



Adaptive Calibration in Early Development: Brief Measures of Perceived Childhood Harshness and Unpredictability

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Abstract

Objective A burgeoning literature inspired by life history theory suggests that psychological and behavioral processes become adaptively calibrated to the levels of harshness and unpredictability encountered in early developmental environments. The current research develops and validates brief scales intended to measure perceptions of childhood harshness (resource scarcity) and unpredictability.

Methods Data were collected from adults in the U.S. (total $N=3252$). Study 1 was used to design the measures and confirm reliability. Study 2 provided evidence of convergent and discriminant validity. Study 3 assessed associations between the perceived harshness and unpredictability scales and indicators of life history strategies.

Results The scales showed good convergent validity (e.g., moderate-to-strong associations with adverse childhood experiences, impulsivity, and a lack of self-control) and discriminant validity (e.g., null-to-low associations with social desirability, sex, and age), as well as associations with biometric (e.g., age of menarche and sexual debut), behavioral (e.g., number of sexual partners, age of first offspring, number of offspring), and psychometric (e.g., scores on the K-SF-42 and Mini-K) indicators of life history strategies.

Conclusions These scales provide easy-to-administer retrospective measures of perceived childhood harshness and unpredictability and facilitate research testing hypotheses related to adaptive calibration.

Keywords Harshness · Unpredictability · Life history theory · Behavioral ecology · Adaptive calibration · Measures

Evolutionary perspectives suggest that early in human life, psychological systems develop adaptively and in close conjunction with ecological variables (e.g., Kaplan

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& Gangestad, 2005; Neuberg et al., 2010; Pigliucci, 2005). Two ecological variables that play particularly important roles in human development are the harshness and unpredictability of early childhood environments. Harshness refers to rates of morbidity and mortality in the environment, reflecting the absence of resources by which to survive (Belsky et al., 1991; Ellis et al., 2009), as well as the presence of threat (e.g., dangerous terrain, pathogens). Unpredictability refers to the degree of instability in the environment due to stochastic changes across time and situations in the presence of threat or the availability of social and material resources (Belsky et al., 1991; Ellis et al., 2009). The experience of childhood harshness and/or unpredictability has been linked to outcomes in domains as diverse as cognition, close relationships, economic decisions, and health (e.g., Doom et al., 2016; Maner et al., 2017; Maranges & Strickhouser, 2021; Mittal & Griskevicius, 2014; Szepeswöl et al., 2019; for review, see Pepper & Nettle, 2017).

To facilitate the further development of this research area, the current paper generates and validates new scales that assess people's perceptions of their childhood ecologies. Extant work has relied largely on data available from relatively few and relatively expensive longitudinal studies, or on unvalidated self-reports of childhood unpredictability and harshness. The goal of the current project was to develop reliable, psychometrically sound, and empirically validated self-report measures of perceived childhood harshness and unpredictability. To this end, we developed and validated scales that capture people's perceptions of unpredictability and resource scarcity (a crucial source of harshness) (Study 1) and provide evidence of discriminant and convergent validity in terms of individual differences (i.e., impulsivity, self-control, personality, social desirability; Study 2), and psychosocial and biological markers of life history strategies (Study 3).

Life History Theory: The Importance of Unpredictability and Harshness

A rich body of work in evolutionary psychology, much of it inspired by Life History Theory (LHT), has generated and tested predictions about ways in which childhood harshness and unpredictability shape psychological, behavioral, and neuroendocrinological development across the lifespan (e.g., Belsky et al., 1991; Ellis et al., 2009). The theoretical framework on which LHT is based entails three key assumptions. First, throughout the lifespan, organisms face fundamental tradeoffs with respect to how they use their limited bioenergetic resources (i.e., immediate reproduction vs. long-term somatic growth, quality vs. quantity of offspring; mating vs. parenting effort). Second, the way people (and other organisms) manage those tradeoffs is calibrated adaptively to the level of harshness and unpredictability in the environment. Third, that adaptation process is particularly strong during early development (i.e., childhood) because the phenotype is particularly flexible in that phase (e.g., Belsky et al., 1991; Belsky & Pluess, 2013; Bjorklund & Ellis, 2014; Ellis et al., 2009; Simpson et al., 2012).

Variation in how humans manage those tradeoffs gives rise to individual differences in clusters of biological, cognitive, and social traits and behavioral tendencies (Figueredo et al., 2007). Those clusters of traits and behavioral tendencies are

sometimes described as reflecting reproductive strategies that fall on a *fast* to *slow* spectrum (Kaplan & Gangestad, 2005). Evidence supporting this view suggests that high levels of harshness and unpredictability tend to be associated with relatively fast strategies marked by accelerated reproductive timing, greater focus on immediate reproduction, and larger numbers of offspring. In contrast, low levels of harshness and unpredictability are associated with delayed reproductive timing, greater focus on long-term somatic growth, and investing more strongly in a smaller number of offspring (Belsky et al., 2012; Ellis et al., 2009; Maranges & Strickhouser, 2021).

Research in humans has examined implications of childhood unpredictability and harshness for a range of cognitive and social outcomes. When exposed to environments marked by limited or unreliable survival resources, humans develop psychological tendencies that facilitate the expedient extraction of resources from the environment, given that environmental cues indicate that one may receive limited future return on prolonged investment. This developmental calibration is reflected in a global orientation toward focusing on the present and short-term future rather than the long-term future. For example, harshness and unpredictability have been associated with less long-term planning (e.g., Figueredo et al., 2007), less investment in long-term relationships (Maranges et al., 2021), and more risk-taking and impulsivity (e.g., Doom et al., 2016; Griskevicius et al., 2011; Mittal & Griskevicius, 2014). Such outcomes are underpinned by perceptions that one lacks control in the face of harsh or unpredictable environments (e.g., Bosma et al., 1999; Mittal & Griskevicius, 2014). In sum, the strategies that develop in response to environmental harshness and unpredictability feature clusters of biological and psychological processes intended to optimize the expedient use of limited energy.

Applying life history theory principles to understand human individual differences is not without criticism, however (see Baldini, 2015; Frankenhuis & Nettle, 2020; Stearns & Rodrigues, 2020; Zietsch & Sidari, 2020). The theory was originally applied to inter-species variation in life courses and fitness-related traits (e.g., fertility, mortality, offspring size; Jeschke et al., 2008), which are shaped by ecological factors that create selective pressures over the course of evolutionary time (Zietsch & Sidari, 2020). In contrast, the study of human life history in psychology has focused largely on adaptive calibration within individuals' lifetimes, which relies on different, more proximal mechanisms than those operating at the level of entire species on an evolutionary timescale (Zietsch & Sidari, 2020; Del Giudice, 2020). Some theorists question whether adaptive calibration results in "strategies" (i.e., functionally coherent sets of traits; see Nettle & Frankenhuis, 2020), as well as whether such strategies exist on a fast-to-slow continuum (see Andre & Rousset, 2020). Indeed, some have argued that the frameworks applied in evolutionary biology and in human sciences have become conceptually divergent (e.g., Frankenhuis & Nettle, 2020; Sear, 2020). Moreover, what behavioral traits are thought to constitute "life history strategies" varies widely (Sear, 2020; see also Stearns & Rodrigues, 2020). For example, like evolutionary biologists, evolutionary anthropologists tend to consider life history traits those directly involved in reproduction and growth; however, anthropologists sometimes also study risk-taking behaviors as constituent of life history strategies. Evolutionary psychologists emphasize a wide range of developmental, emotional, cognitive, personality, and behavioral factors as reflective

of life history strategies. However, despite these critiques, others have argued that the notion of fast versus slow life history strategies serves as a useful heuristic for generating hypotheses about human individual differences (Del Giudice, 2020).

