive functions (EFs); EFs inhibit psychopathic attitudes and psychopathic attitudes predict engagement in socially deviant behaviors (see Figueredo et al., 2010). In a more recent study, Figueredo et al. (2017) applied a complementary model to investigate the role of LH strategy in the development of cognitive systems that promote or inhibit aggressive behavior. They found that a faster LH strategy promotes the development of a "hot" cognitive system, including greater impulsivity, more sexist and socially hostile attitudes, and facilitates socially deviant behavior, including IPV. On the other hand, a slower LH strategy promotes the development of a "cool" cognitive system that mitigates these impulsive and socially deviant behaviors (Figueredo et al., 2017). Thus, the second step of the cascade model hypothesizes that the LH strategy predicts behavioral self-regulation, such that men with a slower LH strategy will report enhanced self-regulation.

Self-Regulation Predicts Perceptions of Partner Infidelity Risk

Malamuth (1998) contends that two sexual strategies are available to human males: (1) the *convergent*-interest sexual strategy and (2) the *divergent*-interest sexual strategy. Men adopting a convergent-interest sexual strategy experience less conflict in relationships because they perceive their sexual and reproductive goals as consistent with those of their female partners. Men adopting a divergent-interest sexual strategy, in contrast, experience more conflict with their female partner, because they perceive their sexual and reproductive goals to be inconsistent with those of their female partner. According to Malamuth, both strategies are predicted by the LH strategy, such that the slow LH strategy is positively correlated with a convergent-interest, mutualistic sexual strategy, and fast LH strategy is positively correlated with a divergent-interest, antagonistic sexual strategy.

Figueredo et al. (2011) suggested that a slow LH strategy facilitated by enhanced executive functioning and self-

regulation serves as a *protective factor* against antagonistic sexual and social thoughts and behaviors, such that, for example, slow LH strategy individuals are less likely to engage in prejudicial thinking. Thus, the third step of the cascade model investigates the relationship between men's self-regulation and perceptions of partner infidelity. In other words, faster LH strategy men are predicted to be more likely to report antagonistic thoughts about a partner's infidelities because of lack of emotional control and behavioral self-regulation. Slower LH strategy men, on the other hand, will be more likely to suppress antagonistic thoughts, including suspicions about a partner's infidelity.

Perceptions of Partner Infidelity Risk Predict Frequency of MR Behaviors

Step four of the cascade model investigates the relationship between men's perceptions of partner infidelity risk and men's performance of MR behaviors, such that men who perceive a higher likelihood of partner infidelity will report performing more frequent MR behaviors. This step will corroborate previous research identifying links between perceived partner infidelity and men's performance of MR behaviors (Buss & Shackelford, 1997; Kaighobadi et al., 2008).

Frequency of MR Behaviors Predicts IPV

Finally, as documented in previous research (e.g., Kaighobadi et al., 2008; Shackelford et al., 2005), the last step of the cascade model predicts that the frequency of men's MR behaviors will predict the frequency of men's partner-directed violence and sexual coercion.

What is a Cascade Model?

A cascade model can be constructed as a series of hierarchical multiple regressions analyzed sequentially according to a hypothesized causal order. This procedure is functionally equivalent to performing a sequential canonical analysis (SEQCA), which can be used as an exploratory form of path analysis (Davis et al., 2007; Figueredo & Gorsuch, 2007; Guggenheim et al., 2007). This method "controls statistically for any indirect effects of the predictors through the causally prior criterion variables" (Sotomayor-Peterson et al., 2013, pp. 627–628). Because of the hypothesized causal order, each hierarchically prior criterion variable is entered first as a predictor in the next multiple regression. As Figueredo and Gorsuch (2007, p. 63) explain:

> Each successive dependent variable can be predicted from an initial set of ordered predictor variables, each time entering the immediately preceding dependent variable hierarchically as the first predictor, then entering all the ordered predictors from the previous regression equation. Thus, each successive regression enters all of the preceding dependent variables in reverse causal order to statistically control for any indirect effects that might be transmitted through them. Within this analytical scheme, as with SEQCA, the estimated effect of each predictor is limited to its direct effect on each of the successive dependent variables. The general format for this system of hierarchical multiple regressions is as shown in Table 7 below.

