



# Life history strategies and procrastination: The role of environmental unpredictability



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## ABSTRACT

Life history theory provides a unifying perspective on understanding human behaviors as adaptive strategies in response to particular environmental conditions. Procrastination, characterized by seeking immediate hedonic rewards and avoiding investment for future rewards, can be seen as a fast life history strategy in response to the unpredictable environment. The purpose of the present study was to examine the relationships between environmental unpredictability, life history strategies and procrastination. In two studies, participants completed a measure of environmental unpredictability, life history strategies and procrastination. Samples included 577 adolescents (Study 1) and 253 young adults (Study 2). Across two studies, we found that those who perceived environmental unpredictability reported greater levels of procrastination. Furthermore, a slow life history strategy mediated the association between perceptions of environmental unpredictability and procrastination. Implications for life history theory, conceptualizing procrastination, and future research directions are discussed.

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## 1. Introduction

Procrastination is conceptualized as a form of self-regulatory failure involving the purposive delay of intended tasks (Chen, 2017a; Ferrari, 2010; Steel, 2007). A large body of literature indicates that certain environmental factors such as peer relationship, parenting behaviors, and social support networks (Chen, Shi, & Wang, 2016; Ferrari, Harriott, & Zimmerman, 1998; Ferrari & Olivette, 1994; Pychyl, Coplan, & Reid, 2002) and intrapersonal characteristics such as personality traits (Díaz-Morales, Cohen, & Ferrari, 2008; Lyons & Rice, 2014; Steel, Brothen, & Wambach, 2001; Watson, 2001) are associated with procrastination. Although such research evidence has been accumulating in recent years, little is known about the evolutionary origin and function of procrastination. Within an evolutionary life history (LH) framework, we propose that exposure to unpredictable environmental conditions may play a role in procrastination.

LH theory elucidates that an individual's LH strategy represents a co-ordinated pattern, involving multiple physiological and psychological systems, which constantly assess environmental pressures and make decisions about the allocation of resources, energy, and time, accordingly (Del Giudice, Gangestad, & Kaplan, 2015). An adaptive LH strategy adopted by an individual may be optimal in response to their particular environmental conditions, which, ultimately, promotes an individual's reproductive fitness. In particular, the LH theory emphasizes that

humans vary in their LH strategies, ranging on a slow-to-fast continuum (Del Giudice et al., 2015; Figueredo et al., 2006; Griskevicius et al., 2013). A faster LH strategy evolved in a harsh and unpredictable environment, and is associated with impulsivity, short-term opportunism, risk taking, promiscuity, and low parental investment (Belsky, Schlomer, & Ellis, 2012; Belsky, Steinberg, & Draper, 1991; Chen, 2017b; Chen, Shi, & Sun, 2017; Ellis, McFadyen-Ketchum, Dodge, Pettit, & Bates, 1999; Griskevicius, Tybur, Delton, & Robertson, 2011; Kruger, Reischl, & Zimmerman, 2008; Ponzi et al., 2015; Reynolds & McCrea, 2015; Szepeswol, Simpson, Griskevicius, & Raby, 2015; Vigil & Geary, 2006; Wang, Kruger, & Wilke, 2009). A slower LH strategy, on the other hand, evolved in a relatively favorable and predictable environment, and is associated with impulse control, long-term goals, and risk avoidance (Chisholm, 1999; Figueredo, Woodley of Menie, & Jacobs, 2015; Griskevicius et al., 2011; Sherman, Figueredo, & Funder, 2013).

Procrastination, typified by present-orientation, is characterized by seeking immediate hedonic rewards and avoiding investment for future rewards (Chen & Chang, 2016; Chen & Kruger, 2017; Gustavson, Miyake, Hewitt, & Friedman, 2014). Within the same framework discussed above, procrastination can be seen as a fast LH strategy. In one of the few published studies to examine procrastination in an evolutionary perspective, Chen and Chang (2016) found that procrastination was associated with a fast LH strategy, assessed by the Mini-K scale. Furthermore, as a fast LH strategy, procrastination may play a crucial role when faced with an unpredictable environment, in which an individual's effort invested in the future would be wasted (Chen & Chang, 2016). That is to say, procrastination may be adaptive under conditions of environmental unpredictability if it reduces the amount of

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effort invested into behaviors that are unlikely to be associated with future (fitness) payoffs.

In the evolutionary literature, LH strategy is frequently examined as a mediator between the environmental condition and its psychological and behavioral outcomes. For example, a fast LH strategy mediates the relationships between harsh environmental conditions (assessed in terms of a dangerous neighborhood, low parental investment, and interpersonal threat) and poor psychological and physical health (Gibbons et al., 2012; Hampson, Andrews, Barckley, Gerrard, & Gibbons, 2016). More direct evidence, which was similar to the association between LH strategy and procrastination, demonstrated that a slow LH strategy mediated the relationships between childhood environmental unpredictability and Conscientiousness, which is commonly considered as a trait associated with impulse control (Chen et al., 2017). Similarly, we examined whether environmental unpredictability played both a direct and an indirect role in procrastination through mediation of the LH strategy.

Last, we expected potential sex differences in the associations among the variables discussed above. Previous literature has indicated that relative to females, males may be more sensitive to unpredictable environments where they can adaptively adopt and develop fast LH strategies to accomplish success (Del Giudice, 2009; Jonason, Zeigler-Hill, & Baldacchino, 2017). Therefore, we predicted that the associations among environmental unpredictability, LH strategy, and procrastination would be stronger for males than for females.