Indeed, notwithstanding this debate, research on the effects of early developmental ecologies has brought about many novel insights—e.g., that specific childhood conditions shape cognitive functioning (e.g., Mittal et al., 2015; Young et al., 2018), physical and mental health outcomes (e.g., Martinez et al., 2022; Reuben et al., 2016; Ross et al., 2016), complex moral decision making (Maranges et al., 2021), and romantic relationship functioning and sexual risk-taking (e.g., French et al., 2020; Maranges & Strickhouser, 2021). Childhood harshness and unpredictability predict a range of important outcomes, including those beyond the original formulations of LHT. Accordingly, the development of valid, reliable, and easy to administer measures of harshness and unpredictability stands to substantially advance the field and to facilitate novel insights about human individual differences.

Measurement of Harshness and Unpredictability

Harshness and unpredictability have been measured in a variety of ways. Harshness has most often been operationalized using measures of childhood socioeconomic status (SES), with items such as parental income (e.g., Belsky et al., 2012; Glynn et al., 2019; Li et al., 2018; Sung et al., 2016), parental education (and composites thereof; e.g., Maranges & Strickhouser, 2021; Mittal et al., 2015), neighborhood SES (e.g., Safra et al., 2017), and resources (e.g., land, food, crop yield; Rickard et al., 2010). This approach is reasonable given the linear (negative) relationship between economic resources and levels of morbidity and mortality. Less frequently, harshness has been assessed with measures of exposure to danger or violence outside the home (Brumbach et al., 2009), stressful/adverse events (e.g., Wuth et al., 2021), and parental abuse (e.g., McCullough et al., 2013).

Unpredictability has been assessed with a range of measures. Because of the important role played by family environments, most measures of childhood unpredictability reflect household and family instability/inconsistency (e.g., French et al., 2020; Glynn et al., 2019; Jonason et al., 2016; Ross et al., 2016; Wuth et al., 2021). Many of these measures ask people to report on events in the household or household dynamics (Ross & McDuff, 2008) and others ask about specific events that could give rise to unpredictability (e.g., residential changes, parental relationship or employment changes; Barbaro & Shackelford, 2019; Glynn et al., 2019; Ross & Hill, 2000). Less often, unpredictability has been operationalized as poor-quality child–parent relationships (e.g., Belsky et al., 2007; Ellis & Garber, 2000), economic uncertainty or change (e.g., Szepsenwol et al., 2020), and ecological danger or violence (e.g., Sherman et al., 2016).

Both harshness and unpredictability in childhood have been assessed via variables available in longitudinal datasets (e.g., Belsky et al., 2010, 2012; Chang et al., 2019; Doom et al., 2016; Hartman et al., 2018; Maranges & Strickhouser, 2021; Nettle, 2010; Simpson et al., 2012; Warren & Barnett, 2020). For example, several researchers have used the NICHD Study of Early Child Care and Youth Development (e.g.,

Hartman et al., 2018) and Minnesota Longitudinal Study of Risk and Adaptation (MLSRA; e.g., Doom et al., 2016; Simpson et al., 2012) datasets. This approach has the advantage of allowing analysis of temporally downstream effects of harshness and unpredictability measured during childhood.

However, there are limitations to existing approaches. First, although facilitating analyses of change over time, amassing longitudinal data can be difficult and expensive. Subsequently, such datasets are few in number and thus may be over-utilized. Relatedly, these datasets are limited with respect to variables available to test predictions because they are usually not originally designed to answer adaptive calibration research questions. Thus, use of these sorts of longitudinal datasets precludes the design of and use of data from items created to test *a priori* hypotheses; researchers must operationalize harshness and unpredictability in ways that the dataset allows. Finally, these datasets are often constrained in terms of sample population due to the goal of the original longitudinal study, limiting variable variance and generalizability of conclusions. For example, the MLSRA focused on birth mothers who were below the poverty line, limiting variability in SES (e.g., Simpson et al., 2012).

Second, existing self-report measures miss important sources of harshness and unpredictability. With respect to harshness, existing measures miss, for example, lack of food and ability to purchase regularly priced or “luxury” goods. These indicators likely track poverty in industrialized countries and ensure that, across cultural contexts, within and across geographical borders, variation in access to resources can be captured. Measures of unpredictability miss sources such as inconsistency in transportation, neighborhood, school, and non-parental relationships, which can serve as important sources of unpredictability outside the home.

Third, some measures conflate harshness and unpredictability (e.g., Chang et al., 2019; Griskevicius et al., 2011; Li et al., 2018). For example, up until (and still for some years after) Ellis et al. (2009) and Belsky et al. (2012) encouraged the separate measurement of childhood harshness and unpredictability, both have sometimes been operationalized using the same measures. For example, some studies assess both together using measures of childhood SES (e.g., Griskevicius et al., 2011; Li et al., 2018) or with composite measures of household unpredictability, negative life events, neighborhood safety, and income change (Chang et al., 2019). This is a problem for (at least) two reasons. First, harshness and unpredictability are conceptually and theoretically dissociable (Belsky et al., 2012; Ellis et al., 2009). Second, harshness and unpredictability have differential effects on downstream biology, psychology, and behavior—e.g., on puberty and mating behavior (Maranges & Strickhouser, 2021), mental and physical health (Maner et al., 2017; Martinez et al., 2022), and moral decision making (Maranges et al., 2021).

Last, and perhaps most crucially, the extent to which particular events are perceived as sources of harshness or unpredictability likely varies across people and contexts. Moreover, those perceptions likely play an important role in calibrating developmental processes. Although studies often operationalize childhood unpredictability in terms of specific adverse experiences (e.g., parent divorce, residential moves, or changes in parental employment), and harshness as an objective lack of resources, such experiences do not inevitably give rise to feelings of unpredictability or harshness. Consider divorce: although parental divorce may create

unpredictability in a child's environment, it may alternatively result in more predictability through amiable coordination and scheduled family time (Steinbach & Augustijn, 2021; Thiroit & Buckner, 1991). Thus, over and above specific childhood experiences, *perceptions* of unpredictability and harshness may play an important role in shaping developmental processes, as has been demonstrated in predicting aggression (Barbaro & Shackelford, 2019), impulsivity (Martinez et al., 2022), and health (Williams et al., 2017). Similar insight comes from work on stress and coping, in which perceived stress often predicts outcomes beyond “objective” stressors (Taylor & Stanton, 2007; Tomaka et al., 1993; see also Ehlers & Clark, 2000). Indeed, people process their experiences through complex layers of (sometimes idiosyncratic) cognition and appraisal (e.g., Lazarus, 1991), leading some to argue that behavioral ecology research should focus more on people's perceptions of their environment (e.g., Dunkel et al., 2010).

The Current Research

There is a crucial need for well-validated measures that assess perceptions of harshness and unpredictability in childhood. The current work extends previous research that created short scales to assess perceptions of harshness (specifically, subjective resource scarcity) and unpredictability in childhood (Mittal et al., 2015; Young et al., 2018). Those measures reflect common operationalizations of harshness and unpredictability and are commonly used in psychological research (e.g., Maranges et al., 2022). Nevertheless, those scales were never validated. Thus, the current research expanded on the original scales with additional items to assess a broader range of domains and assessed the validity of the resulting scales.

With respect to harshness, subjective resource scarcity is the most commonly utilized operationalization of harshness in the study of adaptive calibration in humans (Maranges et al., 2022), which makes sense in light of the fact that exposure to threat (an alternative source of harshness) may also reflect a source of unpredictability, hence conflating measures. The harshness measure included 4 items about people's lives before age 10 and focused on income and subjective SES (Mittal et al., 2015; Young et al., 2018); the unpredictability scale included 8 items focusing on the unpredictability of family and home environments (Mittal et al., 2015; Young et al., 2018). It is important to ask about perceptions of ecologies before age 10 because that captures the development phases in which people are most flexible and responsive to their environments (i.e., early childhood; Belsky et al., 1991; Draper & Harpending, 1982; Simpson et al., 2012).

Those scales have facilitated work investigating the associations between childhood harshness and unpredictability and a broad range of outcomes in adults, such as executive functioning (Mittal et al., 2015; Young et al., 2018), body perceptions and eating behavior (e.g., Leyva & Hill, 2018), antisocial personality traits and psychopathology (e.g., Jonason et al., 2016, 2017), and moral decision making (Maranges et al., 2021).