Table 7. General format for multiple dependent criterion variables analyzed sequentially according to a hypothesized causal order.

$$
\begin{array}{llll}
Y_4 = & & \beta_1 X_1 + & \beta_2 X_2 + \beta_3 X_3 \\
Y_5 = & \beta_4 Y_4 + & \beta_1 X_1 + & \beta_2 X_2 + \beta_3 X_3 \\
Y_6 = & \beta_5 Y_5 + \beta_4 Y_4 + & \beta_1 X_1 + & \beta_2 X_2 + \beta_3 X_3
\end{array}
$$

In the current study, the order of multiple hierarchical regressions is as follows: (1) PE predicts LH strategy (criterion variable 1); (2) PE and LH strategy together (with LH strategy entered first) predict self-regulation (criterion variable 2); (3) PE, LH strategy, and self-regulation together (with self-regulation entered first) predict perceptions of partner infidelity risk (criterion variable 3); (4) PE, LH strategy, self-regulation, and perceptions of partner infidelity together (with perceptions of partner infidelity entered first) predict MR behaviors (criterion variable 4); and (5) PE, LH strategy, self-regulation, perceptions of partner infidelity, and MR behaviors together (with MR behaviors entered first) predict IPV (final criterion variable).

Methods

Participants

One-hundred-and-fourteen men, each in a self-defined heterosexual relationship, participated in this study. Participants were drawn from psychology courses and the subject pool of the Department of Psychology at a state university in the southeastern US. The mean age of participants was 22.8 years ($SD = 6.5$), ranging from 18 to 55 years. The mean age of participants' partners was 22.1 years ($SD = 6.0$), ranging from 17 to 51 years. Because of a problem in the framing of the question measuring relationship length, we are unable to report an accurate estimate of the mean of the relationship length. Participants were offered extra course credit or subject pool credit upon completion of the study.

Materials

Participants completed a survey that included several sections. The first section solicited demographic information, including the participant's age, his partner's age, and the duration of his current relationship. The remainder of the survey included measures of the main variables of interest.

Father and Mother's PE Scales (Cabeza de Baca, Sotomayor-Peterson, Smith-Castro, & Figueredo, 2012, Cabeza de Baca,

Sotomayor-Peterson, Smith-Castro, & Figueredo, 2014). These scales measure the relative frequency of father's and mother's caregiving acts across different domains. The tasks vary in typical performance frequency. Some tasks are performed more frequently (e.g., "Encouraging us to do our homework," with response options ranging from "daily" to "once weekly"). Some acts are less frequently performed (e.g., "Playing sports with us," with response options ranging from "five times a week" to "once a month"). Some acts are performed only once in a lifetime (e.g., "Teaching us about race and prejudice," with response options of "Yes" or "No"). The performance frequencies of all tasks were aggregated into scores for total PE, separately for each parent.

Mini-K Short Form of the Arizona LH Battery (Figueredo et al., 2006). This measure was used to assess the slow LH strategy. The measure includes 20 cognitive and behavioral items on a Likert scale (e.g., "I often make plans in advance"), with responses, ranging from −3 (*disagree strongly*) to +3 (*agree strongly*).

High-K Strategy Scale (Giosan, 2006). This measure assesses the High-K (i.e., slow) LH strategy with 26 items on a Likert scale (e.g., "I live in a comfortable and secure home"), with responses ranging from −2 (*strongly disagree*) to +2 (*strongly agree*).

Rand-36 Health Survey (Hays, Sherbourne, & Mazel, 1993). This measure assesses physical and mental health. It includes 36 items measuring eight health parameters: physical functioning, bodily pain, role limitations due to physical health problems, role limitations due to personal or emotional problems, general mental health, social functioning, energy/fatigue, and general health perceptions.

Ten-Item Personality Inventory (Gosling, Rentfrow, & Swann, 2003). The ten-item personality inventory (TIPI) is a 10-item measure of the five-factor model of personality dimensions. Each item includes two personality adjectives (e.g., "extraverted, enthusiastic"); there are two items per factor. The participant responds on a Likert scale ranging from −3 (*disagree strongly*) to +3 (*agree strongly*).