### 1.1. Research overview

Most LH research to date has been done on Western populations, it is necessary to test pan-cultural evolutionary predictions. There is some evidence based on the Chinese samples that is in accord with predictions derived from the evolutionary theory of LH (e.g., Chen, 2017c; Chen & Chang, 2012; Chen & Kruger, 2017; Lu, Wong, & Chang, 2017). For example, the LH strategies were associated with personality traits based on the Five Factor Model (Chen et al., 2017) and procrastination (Chen & Chang, 2016). In the current study, two studies further tested how perception of environmental unpredictability was associated with procrastination in the Chinese societies. Study 1 tested our central hypothesis in a sample of adolescents: perception of environmental unpredictability was associated with procrastination directly, as well as

indirectly through the mediation of a slow LH strategy. Study 2 sought to replicate and extend these associations in a sample of young adults by inclusion of early-life environmental unpredictability. The description of our specific studies is given below.

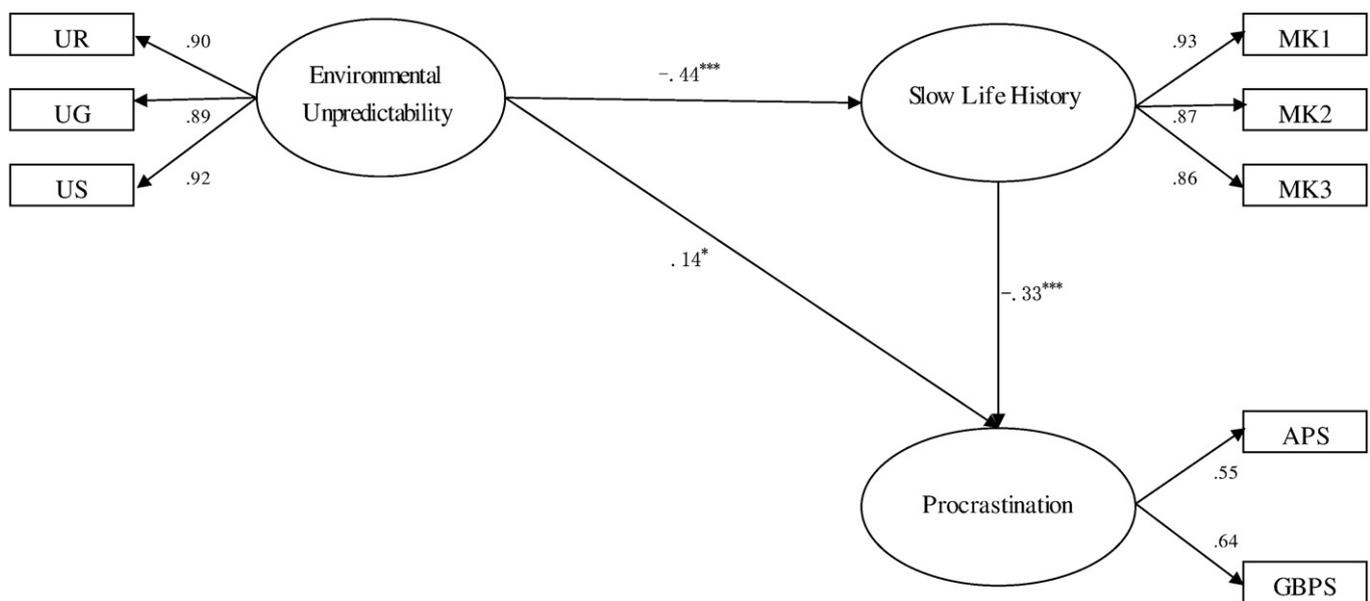
## 2. Study 1

We examined whether environmental unpredictability played a direct and an indirect role in procrastination through mediation of a slow LH strategy. Specifically, we predicted that environmental unpredictability would be positively correlated with procrastination as well as with a fast LH strategy. In addition, the role of environmental unpredictability on procrastination would be mediated by the LH strategy. The model is presented in Fig. 1. We tested these associations in a sample of adolescents. Structural Equation Model was conducted using Mplus 7.0 (Muthén & Muthén, 2007). We employed the multiple-indicator approach to measure the three latent constructs. We used three subscales of environmental unpredictability (i.e., resource acquisition, social rank, and offspring survivability) to measure the environmental unpredictability construct. We used two scales (i.e., academic procrastination and general behavioral procrastination) to measure the procrastination construct. We applied the parceling approach (Little, Cunningham, Shahar, & Widaman, 2002) to create multiple indicators from the Mini-K scale to measure the slow LH construct. We relied both on the overall model fitness statistics and significance tests of specific paths to examine the direct association between environmental unpredictability and procrastination, as well as the indirect association between these two constructs through the mediation of the LH strategy.

### 2.1. Method

#### 2.1.1. Participants

This study utilized part of the data collected in a sub-project, initiated by the Positive Youth Development (PYD) cross-national project. The sample comprised 577 Chinese adolescents (53.5% male) from five public schools in Shanghai, China. The average age of the sample was 14.56 years ( $SD = 1.05$ ). Fathers' and mothers' respective educational levels were as follows: 18.07% and 25.22% had junior high school or lower education; 43.86% and 39.58% had a senior high school education; and 38.07% and 35.20% had at least some college or higher education.



**Fig. 1.** The model depicting the associations among environmental unpredictability, LH strategy, and procrastination in Study 1. Note. UR, UG and US represent resources acquisition certainty, offspring survivability certainty, and social rank certainty subscales of the Probability Judgments Scale respectively; MK1 to 3: represent three item parcels from the Mini-K scale; APS: Academic Procrastination Scale; GBPS: General Behavioral Procrastination Scale. \* $p < 0.05$ , \*\*\* $p < 0.001$ .

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