We extend and enhance existing measures in several important ways. We created a nuanced set of items aimed at capturing perceptions of harshness as resource scarcity and unpredictability across a range of sources. For harshness, we incorporated perceptions of essential and luxury goods, such as food and clothing, as well as people's perceptions of their relative wealth. For unpredictability, we included items pertaining to sources of social unpredictability such as in children's neighborhood or schools, or with siblings, caretakers, extended family, and peers, as well as from the surrounding neighborhood's physical environment. We also provide systematic validation of these scales. Our overarching goal was to create measures that are easy to administer and that facilitate further research on adaptive calibration.

To develop and validate retrospective self-report measures of childhood harshness (subjective SES) and unpredictability, we conducted three studies. In Study 1, we created and pared down items, assessing their factor loadings and reliability, redundancy, and face validity, using two datasets from prior work (Maranges et al., 2021). Study 2 established convergent and discriminant validity in a diverse sample. Study 3 leveraged high power granted by an integrative data analysis to test whether our measures predict biological, behavioral, and psychosocial markers of life history strategies.

Study 1: Item Development and Reliability

We developed a set of items aimed at measuring perceptions of childhood harshness as resource scarcity and unpredictability using data from Maranges et al. (2021). That work generated and used a large set of candidate items, so we pared down those items to create more manageably sized scales. To generate candidate items, we examined common conceptualizations and operationalizations of harshness and unpredictability in prior literature; generated and considered a list of potential items; discarded redundant and/or ambiguous items; and reworded remaining items for clarity. Maranges et al. (2021) used 36 items to measure unpredictability and 28 items to measure harshness (see that work for more details). For systematic scale development in the current work, we did the following: In Study 1a, we created new, shorter scales by performing factor analyses, and removing items that did not load on their intended factor(s), and again paring scales down to avoid items that were redundant, vague, too specific or ambiguous with respect to whether they reflected harshness or unpredictability. All items measuring harshness assessed perceptions involving a lack of access to essential and luxury resources, such that our harshness measure reflects subjective resource scarcity. We did not focus on threat (e.g., violent crime) because that component of harshness also begets unpredictability, and it was important to maximally distinguish the two measures. All items measuring unpredictability assessed perceptions of unpredictability, uncertainty, or instability in a person's social and physical environment. Study 1b assessed the factor structure and reliability of our scales in a larger, independent sample.

Item Development

To facilitate item development, we reviewed extant conceptualizations and operationalizations of harshness and unpredictability.

Childhood Harshness Harshness has most often been operationalized as the child’s family’s low socioeconomic status (SES), particularly levels of monetary resources (e.g., Belsky et al., 2012; Brumbach et al., 2009; Doom et al., 2016; Mittal & Griskevicius, 2014; Simpson et al., 2012). A dearth of financial resources (a) reduces access to basic survival resources (e.g., food, good living conditions, healthcare), (b) increases vulnerability to stressful life events, illness, and death, and accordingly (c) relates in linear fashion to morbidity and mortality (see Ellis et al., 2009; Pepper & Nettle, 2017).

We built on items created and used by Mittal, Griskevicius and colleagues to assess harshness (Mittal et al., 2015). After generating a list of potential items, our research team edited the list for redundancy and clarity. We began with 40 items and discussion left us with 31 items to pare down in Pilot 1. See SM for the 31 Childhood Harshness items.

Childhood Unpredictability Unpredictability has most often been operationalized as frequent changes or inconsistencies in the presence of caretakers, in relationships with and between parents/stepparents/caretakers, and in homes and schools (e.g., frequent moves), as well as instability in daily routines (e.g., Belsky et al., 2012; Brumbach et al., 2009; Doom et al., 2016; Mittal & Griskevicius, 2014; Simpson et al., 2012). We also drew inspiration from the animal LHT literature, which focuses on the physical environment (Promislow & Harvey, 1990), paralleling humans’ neighborhoods.

As with harshness, we extended the unpredictability items created and used by Mittal, Griskevicius and colleagues and generated and edited a list of potential items. Through this process, we began with 60 and reduced our list to 50 unpredictability items to pare down in Pilot 1. See SM for the initial list of 50 Childhood Unpredictability items.

For both scales, participants read the following instructions (Mittal et al., 2015): *“Think back to your life when you were younger than 10. This time includes pre-school, kindergarten, and the first few years of elementary school. Rate the extent to which you agree with each of the following statements on a scale from 1 (strongly disagree) to 7 (strongly agree).”*

Study 1a

Participants We collected data from 100 participants via MTurk, with a final sample of 67 participants after excluding participants who did not complete the whole

survey ($n = 10$) or pass the attention check (i.e., *I always pay attention to surveys so I will select somewhat disagree*; $n = 23$). No demographics were collected.

Item Selection In selecting items, we considered both psychometric and theoretical issues. First, we conducted serial factor analyses (Principal Axis Factoring) to pare down items by removing those that did not load on the primary factor(s) above a minimum threshold and re-running the factor analysis with remaining items and an increased minimum factor loading (i.e., 0.4 for first round, 0.45 for second, 0.5 for third, 0.55 for all subsequent factor analyses). For all factor analyses, we set the minimum eigenvalue to 2.5 and rotations to Oblimin given that factors would likely be correlated. We took into account that reverse-coded items often load differently from other items even when conceptually related, creating “artifacts,” as a result of biased responding to differently valenced items (Tomás & Oliver, 1999; Weijters et al., 2013; Woods, 2006). Second, we removed resulting items that were redundant, vague, or too specific.

Harshness First, we conducted factor analyses. After the first-round factor analysis, we removed two items that did not load on either of the two primary factors above 0.4 (the second factor captured mostly reverse coded items, i.e., an “artifact”). After the second round of factor analysis with the remaining 29 items, we removed one item that did not load on either factor above 0.45. Round three confirmed that 28-item factor structure, with two primary factors (eigenvalue of 8.80 with 31.43% of the variance accounted for and eigenvalue of 6.20 with 22.14% of variance accounted for by reverse-coded items). Next, we removed items that were redundant, too specific, too unclear or vague, double-barreled, or that referred to resources about which a child might not have knowledge.

This left 11 items. Factor analysis with this scale yielded two factors (i.e., one with the non-reverse coded items had an eigenvalue of 4.32 and accounted for 39.28% of variance, and one with reverse coded items had an eigenvalue of 2.57 and accounted for 23.38% of variance) onto which all items but one loaded above 0.55 (i.e., loaded above 0.51). See Table 1. This scale (sample $M = 4.43$, $SD = 1.11$) demonstrated good internal reliability ($\alpha = 0.82$).

Unpredictability After the first-round factor analysis, we removed three items that did not load on either of the two primary factors above 0.4 (the second captured mostly reverse coded items). This left 47 items. Applying a higher factor loading criterion (0.45) in the second-round factor analysis, we removed three items. With 44 items and a higher factor loading cutoff (0.50), we removed two items after the third round. After the fourth-round factor analysis with 42 items and a criterion of 0.55, we removed four items. In a fifth-round factor analysis that included 38 items, all items loaded onto one of the main factors above 0.55. Next, we removed items that were ambiguous with regard to whether they are a source of unpredictability or predictability, redundant, too specific, too vague or unclear, or that overlapped with harshness or other aspects of childhood experiences we did not aim to capture (e.g., stress, abuse).

Table 1 Childhood Harshness (Resource Scarcity) scale, Study 1a

Item	Factor 1 Loading	Factor 2 Loading
1. Despite how much my parents worked, my family rarely had enough money for luxury items	0.85	-0.08
2. My family rarely had enough money to go out for a nice dinner	0.81	-0.28
3. Growing up, I rarely got spoiled because money was so tight	0.65	-0.27
4. My family was strained financially	0.85	-0.08
5. I felt uncomfortable asking my parents for money because money was tight	0.75	0.00
6. We had to try to save money when shopping for anything	0.55	-0.25
7. I never had the newest style of shoes or clothes	0.51	-0.14
8. My family and I were usually able to purchase expensive presents for holidays, birthdays, etc.*	0.50	0.55
9. I felt relatively wealthy compared with other kids in my school.*	-0.03	0.89
10. I grew up in a relatively wealthy neighborhood.*	0.20	0.71
11. My family usually had enough money for things when I was growing up.*	0.35	0.58

*reversed-scored

This left us with 15 items, each of which loaded on the primary factor above 0.59 (with an eigenvalue of 8.01, which accounted for 53.41% of the variance), except the one reverse coded factor which loaded on an “artifactor” at 0.55 (with an eigenvalue of 1.82 [notably, below our initial cutoff of 2.5] which accounted for 12.13% of the variance). This scale (sample $M=3.49$, $SD=1.47$) demonstrated strong internal reliability ($\alpha=0.93$). See Table 2.