Multidimensional Sociosexual Orientation Inventory (James-Jackson & Kirkpatrick, 2007). This measure assesses two dimensions of sexuality, preference for short-term sexual relationships and preference for long-term sexual relationships. In the current study, the short-term sexual relationship dimension was revised to assess perceptions of partner preferences for short-term sexual relationships. This dimension includes 10 items (e.g., "My partner believes in taking sexual opportunities where she finds them"), with responses provided on a Likert-type scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*).

Perceived Partner Infidelity Risk. To assess perceptions of partner infidelity risk, and following Shackelford et al. (2002), participants answered four questions addressing their suspicions of their partner's past and future likelihood of sexual and emotional infidelity (e.g., "As far as you know, has your partner had sexual intercourse with someone other than you since you have been involved in a relationship together?"). The responses were recorded on a 10-point scale, anchored by 0 (*definitely no*) to 9 (*definitely yes*).

Intentions Toward Infidelity Scale (Jones, Olderbak, & Figueredo 2010). This scale assesses both own intentions and perceived partner intentions toward infidelity. For use in the current study, the scale was revised in two ways (1) to separate intentions toward emotional infidelity and sexual infidelity and (2) to measure only perceived partner intentions. The current study used 13 items of the revised scale, assessing perceptions of partner intentions toward emotional infidelity and sexual infidelity (e.g., "How likely is your partner to lie about being emotionally unfaithful?"), with responses ranging between −3 (*not at all likely*) to 3 (*extremely likely*).

The Behavioral Regulation Scales of the Behavior Rating Inventory of Executive Function—Adult Version (Gioia, Isquith, Retzlaff, & Epsy 2002). This 30-item scale assesses executive functioning or (equivalently) self-regulation, including the component dimensions of inhibition (e.g., "I tap my fingers or bounce my legs"), set shifting (e.g., "I have trouble changing from one activity or task to another"), and emotional control (e.g., "I overact emotionally"). Response options range from 0 (*never*) to 6 (*almost always*). Gioia et al. (2002) used confirmatory factor analysis to investigate the validity of behavior rating inventory of executive function—adult version (BRIEF-A) against observed data collected from four theoretical models of executive functioning. The researchers documented that the BRIEF-A measure of executive function (EF) provides an assessment consistent with Barkley's (1997) theoretical model of EF, which includes components of behavioral regulation, emotional control, and metacognition. Furthermore, the measure has good ecological validity because it captures "the integrated, multidimensional, relativistic nature of the executive system that often is demanded in real world situations" (Gioia et al., 2002, p. 254).

MR Inventory-Short Form (Buss, Shackelford, & McKibbin, 2008). This scale includes 38 items, representing a brief version of the MR inventory (MRI; Buss, 1988), which assesses performance frequency of MR behaviors (e.g., "Talked to another women at a party to make my partner jealous") on a scale ranging from 0 (*never performed this act*) to 3 (*often preformed this act*).

Violence Assessment Index and Injury Assessment Index. To assess female-directed violence, participants completed both the violence assessment index (VAI; Dobash, Dobash, Cavanagh, & Lewis, 1995) and the injury assessment index (IAI; Dobash

et al., 1995). The VAI assesses how often men performed 26 violent acts against their partners (e.g., "Pushed, grabbed or shoved partner"), and the IAI assesses how often their partners sustained each of 20 injuries as a result of their violence against their partners. For each index, responses are recorded using a six-point Likert-type scale anchored by 0 (*never*) and 5 (*11 or more times*). Dobash et al. (1995, 1996, 1998) have demonstrated the reliability, validity, and utility of the VAI and IAI.

Sexual coercion in intimate relationships scale (SCIRS; Shackelford and Goetz, 2004) includes 34 items that assess men's use of sexual coercion in their current relationship. SCIRS items vary in subtlety, ranging from hinting and subtle manipulations to outright physical force. The items cluster into three components: resource manipulation/violence (e.g., "I hinted that I would withhold benefits that my partner depends on if she did not have sex with me"; "I physically forced my partner to have sex with me"), commitment manipulation (e.g., "I told my partner that if she loved me she would have sex with me"), and defection threat (e.g., "I hinted that I would have sex with another woman if my partner did not have sex with me"). Responses are recorded on a six-point Likert scale ranging from 0 (*act did not occur in the past six months*) to 5 (*act occurred 11 or more times in the past six months*). Shackelford and Goetz (2004) provide evidence of the reliability, validity, and utility of the SCIRS.

Procedures

The data were collected using an online survey. Participants were provided with a link to the online survey and a subject number. The subject number was not linked to participant identity. After consenting to participate, participants were directed to the survey. Participants were allowed to skip any question or to withdraw from the study at any point, but were eligible to receive credit only if they continued the survey to the final page. Survey completion required, on average, about one hour. The Institutional Review Board of the university with which the senior author was affiliated at the time approved the materials and procedures.

Results

The Measurement Model

The measurement models were built to include multiple measures per factor (i.e., the main variables of interest) before building and testing the cascade model that included those factors. SAS 9.1.3 (SAS Institute, 2005) was used to construct all models. The composite scores for each factor were estimated by computing: (1) the means of standardized scores for all items on each subscale; (2) the means of standardized scores for all subscales on each scale; (3) the means of standardized scores for all scales on each factor (see, for example, Sotomayor-Peterson et al., 2013). Cronbach's alphas and part–whole correlations of the scales with each factor also were computed (see Table 1).

Table 1. Means (standard deviations), Cronbach's alphas, and part–whole correlations between each scale and its associated factor.

	Mean (*SD*)	Alpha	Part–whole correlations
PE factor			
Father PE	3.42 (1.20)	.96	.87*
Mother PE	3.58 (0.82)	.93	.74*
LH factor			
Mini-K	1.41 (0.72)	.81	.76*
HKSS	1.74 (0.73)	.88	.83*
Rand-36	78.39 (13.00)	.91	.76*
TIPI	.93 (0.78)	.68	.78*
Executive function factor			
Emotional control	−1.26 (1.00)	.90	.87*
Inhibition	−1.74 (1.18)	.80	.84*
Self-monitoring	−1.17 (1.06)	.84	.90*
Set shifting	−1.37 (1.07)	.81	.87*
Perceived infidelity factor			
Short-term MSOI		.85	.68*
Four-item perceived infidelity risk	1.16 (1.72)	.86	.80*
ITIS-emotional	−1.06 (1.33)	.83	.89*
ITIS-sexual	−1.00 (1.34)	.83	.90*
IPV factor			
VAI	.22 (0.52)	.97	.89*
IAI	.11 (0.42)	.98	.95*
SCIRS	.19 (0.48)	.99	.81*

Note: * $p < .001$. HKSS = high-K strategy scale; IAI = injury assessment index; IPV = intimate partner violence; ITIS = intentions toward infidelity scale; LH = life history; MSOI = multidimensional sociosexual orientation inventory; PE = parental effort; PE = parental effort; SCIRS = sexual coercion in intimate relationships scale; TIPI=ten-item personality inventory.

The factors (i.e., the main variables of interest) were theoretically specified and constructed. The first factor, the PE factor, included scores from *Father's and Mother's PE Scales*. The second factor, the LH factor, included scores from the *Mini-K*, the High-K strategy scale (HKSS), the *Rand-36 Health Survey*, and the *TIPI*. The third factor, the EF factor, included scores from the *BRIEF-A*. The fourth factor, the perceptions of partner infidelity risk or PI factor, included scores from *Perceptions of Partner Infidelity Risk*, the multidimensional sociosexual orientation inventory (*MSOI*)-*Partner*, and the intentions toward infidelity scale (*ITIS*)-*Partner* scales. The fifth factor, the MR factor, only included scores from the *MRI-Short Form*. The sixth factor, the IPV factor, included scores from the *VAI*, *IAI*, and *SCIRS*. Mean scores and the part–whole correlations for each factor to its theoretically specified indicators (scales) and Cronbach alpha for each scale are shown in Table 1.