The two scales were weakly-to-moderately correlated, $r=0.26$, $p=0.03$, confirming that childhood harshness and unpredictability as assessed by our scales are related but dissociable. Given the small sample size of this first study, it is important to replicate this factor structure in a larger sample.

Study 1b

Study 1b assessed the factor structure and reliability of our scales in a larger sample.

Participants We analyzed data from 491 individuals via MTurk across two waves who passed attention checks (failed checks $n=354$, incomplete $n=23$; 240 women, 245 men, 3 other; $M_{\text{age}}=33.40$, $SD=11.98$; 347 White, 64 Black, 50 Hispanic or Latinx, 22 Asian, 12 Native American, 4 Pacific Islander, 2 Middle Eastern, 1 Bengali, 1 ‘mixed race’).

Results: Factor Loadings

We replicated the factor structures of the harshness and unpredictability scales via Confirmatory Factor Analyses (CFAs) in AMOS. The 11-item childhood harshness scale ($M=4.03$, $SD=1.29$) demonstrated good reliability ($\alpha=0.88$). All items loaded onto one of two primary factors above 0.73 (see Fig. 1). No error terms were highly correlated. Model fit indices suggest adequate fit: GFI=0.91, NFI=0.93, CFI=0.95.

The 15-item childhood unpredictability scale ($M=3.48$, $SD=1.60$) demonstrated strong reliability ($\alpha=0.96$). For the CFA, we allowed highly correlated error terms to covary (i.e., $MI > 30$). All items loaded above 0.65 on the primary factor, except for the one reverse-coded item that did not significantly load onto the factor. See Fig. 2. Model fit indices suggest adequate fit: GFI=0.88, NFI=0.94, CFI=0.95.

Our scales were moderately correlated, $r=0.32$, $p < 0.001$, again suggesting that early developmental harshness and unpredictability are related but dissociable. Together, Studies 1a and 1b demonstrate that our childhood harshness and unpredictability measures capture unified constructs that are related but not identical to each other and are internally reliable.

Study 2: Assessing Convergent and Discriminant Validity

The purpose of this study was to assess the convergent and discriminant validity of the scales in a diverse sample. For convergent validity, we assessed the associations between perceived childhood harshness and unpredictability and measures of adverse

Table 2 Childhood Unpredictability scale, Study 1a

Item	Factor 1 Loading	Factor 2 Loading
1. I never knew whether my parents would be there to pick me up from school	0.83	-0.11
2. When I woke up, I often didn't know what could happen in my house that day	0.80	0.23
3. My family life was generally inconsistent and unpredictable from day-to-day	0.80	0.09
4. When I left my house I was never quite certain what would happen in my neighborhood	0.78	-0.18
5. Things were often chaotic in my house	0.76	0.32
6. I did not know what to expect from my family when I had friends over	0.76	0.05
7. My family environment was often tense and on edge	0.74	0.37
8. I did not know when I would see my parent(s)	0.72	-0.20
9. I could not predict which of many caretakers (e.g., babysitters, nannies, neighbors, family) would be watching me	0.72	-0.24
10. I was never certain where it was safe to play	0.72	-0.37
11. The traffic around the house(s) I lived was unpredictable and chaotic	0.71	-0.32
12. People often moved in and out of my house fairly frequently	0.68	-0.26
13. I often did not know what to expect from other students at school	0.64	0.08
14. I had a hard time knowing what my parent(s) or other people in my house were going to say	0.59	0.57
15. My family had a consistent schedule, so I knew what to expect each day.*	-0.03	0.55

*reverse-scored

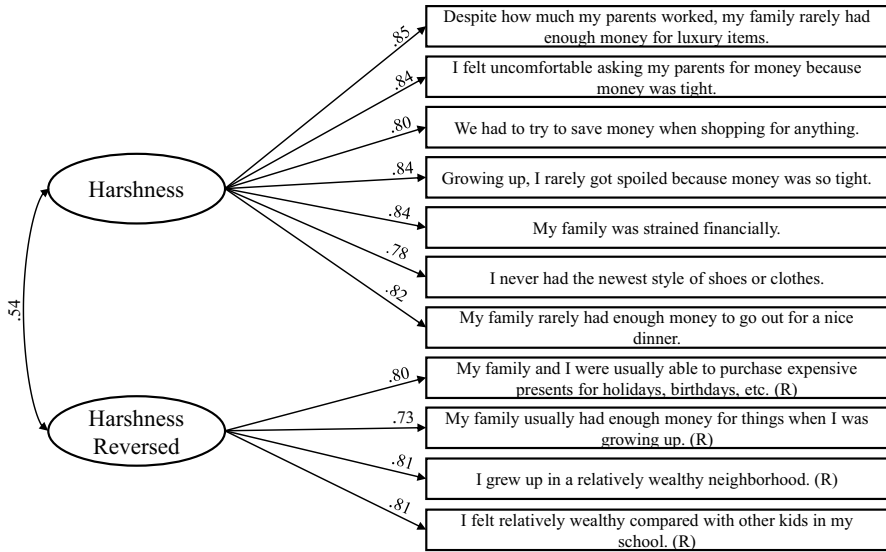


Fig. 1 Confirmatory factor analysis for Childhood Harshness (Resource Scarcity) scale, Study 1b. Values represent standardized factor loadings, all of which are significant at $p < 0.001$

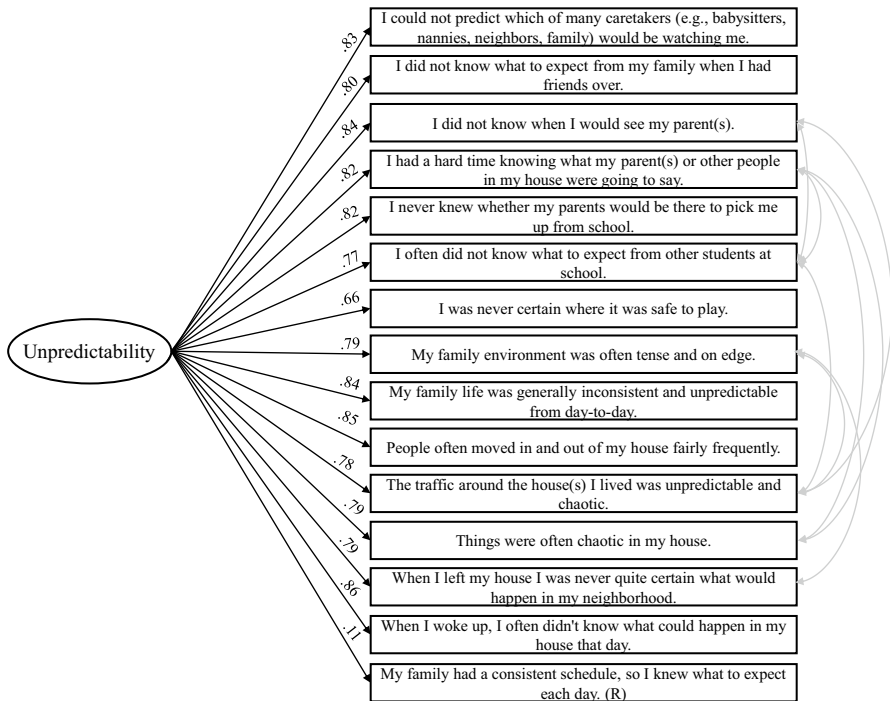


Fig. 2 Confirmatory factor analysis for Childhood Unpredictability scale, Study 1b. Values represent standardized factor loadings, all of which are significant at $p < 0.001$

childhood experiences (ACEs), impulsivity, self-control, and sense of control. We also examined the extent to which the scales were associated with theoretically related personality traits (i.e., agreeableness, conscientiousness, and emotional stability), expecting small-to-moderate associations because these traits reflect partial components of adaptively calibrated strategies. Finally, we test the prediction that the harshness and unpredictability measures should not be strongly associated with social desirability, age, or gender, providing discriminant validity.