The Structural Model

The structural model included a series of hierarchical multiple regressions in the form of a cascade model, as previously described (Figure 1 illustrates the entire cascade model):

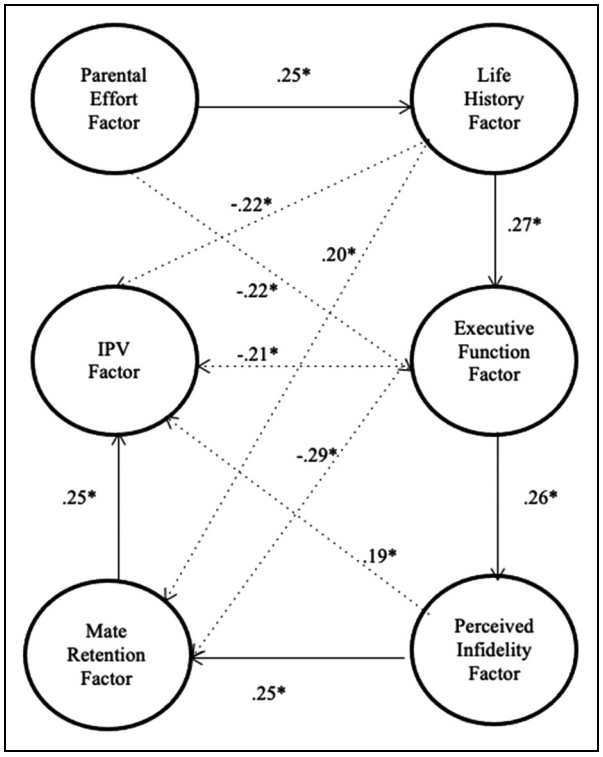

Figure 1. The cascade model. *Note.* The numbers represent Beta weights or standardized regression coefficients. *$p < .05$.

1. Higher levels of PE (PE factor) predicted higher levels of LH strategy (slower LH strategy), $\beta = 0.25$, $F(1, 100) = 6.39$, $p < .05$.
2. Higher levels of LH strategy predicted greater executive functioning (EF factor) and greater self-regulation (EF factor) $\beta = 0.27$, $F(1, 99) = 4.78$, $p < .05$. After the LH factor was entered into the equation, the PE factor negatively predicted the new criterion variable, EF, $\beta = -.22$, $F(1, 99) = 5.22$, $p < .05$.
3. Greater executive functioning predicted lower levels of perceived partner infidelity risk, $\beta = -.26$, $F(1, 98) = 12.04$, $p < .001$. After entering the EF factor into the equation, the PE factor and the LH factor no longer predicted perceived partner infidelity risk.
4. Higher levels of perceived partner infidelity predicted more frequent performance of MR behaviors, $\beta = 0.25$, $F(1, 97) = 11.92$, $p < .001$. Even after entering the perceived partner infidelity factor (the PI factor), the EF and LH factors predicted the frequency of MR behaviors. The EF factor predicted MR behaviors negatively, $\beta = -.29$, $F(1, 97) = 8.00$, $p < .01$. The LH factor predicted MR behaviors positively, $\beta = .20$, $F(1, 97) = 5.57$, $p < .05$.
5. More frequent MR behaviors predicted men's engagement in more frequent IPV, $\beta = 0.25$, $F(1, 96) = 23.38$, $p < .0001$. After entering the MR, LH, EF, and PI factors, all predicted IPV. Higher levels of LH predict less frequent engagement in IPV, $\beta = -.22$, $F(1, 96) = 3.97$, $p < .05$. Higher levels of EF also predicted less frequent engagement in IPV, $\beta = -.21$, $F(1, 96) = 6.18$, $p < .01$. Higher levels of partner infidelity risk predicted more frequent engagement in IPV, $\beta = .19$, $F(1, 96) = 13.24$, $p < .001$.

The squared multiple correlations for each criterion variable were $R^2 = .06$ for the LH factor, $R^2 = .09$ for the EF factor, $R^2 = .14$ for the PI factor, $R^2 = .21$ for the MR factor. In total, 36% of the variance in IPV was explained by the cascade model ($R^2 = .36$).