We expected that childhood harshness and unpredictability would be moderately-to-strongly related to ACEs, which is a cumulative risk measure that captures diverse sources of adversity such as parental divorce and abuse. Those sources of adversity are likely to evoke perceptions of unpredictability and to covary with harshness because a lack of resources can leave people vulnerable to experiencing those types of stressors. We expected moderately sized associations between childhood harshness and unpredictability and low levels of self-control and high levels of impulsivity, as these facilitate expedient extraction of rare or inconsistent resources from the environment and contribute to faster life history strategies (e.g., Doom et al., 2016; Dunkel et al., 2013; Figueredo et al., 2007; Griskevicius et al., 2011; Mittal & Griskevicius, 2014).

Given that unpredictable and harsh environments in childhood beget a lower sense of control (Bosma et al., 1999; Mittal & Griskevicius, 2014), we expected childhood harshness and unpredictability to be moderately related to measures of perceived constraints and personal mastery (Lachman & Weaver, 1998). We expected that the more harsh or unpredictable people's childhood ecologies, the more they would view the external environment as preventing them from effecting change in their lives (i.e., perceived constraints) and the less they would believe they have agentic control over effecting change in their lives (i.e., personal mastery).

Theory suggests that childhood environments can also adaptively shape personality, as reflected in psychosocial strategies that persist across time and situations and that theoretically contribute to life history strategies (Figueredo et al., 2005, 2007; Jonason et al., 2016). In light of these considerations, we assessed associations among the childhood harshness and unpredictability scales and the Big Five personality traits. First, childhood harshness and unpredictability might be associated with lower levels of agreeableness, conscientiousness, and emotional stability (convergent validity) but, second, these traits should not overlap too highly with the childhood ecology factors (discriminant validity). That is, we expected weak-to-moderate negative associations between childhood harshness and unpredictability and agreeableness, conscientiousness, and emotional stability.

Perceptions of limited or unpredictable resources in childhood may promote development of disagreeable, distrusting, and competitive strategies—i.e., low agreeableness (i.e., the tendency to act cooperatively and unselfishly). Indeed, fast life history strategies, harshness, and unpredictability are associated with more competitive strategies and low agreeableness (e.g., Chen et al., 2017; Del Giudice, 2016; Figueredo et al., 2005; Gladden et al., 2008; Jonason et al., 2017; but see Jonason et al., 2016).

Conscientiousness (i.e., tendency to be organized, responsible, and hardworking) predicts planning and future-oriented/long-term strategies (e.g., Friedman et al., 1993). Accordingly, lower conscientiousness may facilitate expedient

extraction of resources from one's environment—a strategy that is particularly beneficial when one perceives the environment lacks resources or predictability. Consistent with this idea, fast life history strategies and childhood harshness and unpredictability have been associated with lower conscientiousness in adulthood (Chen et al., 2017; Gladden et al., 2008; Jonason et al., 2016).

Neuroticism (the inverse of emotional stability) is the tendency to experience negative affect and psychological distress. Fast life history strategies and childhood unpredictability have also been associated with neuroticism (Figueredo et al., 2005; Jonason et al., 2016, 2017). Moreover, unpredictable childhood environments are associated with stronger stress responses and negative affect as manifested in depression, anxiety, and reduced ability to feel pleasure (i.e., anhedonia; Gylmn et al., 2019; Ross et al., 2016). Taken together, that work suggests that the measures of childhood harshness and unpredictability should be positively related to neuroticism, or negatively related to emotional stability. However, there is some inconsistency in findings, as some evidence suggests that harshness may predict lower neuroticism (Jonason et al., 2016, 2017).

In short, we expected that childhood harshness and unpredictability would be weakly-to-moderately negatively associated with agreeableness, conscientiousness, and emotional stability. We also explored the associations among childhood harshness and unpredictability and the personality traits of extraversion (i.e., tendency to focus energies and interests outward; sociable and openly expressive) and openness to experience (i.e., tendency to be open to new aesthetic, cultural, or intellectual experiences). We had no strong theoretical reasons to expect associations between childhood unpredictability and harshness and levels of extraversion and openness, given that those traits have costs and benefits and that higher versus lower levels of those traits should not be systematically (dis)avored in harsh or unpredictable environments (i.e., balancing effects; for a discussion of the adaptive and maladaptive aspects of these personality traits, see Nettle, 2006). However, past work has documented the presence of such associations (e.g., Figueredo et al., 2005; Gladden et al., 2008; Jonason et al., 2016). Thus, analyses with extraversion and openness should be considered exploratory.

To establish discriminant validity, we included measures of social desirability, gender, and age, and expected no more than weak associations between perceptions of childhood harshness and unpredictability and those measures. Specifically, we aimed to demonstrate that responses to the perceived unpredictability and harshness in childhood measures cannot be accounted for by desire to be seen positively or with socially desirable traits at the cost of honesty; thus, we did not think childhood harshness and unpredictability would be strongly associated with social desirability. Additionally, we did not expect perceptions of childhood harshness and unpredictability to vary strongly by participant gender or age.

Method

Participants For effect sizes between small and medium (i.e., $f=0.17$), power analyses indicated that 483 people provided 90% power (Faul et al., 2007). In order to

obtain a diverse sample with good power, we decided a priori to collect data from at least 600 people, half of which identified as non-White, via TurkPrime. Participants who failed an attention check were dismissed from the study and their responses were not recorded. The final sample included 601 people (356 women, 201 men, 7 other; $M_{\text{age}}=38$, $SD=12.47$; 303 White, 201 Black, 49 Hispanic or Latinx, 31 Asian, 4 Native American, 1 Pacific Islander, 14 multiracial, 8 unknown/do not wish to report).

Procedure and Materials Participants responded to the childhood harshness (11 items, $M=3.98$, $SD=1.59$, $\alpha=0.94$) and unpredictability (15 items, $M=2.59$, $SD=1.34$, $\alpha=0.94$) scales as well as to measures of adverse childhood experiences, impulsivity, self-control, sense of control (i.e., perceived constraints and personal mastery), social desirability, and personality before demographics and debriefing.

Adverse Childhood Experiences (ACEs) Participants responded *yes* or *no* to 10 items about aversive events that occurred when they were growing up. These include physical abuse to the self or other family members, alcoholism, poor mental health, going to prison; e.g., *Was your mother or stepmother often pushed, grabbed, slapped or had something thrown at her?* (Felitti et al., 1998). We computed a composite by summing the number of *yes* responses (*yes*=1, *no*=0), such that higher scores represent more adverse childhood experiences ($M=2.48$, $SD=2.53$).

Barratt Impulsivity Scale-Brief Participants responded to 8 items with how often each characterizes them on a 4-point scale (*rarely*, *occasionally*, *often*, and *almost always/always*), such as *I act on spur of the moment* ($M=1.79$, $SD=0.52$, $\alpha=0.81$; Steinberg et al., 2013).

Self-Control Participants responded to the 13-item trait self-control measure on a 1 (*strongly disagree*) to 7 (*strongly disagree*) scale, e.g., *I am good at resisting temptation* ($M=4.53$, $SD=1.17$, $\alpha=0.89$; Tangney et al., 2004).

Perceived Constraints Participants responded to the Perceived Constraints subscale of the Sense of Control Scale on a 1 (*strongly disagree*) to 7 (*strongly disagree*) scale (Lachman & Weaver, 1998). This 8-item subscale reflects the extent to which people feel their goal-oriented actions are constrained by external forces (e.g., *There is little I can do to change many of the important things in my life*; $M=3.33$, $SD=1.40$, $\alpha=0.91$).

Personal Mastery Participants responded to the 4-item Personal Mastery subscale of the Sense of Control Scale on a 1 (*strongly disagree*) to 7 (*strongly disagree*) scale (Lachman & Weaver, 1998). Items reflect the extent to which people feel they are personally in control of the outcomes they achieve (e.g., *I can do just about anything I really set my mind to do*; $M=5.24$, $SD=1.10$, $\alpha=0.84$).

Social Desirability Participants responded to the 13-item Marlowe-Crowne Social Desirability short scale, which has True–False items that capture the tendency to self-report in positively biased vs. candid way (Reynolds, 1982): e.g., *No matter who I'm talking to, I'm always a good listener* and *There have been occasions when I took advantage of someone* (reversed). We summed positively biased responses to create a social desirability score for each participant ($M=6.79$, $SD=3.20$).

Big Five Personality Traits Participants responded to the Ten-Item Personality Inventory (TIPI; Gosling et al., 2003), which includes two items for each of the Big Five personality traits: extraversion (e.g., *extraverted, enthusiastic*; $M=3.33$, $SD=1.52$, $\alpha=0.68$), agreeableness (e.g., *sympathetic, warm*; $M=5.21$, $SD=1.23$, $\alpha=0.47$), conscientiousness (e.g., *dependable, self-disciplined*; $M=5.36$, $SD=1.24$, $\alpha=0.60$), emotional stability (i.e., inverse of neuroticism; e.g., *calm, emotionally stable*; $M=4.64$, $SD=1.34$, $\alpha=0.75$), and openness to experience (e.g., *open to new experiences, complex*; $M=4.93$, $SD=1.18$, $\alpha=0.34$).

Results and Discussion

To provide evidence for convergent and discriminant validity, we assessed correlations between measures of childhood harshness as resource scarcity and unpredictability, ACEs, impulsivity, self-control, perceived constraints, personal mastery, social desirability and the Big Five personality traits (see Table 3).¹ As expected, the measures of childhood harshness and unpredictability were positively correlated.

Convergent Validity

Adverse Childhood Experiences Both perceptions of childhood harshness and unpredictability were strongly positively related to ACEs, as predicted. Notably, of the validation scales, ACEs was most strongly associated with harshness and unpredictability; the association was especially strong for unpredictability.

Impulsivity and Self-Control Also as predicted, perceived childhood unpredictability was moderately-to-strongly positively related to impulsivity and negatively to self-control. Associations between childhood harshness and impulsivity and self-control conformed to the same pattern but were relatively weaker.

Sense of Control People who perceived their childhoods to be harsh and unpredictable also perceived themselves to have less control over their lives. Specifically, there was a

¹ To interpret our findings, we used Cohen's effect size guidelines of $r=0.1$, $r=0.3$, and $r=0.5$ as reflecting small, medium, and large effect sizes, respectively (Gignac & Szodorai, 2016).

Table 3 Correlations among Childhood Harshness (Resource Scarcity) and Unpredictability scales and validating measures

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Childhood Harshness	—													
2. Childhood Unpredictability	0.49 ^{***}	—												
3. Adverse Childhood Experiences	0.44 ^{***}	0.69 ^{***}	—											
4. Impulsivity	0.09 [*]	0.30 ^{***}	0.18 ^{***}	—										
5. Self-Control	-0.07 [†]	-0.28 ^{***}	-0.21 ^{***}	-0.71 ^{***}	—									
6. Perceived Constraints	0.13 ^{**}	0.34 ^{***}	0.20 ^{***}	0.41 ^{***}	-0.47 ^{***}	—								
7. Personal Mastery	-0.07 [†]	-0.13 ^{**}	-0.02	-0.38 ^{***}	0.34 ^{***}	-0.56 ^{***}	—							
8. Social Desirability	-0.07 [†]	-0.17 ^{***}	-0.15 ^{***}	-0.36 ^{***}	0.56 ^{***}	-0.35 ^{***}	0.29 ^{***}	—						
9. Extraversion	-0.20 ^{***}	-0.09 [*]	-0.06	-0.01	0.10 [*]	-0.24 ^{***}	0.21 ^{***}	0.09 [*]	—					
10. Agreeableness	-0.18 ^{***}	-0.30 ^{***}	-0.22	-0.34 ^{***}	0.39 ^{***}	-0.28 ^{***}	0.26 ^{***}	0.36 ^{***}	0.06	—				
11. Conscientiousness	-0.09 [*]	-0.32 ^{***}	-0.17 ^{***}	-0.65 ^{***}	0.61 ^{***}	-0.41 ^{***}	0.46 ^{***}	0.32 ^{***}	0.10 [*]	0.35 ^{***}	—			
12. Emotional Stability	-0.14 ^{**}	-0.27 ^{***}	-0.26 ^{***}	-0.47 ^{***}	0.51 ^{***}	-0.47 ^{***}	0.38 ^{***}	0.39 ^{***}	0.22 ^{***}	0.36 ^{***}	0.43 ^{***}	—		
13. Openness to Experience	-0.07 [†]	-0.08 [†]	0.04	-0.27 ^{***}	0.25 ^{***}	-0.21 ^{***}	0.32 ^{***}	0.22 ^{***}	0.20 ^{***}	0.27 ^{***}	0.26 ^{***}	0.21 ^{***}	—	
14. Gender	-0.00	-0.09 [*]	0.08 [*]	-0.08 [*]	0.09 [*]	-0.05	0.08 [†]	0.07 [†]	-0.07	0.19 ^{***}	0.13 ^{***}	-0.14 ^{***}	0.08 [†]	—
15. Age	0.04	-0.17 ^{***}	-0.07 [†]	-0.15 ^{***}	0.18 ^{***}	-0.10 [*]	0.10 [*]	0.10 [*]	0.06	0.21 ^{***}	0.16 ^{***}	0.26 ^{***}	-0.01	0.07 [†]

Gender coded as 1 = man, 2 = woman. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Significant correlations in bold

small, significant positive association between harshness and perceived constraints and a small, marginally significant association between harshness and personal mastery. These associations were less strong than expected. Associations with childhood unpredictability showed a similar but stronger pattern: childhood unpredictability was moderately-to-strongly and positively associated with perceived constraints and weakly, negatively associated with personal mastery.

Personality As expected, perceptions of childhood harshness and unpredictability were negatively associated with agreeableness, conscientiousness, and emotional stability.

We also explored associations between the childhood ecologies scales and extraversion and openness to experience. Harshness was negatively associated with extraversion, such that people who perceived their childhoods to be highly bereft of resources reported being less outgoing and social. Similarly, perceptions of childhood unpredictability were weakly associated with lower levels of extraversion. Neither perceptions of harshness nor of unpredictability were significantly associated with openness to experience.

Summary People who perceived their developmental ecologies to lack resources or to be unpredictable also reported experiencing more adverse and threatening events as children, being lower in impulse control, perceiving less control over their lives via more external and internal limitations, and less agreeableness, conscientiousness, and more neuroticism in adulthood.

Discriminant Validity

Social Desirability Social desirability was not significantly associated with perceptions of childhood harshness (there was a negative, weak trend) and was negatively, and only weakly-moderately associated with perceptions of childhood unpredictability. Whether one responds in more or less socially desirable ways is thus unlikely to explain substantial variance in responses to the childhood harshness and unpredictability scales.

Gender and Age Additionally, neither gender nor age were strongly related to perceptions of harshness or unpredictability in childhood ecologies: harshness was unrelated to both gender and age, and unpredictability was negatively weakly and weakly-to-moderately associated with gender and age, respectively. That is, men more than women and younger people more than older people perceived their childhood ecologies to be characterized by unpredictability, but these associations were relatively weak.

These results suggest that the measures of perceived childhood harshness and unpredictability have reasonable convergent validity and discriminant validity.²

² See SM for validation of the original Mittal et al. scales.