Discussion

The current study complemented previous evolutionary psychological research on men's violence against their female partners by investigating individual difference variables, including LH and self-regulation strategies. LH theory, applied to individual differences, predicts that unpredictable and harsh developmental environments select for a cluster of traits and behaviors that together constitute an adaptive strategy, a fast LH strategy. Previous research has found fast LH individuals to be high on mating effort, low on parenting effort, highly risk-taking, and low on emotional control and self-regulation. Previous research also has demonstrated that slow LH individuals are interested in long-term romantic relationships, are high on parenting effort, and have high levels of executive functioning and low levels of risk-propensity (Figueredo et al., 2006, 2007). Figueredo et al. (2006, 2007) reported that this suit of LH traits cluster into a single common factor, the "K" factor.

Informed by LH theory, the current study hypothesized a hierarchy of events, traits, and behaviors leading to men's partner-directed violence. The results supported a causal model beginning with childhood experiences with parental investment, leading to adjustments in LH strategy and behavioral self-regulation, which in turn predicted men's perceptions of the likelihood of partner infidelity. Consistent with previous research, perceived partner infidelity risk predicted frequency of engagement in nonviolent MR behaviors, and frequency of nonviolent MR behaviors, in turn, predicted frequency of men's perpetration of partner-directed violence and sexual coercion.

Childhood experiences with parental investment and effort predicted LH strategy in adulthood. Men who reported higher levels of PE during development adopted a slower LH strategy, including a high-K strategy and better mental and physical health. Mother's and father's greater parental investment in the form of frequently performed tasks such as attention to homework, or less frequently performed tasks such as taking the children to the movies or romping and wrestling with them, or lifetime tasks such as helping children deal with fears or helping them find direction in life, may provide children with information about the predictability of the environment and resource availability. Children growing up in high parental investment homes may adopt a slow LH strategy. However, it may be adaptive for children growing up in unstable, unpredictable environments with low levels of parental investment to adopt a fast LH strategy in response to those environmental conditions.

The results supported a positive relationship between LH strategies and executive functioning. Men with slow LH strategies have greater EF and higher levels of emotional control and behavioral self-regulation. Consistent with previous research, it may be adaptive for fast LH strategy men in unpredictable environments to display a more flexible behavioral strategy, more risk-taking, and less deliberation in decision-making (Figueredo et al., 2010, 2011).

The results supported the hypothesis that a slow LH strategy may act as a protective factor against antagonistic thoughts and behaviors. In this study, greater executive functioning was associated with lower perceptions of the likelihood of partner infidelity. The results further supported previous research, such that higher levels of perceived partner infidelity risk positively predicted the frequency of men's performance of nonviolent MR behaviors. The hierarchy of events, similar to previous research (Kaighobadi et al., 2008), suggests that men who perceive a greater likelihood of partner infidelity may first increase the deployment of nonviolent MR behaviors before engaging in violence against partners. Finally, the frequency of MR behaviors positively predicted the frequency of IPV, including partner-directed physical violence, sustained injuries, and partner-directed sexual coercion.

The overall cascade model predicted 36% of the variance in IPV. The chain of causal events, traits, and behaviors identified in this study corroborates hypotheses derived from LH theory. Genetic variation and phenotypic plasticity prepare the individual to develop optimal strategies expressed in the form of personality traits, self-regulation, and sometimes even deviant behaviors in response to environmental conditions (Ellis et al., 2009). Unpredictable environmental conditions (e.g., unstable parental investment) may lead to the adoption of a fast LH strategy. Traits associated with fast LH strategies, such as high mating effort, high-risk-propensity, and lack of self-regulation, may facilitate the use of violence and sexual coercion in intimate relationships (Thornhill & Palmer, 2004). These views are consistent with either the adaptation or by-product hypotheses of sexual coercion (Thornhill & Palmer, 2004). If a fast LH strategy involves risk-taking, short-term mating, and low self-regulation, IPV or sexual coercion may be side effects or byproducts of a fast LH strategy. In other words, the LH strategy may be an adaptation, and IPV or sexual coercion may be byproducts of that adaptation, without serving a specific purpose. This hypothesis is also consistent with the view that a fast LH strategy underlies general criminality (Ellis, 1988).