Study 3: Predicting Life History Strategies

Study 3 entailed a high-powered test of whether the childhood harshness as resource scarcity and unpredictability scales are associated with biological, reproductive, and psychosocial markers of faster versus slower life history strategies—i.e., analyzing data from over two-thousand participants across five studies. We predicted that people who perceived higher, versus lower, levels of harshness (i.e., lower subjective SES) and unpredictability in their childhood environments would report having an earlier age of sexual maturity, first sexual intercourse, and first child, and also having a larger number of sexual partners and children. Moreover, we expected that higher (vs. lower) childhood harshness and unpredictability would predict psychological, social, and behavioral patterns of a fast life history strategy (LHS) in adulthood—a constellation of low-quality close relationships and support, low altruism, low religiosity, and low insight and planning.

Method

Participants Across the five studies, 2625 participants were recruited from an undergraduate subject pool and M Turk (see SM). Excluding 532 participants who failed at least one attention check, the final sample consisted of 2093 participants (1444 women, 619 men, 20 other; $M_{age} = 27.97$, $SD = 11.28$; 1578 White, 444 Hispanic or Latinx, 252 Black, 116 Asian, 18 identified Native American or Alaska Native, 8 Native Hawaiian or other pacific islander, and 107 multiracial, other, unknown, or do not wish to report).

Procedure and Materials In addition to measures of childhood ecology, the five studies included measures of biometric and psychometric indicators of life history strategy. The Mini-K and K-SF-42 assessed psychosocial LHS. Age of menarche, age of sexual debut, number of sexual partners, age at first childbirth, and number of children served as biometric indicators of LHS. Prior work suggests that biometric and psychometric assessments of LHS complement one another by overcoming inherent limitations with each type of measure (e.g., Copping et al., 2017; Figueredo et al., 2015). See Table 4 for descriptives.

K-SF-42 The K-SF-42 (Figueredo et al., 2017) includes 42 items across seven domains: insight planning and control (e.g., *When I encounter problems, I don't give up until I solve them*), general altruism (e.g., *I spend a great deal of time per month doing formal volunteer work at school or other youth-related institution*), religiosity (e.g., *Spirituality is important in my life*), romantic partner attachment (e.g., *I often want to merge completely with romantic partners, and this sometimes scares them away*), parental relationship quality (e.g., *How much love and affection did your biological father give you while you were growing up?*), family social contact and support (e.g., *How much have your relatives shown interest and concern for your well-being?*), and friendship social contact and support (e.g., *How much have your friends helped you get worries off your mind?*). Because

Table 4 Descriptive statistics for and correlations among Childhood Harshness (Resource Scarcity) and CChildhood Unpredictability and indicators of life history strategies

	Mean (SD)	1	2	3	4	5	6	7	8	9
1. Childhood Harshness (<i>n</i> = 2093)	3.56 (1.60)	—								
2. Childhood Unpredictability (<i>n</i> = 2093)	2.73 (1.50)	0.57***	—							
3. Age of menarche (<i>n</i> = 1442)	12.49 (2.81)	-0.08**	-0.004	—						
4. Age of sexual debut (<i>n</i> = 1704)	17.06 (3.63)	-0.06*	-0.17***	0.31***	—					
5. Number of sex partners (<i>n</i> = 1157)	9.32 (14.14)	0.06*	0.13***	-0.04	-0.23***	—				
6. Age at first child (<i>n</i> = 516)	21.11 (8.56)	-0.12**	-0.45***	0.12*	0.33***	-0.02	—			
7. Number of children (<i>n</i> = 516)	2.71 (2.89)	0.08	0.29***	0.03	-0.15***	0.18***	0.25***	—		
8. Mini-K (<i>n</i> = 1003)	5.00 (0.89)	-0.23***	-0.14***	0.14***	0.10**	-0.22***	0.01	-0.09	—	
9. K-SF-42 (<i>n</i> = 222)	0 (1.00)	-0.33***	-0.45***	0.10	0.11	N/A	N/A	N/A	N/A	—

N/As indicate no possible correlation because the variables were either never measured in the same study (e.g., K-SF-42 and mini-K) or because participants responded to only one of the measures (e.g., ages of menarche and adrenarche). * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Significant correlations in bold

subscales of the K-SF-42 have different length response scales, the subscales were standardized and averaged, with higher scores reflecting slower LHS.

Mini-K The Mini-K is a 20-item short form of the Arizona Life History Battery (Figueredo et al., 2006). Participants respond to items on a scale from 1 (*strongly disagree*) to 7 (*strongly agree*): e.g., *I avoid taking risks*, *I often make plans in advance*, and *I would rather have one than several sexual relationships at a time*. Higher scores on the Mini-K reflect a slower LHS.

Age of Menarche Participants responded to: *How old were you when your periods or menstrual cycles started?*

Age of Sexual Debut Participants who reported that they have had sexual intercourse responded to: *How old were you when you had sexual intercourse for the first time?*

Number of Sexual Partners Participants who reported that they have had sexual intercourse responded to: *How many different sexual partners have you had?*

Age at First Childbirth Participants who reported that they have biological children responded to: *How old were you when you had your first child?*

Number of Children Participants who reported that they have biological children responded to: *How many biological children do you have?*

Results

Perceptions of childhood harshness and unpredictability were associated with psychosocial and biometric indicators of fast life history strategies (Table 4). Both ecological factors were associated with younger age at sexual debut and first childbirth and more sexual partners. Harshness was also associated with younger age of menarche, and unpredictability with more children. (See SM for exploratory analyses that include control variables and with harshness and unpredictability included simultaneously in the same models.) In sum, the measures of perceived childhood harshness and unpredictability were associated with downstream biological, reproductive, and psychosocial indicators of life history strategies.³

General Discussion

In this work, we develop and validate retrospective self-report measures that capture diverse sources of harshness and unpredictability and facilitate research testing adaptive calibration hypotheses. In three studies, we developed and

³ See SM for analyses testing whether harshness as subjective resource scarcity is curvilinearly (quadratically) related to these indicators of LHS and for validation of the original Mittal et al. scales.

verified the psychometric properties of our scales across two samples (Study 1) and provided evidence of convergent validity (e.g., associations with adverse childhood experiences, impulsivity, and lack of self-control, conscientiousness, agreeableness, and emotional stability) and discriminant validity (e.g., associations with social desirability, sex, and age) (Study 2). We also confirmed that the childhood ecology measures predict established biological, reproductive, and psychosocial indicators of life history strategies (Study 3).

The scales focus on *perceptions* of harshness as resource scarcity and unpredictability in childhood. This approach fits with the idea that perceptions, beliefs, and expectancies may at least partially mediate the link between ecological factors and the strategies people adopt to succeed in those ecologies. For example, in one study, changes in maternal cohabitation with romantic partners, maternal employment, and residence experienced in childhood were associated with adult externalizing behavior, and that association was mediated by perceptions of childhood unpredictability (Martinez et al., 2022). Indeed, the way people adapt to their environments depends on the extent to which they perceive their environments as safe, predictable, and abundant in resources versus unpredictable, dangerous, and lacking in resources.

The scales reported in the current research include items pertaining to numerous sources of harshness (namely, perceived resource scarcity) and unpredictability: the harshness measure includes items about essential and luxury goods, such as food and clothing, as well as people's perceptions of their relative wealth; the unpredictability measure includes items involving sources of social unpredictability such as in children's neighborhood or schools, or with a variety of caretakers, extended family, and peers, as well as from the surrounding neighborhood's physical environment. Accordingly, by capturing people's perceptions, these measures capture psychologically proximate aspects of childhood environments that likely contribute to and shape overall developmental trajectories.

The current work builds on existing (although until now unvalidated) measures of unpredictability and harshness (Griskevicius et al., 2011; Mittal & Griskevicius, 2014). The present studies provide validation for these measures (see SM) and extend them by adding new items to tap a broader range of domains. For example, while the original measure of unpredictability was limited to family relationships, the unpredictability scale developed and validated in this work also includes items tapping sources of unpredictability in school, with extended family and caregivers, and in the wider neighborhood. And the new measure of harshness includes a broader set of items intended to tap resource scarcity. For studies that focus on testing adaptive calibration hypotheses, we recommend including the new, broader measures presented in this research. For researchers who require very short measures of unpredictability, the validation data we report on the original, shorter scale are of value. These data provide support for the validity of the short unpredictability, but not harshness, measure.

Implications for Theories of Adaptive Calibration

In addition to providing new measures of perceived unpredictability and harshness as resource scarcity, this work also provides support for theories of adaptive calibration. Humans have limited energy and accordingly must face important reproductive tradeoffs (i.e., present vs. future reproduction, quality vs. quantity of offspring, and mating vs. parental effort). The current findings are consistent with theorizing that harshness and unpredictability shape perceptions that guide the way people allocate their limited store of bioenergetic resources: perceptions of harshness as resource scarcity and unpredictability predict prioritization of earlier (vs. later) reproduction, higher quantity of offspring, and immediate mating effort (Figueredo et al., 2007; Griskevicius et al., 2011; Kaplan & Gangestad, 2005; Nettle, 2010; Quinlan, 2007; Simpson & Belsky, 2008).

Perceptions of childhood environments shape a wide cluster of traits that help people reap maximum reproductive benefits of their environment. We found that people who perceived their childhoods as particularly harsh or unpredictable reported characteristics that facilitate expedient extraction of resources from an environment that might lack resources or resource stability, consistent with past work (e.g., Doom et al., 2016; Griskevicius et al., 2011; Mittal & Griskevicius, 2014). In particular, their traits feature a pattern of decision-making marked by a short time horizon and uncooperative view of others: lower self-control/higher impulsivity, lower conscientiousness, and lower agreeableness. In addition to providing evidence for the utility of models of adaptive calibration, our work also highlights the importance of perceptions in linking childhood environments to those traits and tendencies.

The measure of harshness we present here focuses narrowly on resource scarcity. Our goal was to develop a measure of harshness that was maximally differentiated from unpredictability. Many threats faced by humans, such as exposure to violent crime or ecological hazards are typically unpredictable and thus measures of those threats could conflate harshness with unpredictability. Resource scarcity, in contrast, is often experienced on a consistent basis and thus provides an assessment (albeit an intentionally narrow one) of harshness as distinct from unpredictability. Other sources of threat (e.g., diseases that culminate in high mortality risk) are difficult to assess with self-report items. Thus, our measure of harshness focused on assessing resource scarcity. Research in this literature would benefit from considering other sources of harshness, aside from resource scarcity. For example, Chua et al. (2020) found that when operationalized as crime, harshness is associated with indicators of LHS (i.e., psychosocial well-being and mating patterns) as mediated through health, whereas low SES was not related to LHS through health.

The current unpredictability measure captures perceptions of the most common conceptualization and operationalization, namely, household and family instability (Maranges et al., 2022), but it also goes beyond that to capture unpredictability in other important contexts, i.e., with extended family and caretakers, at school, and in one's neighborhood. Nonetheless, other operationalizations of unpredictability may have different effects or similar effects through different mechanisms. For example, unpredictability has also been operationalized by presence or absence of parents or stepparents (e.g., Belsky et al., 2007; Lu & Chang, 2019; Sheppard et al., 2014).

For example, Lu and Chang (2019) find that unpredictability as absence of parents is more strongly related to measures of impulsivity than is unpredictability at home. However, as discussed earlier, life circumstances such as absence of parents may or may be sources of unpredictability based on the response of the parents or other caregivers in the child's life. The current measure of perceptions of childhood unpredictability also has the advantage of tapping a factor that can be expected to vary across cultures and geographical boundaries.

Our findings suggest that unpredictability (versus harshness) was especially predictive of psychosocial strategies and reproductive patterns (i.e., age of first childbirth, number of children, age of sexual debut, and number of sexual partners; see SM). These findings fit with other work underscoring the importance of dissociating harshness and unpredictability, given that childhood harshness and unpredictability may differentially shape adaptive strategies and thus may have different downstream effects on behavior (e.g., Belsky et al., 1991; Ellis et al., 2009; Maranges & Strickhouser, 2021; Maranges et al., 2021; Simpson et al., 2012). Likewise, in a variety of domains, such as moral decision making (Maranges et al., 2021), intimate partner violence (Barbaro & Shackelford, 2019), pathological personality (Jonason et al., 2017), and mental and physical health (Maner et al., 2017; Martinez et al., 2022) unpredictability appears to be a relatively stronger predictor than harshness. Furthermore, the current measures were somewhat but not highly correlated, suggesting that although harshness and unpredictability may covary, perceptions of each can be dissociated and the scales are not measuring the same thing. As a whole, such evidence underscores the importance of using distinct measures of childhood harshness and unpredictability.

Limitations and Future Directions

Our scales allow for the valid measurement of perceived childhood harshness as resource scarcity and unpredictability. However, the development of these scales is not without limitation. First, our participants were adults (over the age of 18). Although we do not expect the validity or usefulness of our scales to vary by developmental phase, we cannot speak directly to the validity or predictive power of these measures for adolescents. Adolescence (roughly age 11 to 18) is an important stage of development when adaptively calibrated constellations of characteristics and behaviors come online (e.g., Brumbach et al., 2009; Chang et al., 2019; Hartman et al., 2018; Maranges & Strickhouser, 2021), and future research should evaluate the implications of perceived childhood harshness and unpredictability in this developmental phase.

Notably, our samples include participants from the United States and largely WEIRD populations (Western, Educated, Industrialized, Rich, and Democratic; Henrich et al., 2010). Although some of our samples are more diverse (e.g., Study 2), most included majority White participants. Relatedly, inclusion of undergraduate student samples in Study 3 may constrain variance in biometric indicators such as number of children, given the samples' young adult age range. Future work would

benefit from assessing the predictive validity of these scales in more diverse samples, which may require collaboration of researchers across different countries and cultures. This is important given that ecological factors vary considerably across nations (e.g., resource scarcity).

There are also other measures that would be important to include for further validation. For example, a recent network analyses by Manson and Kruger (2022) suggests that mating effort and parental effort may be central in assessing LHS. This may be particularly important in light of the limitations of using psychosocial measures of LHS (e.g., K-SF-42), which have been criticized (e.g., Copping et al., 2017) and failed to correlate with all biometric indicators in the present studies. Furthermore, including measures that should *not* be associated with downstream LHS, but that have adaptive value across ecologies, such as intelligence (*g*) can also be leveraged in further validation. We hope that our work and that of others will continue to build an understanding of the network of traits that are related to perceptions of childhood ecologies and downstream patterns of adaptive calibration.

The measurement of perceptions of childhood harshness and unpredictability and the use of those measures in answering questions of adaptive calibration cannot attest to the role of genetic factors in connecting childhood environments with adult outcomes (see Belsky, 2012). Children's experiences of harshness and unpredictability are inextricably linked with environments produced in part by parents (and other relatives), with whom children share genes. Accordingly, childhood ecologies are shaped by a potentially complex interaction of environmental and genetic factors. Future research can use behavioral genetic methods (e.g., twin or adoption studies) to assess the genetic versus environmental contribution to strategies tied to childhood harshness and unpredictability.

Finally, although there is precedent for this approach (Griskevicius et al., 2011; Mittal & Griskevicius, 2014; Mittal et al., 2015; Young et al., 2018) and this was intentional, it is important to reiterate that the current measures entail retrospective reports, which may be affected by factors such as current mental health and can predict outcomes differentially than prospective measures (e.g., Baldwin et al., 2019; Newbury et al., 2018; Reuben et al., 2019). Future research with young adults, adolescents, and children can leverage these scales by adapting them to the target population or observers of individuals in the target population.

Conclusion

Across three studies, we developed and validated easy-to-administer, retrospective self-report measures of perceived childhood environmental harshness (i.e., subjective resource scarcity) and unpredictability. The measures can be applied across a range of adult samples and contexts. Development of these measures not only contributes to the core literature on adaptive calibration but also facilitates further systematic empirical investigation in the field.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s40750-022-00200-z>.

Data Availability Materials and data can be shared upon request.

Declarations

Ethics Approval All studies were approved by the Institutional Review board and complied with APA standards. All participants provided informed consent.

Conflict of Interest The authors have no conflict of interest to report.

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