The results of this study might also be framed as consistent with the adaptation hypothesis because the relationship between LH strategies and IPV was investigated in the context of perceived partner infidelity risk. Fast LH men were more likely to engage in IPV and sexual coercion when they reported greater suspicion of their partner's infidelity. Thus, the problem of paternity uncertainty may have been selected for behaviors that prevent or punish female sexual infidelity. However, men who possess the high "K" protective factor may be able to suppress antagonistic thoughts and antisocial behaviors, thereby refraining from engaging in costly behaviors. Fast LH men, in contrast, may not deliberate on the consequences of their behaviors once they suspect female infidelity, and may be more likely to engage in partner-directed violence or sexual coercion as a result.

An alternative explanation may be derived from Malamuth's (1998) confluence model. Malamuth argues that men may adopt one of two general sexual strategies: (1) a *convergent-interest* sexual strategy and (2) a *divergent-interest* sexual strategy. According to Malamuth, LH strategies may explain the adoption of each strategy, such that slow LH individuals may be motivated to engage in convergent-interest sexual strategies and fast LH individuals may be motivated to engage in divergent-interest sexual strategies. Thus, fast LH men may be more likely to perceive their partner to be unfaithful, causing additional conflict in the relationship, and engaging in violence as a side-effect of this greater conflict.

Limitations of the Current Study

One limitation of the current study is the lack of paired-partner reports. Whereas men may be reluctant to report perpetration of IPV and sexual coercion (Dobash et al., 1998), their female partners may provide a more reliable account of the context and frequency of such behaviors (see Goetz & Shackelford, 2006, for review). Future studies should collect data from women in the form of self-reports to test the target hypotheses about IPV against women, and data in the form of paired-partner reports to verify the veracity of men's self-reports. A second limitation is that we cannot confidently infer strong causal relationships because the data reflect single assessments. Further research using a methodology that includes repeated assessments over time would provide insights into the nature of the links between childhood experiences, LH strategies, suspicions of female infidelity, male MR behaviors, and female-directed violence.

The current study was also limited because of restricting the sample to a university sample. It might be argued that men who had been admitted to and are attending university have already adopted a slow LH strategy, and may be different in LH strategies from a non-university sample. Including a non-university, community sample may provide more variation in LH strategies, and in IPV. In fact, a cross-cultural study was recently conducted, indirectly predicting interpersonal aggression from LH in a cascade model (Figueredo et al., 2018), in which the model parameters of a low-risk undergraduate student population in Arizona were compared to those of a high-risk adult non-student population in Central Mexico. With just a few statistically significant parametric differences, which in no case reversed the direction of the effects, the cascade model cross-validated reasonably well across two independent and highly discrepant populations. In addition, a formal comparison was recently conducted of LH speeds across North American student and non-student populations, and no statistically significant difference in means scores was found (Figueredo et al., 2015). Finally, there is evidence for other proximate predictors

of male aggression toward their female romantic partners that were not included in the current study. For example, Thornhill and Fincher (2011) documented the role of conservative value systems in gender inequality and female-directed aggression and homicide. Future research may build a model that includes such cross-cultural behavioral variations.

To summarize, the current study was guided by an evolutionary developmental approach to investigate IPV as a consequence or by-product of men's LH strategies. The causal cascade model documented a hierarchy of events and traits initiated by early experience with parental investment, leading to an adjustment in LH strategies and behavioral self-regulation, such that men who experience lower parental investment may be more likely to adopt a fast LH strategy, identified by lower levels of executive functioning and self-regulation, which in turn predicted greater suspicions of partner infidelity. Finally, and corroborating the results of previous studies, greater perceived partner infidelity risk predicted men's more frequent performance of nonviolent and violent MR behaviors, including physical violence and sexual coercion. The results of this study build a model of the predictors of men's violence against intimate female partners that include proximate and ultimate predictors of these costly behaviors. This model offers a comprehensive explanation of how men's LH strategies play a role in their deployment of antagonistic behaviors in intimate relationships, thereby contributes to our understanding of IPV perpetration, and may facilitate development of interventions that can address perpetrators' suspicions of partner infidelity, lower ability to self-regulate, and motivations for violence.

Public Significance Statement

This study documented a developmental model of predictors of men's violence toward their intimate female partners. The study found that early experiences with PE predict men's adoption of a sequence of cognitive and behavioral traits that lead to antagonistic thoughts and behaviors toward intimate female partners.

Declaration of Conflicting Interests

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