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The Effect of Predictable Early Childhood Environments on Sociosexuality in Early Adulthood

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According to life history theory, sociosexual orientations in adulthood should be affected by an individual's early childhood environment. Highly predictable (stable) environments should increase the potential fitness benefits of long-term (slow) mating strategies as well as the potential costs of short-term (fast) mating strategies. Experiencing a more predictable childhood environment, therefore, should lead individuals to enact a slower life history strategy characterized by more restricted sociosexual behaviors. We tested this hypothesis in the Minnesota Longitudinal Study of Risk and Adaptation (MLSR), an ongoing longitudinal study that has followed individuals from before they were born into adulthood. Indicators of sociosexuality in early adulthood were assessed by trained coders based on interviews conducted with participants about their current relationship, their relationship history, and their future relationship aspirations when they were 23 years old. The findings revealed that having experienced more predictable environments during the first 4 years of life (indexed by less frequent changes in parents' employment status, cohabitation status, and residence) prospectively predicted more restricted sociosexuality at age 23, over and above current levels of predictability (that also uniquely predicted restricted sociosexuality at age 23). This early life predictability effect was partially mediated by greater early maternal support and being securely attached at age 19. Viewed together, these findings suggest that greater predictability early in life may be partially conveyed to children through more supportive parenting, which results in secure attachment in adolescence, which in turn predicts more restricted sociosexuality in early adulthood.

Keywords: life history theory, sociosexuality, early life stress, attachment, unpredictability

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The ability to form and maintain long-term committed romantic relationships is considered to be an important developmental achievement and an indicator of good psychological functioning (e.g., W. A. Collins, 2003; Conger, Cui,

Bryant, & Elder, 2000). Committed romantic relationships are associated with better psychological and physical well-being (Kamp Dush, & Amato, 2005; Loving & Slatcher, 2013) and with more invested and involved parenting (Belsky & Jaffee, 2006). Nevertheless, individuals differ substantially in the extent to which they pursue long-term committed relationships, with some individuals opting for a lifestyle of short-term relationships and casual sexual encounters. This dimension of individual variability is known as *sociosexuality* (Gangestad & Simpson, 1990; Simpson & Gangestad, 1991). Individuals can range on this continuum between having "restricted" attitudes, desires, and behaviors (indicating a general preference for longer-term relationships) and having "unre-

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stricted” attitudes, desires, and behaviors (indicating a general preference for shorter-term relationships).

In this longitudinal study, we offer a life history explanation for individual variability in preference for longer-term versus shorter-term romantic relationships. We propose that this variability reflects *adaptive adjustments* to particular ecological conditions experienced early in life, particularly the degree of predictability in one’s family environment. In addition, we investigate a possible parenting-attachment mechanism for this early environment effect. We test these ideas using the Minnesota Longitudinal Study of Risk and Adaptation (MLSRA; Sroufe, Egeland, Carlson, & Collins, 2005), which has followed a cohort of participants from before birth into adulthood.

Life History Theory and Sociosexuality

Life history theory deals with tradeoffs individuals make when allocating limited resources (e.g., energy, time, and capital) to various, often competing life tasks (Kaplan & Gangestad, 2005; Kaplan & Lancaster, 2003). The theory identifies the ecological conditions that make particular resource allocation strategies more or less favorable. Thus, an underlying assumption of a life history approach is that some of the variability in important traits should be rooted in ontogenetic adjustments that increased fitness within a given ancestral environment.

Life history strategies exist on a slow-to-fast continuum. A slow strategy entails a slower pace of development and reproduction, which allows for greater investment in fewer but higher-quality offspring. A fast strategy, in contrast, entails a faster pace of development and reproduction, which results in more offspring but less investment in each one. Slow strategists, therefore, invest more in forming and maintaining long-term, committed relationships that facilitate more investment in fewer offspring, whereas fast strategists invest more in finding sexual partners and short-term mates and less in building long-lasting relationships (Kaplan & Gangestad, 2005).

The adaptive value of a given life history strategy depends on the context in which it is enacted (Gangestad & Simpson, 2000). One key facet is the rate of morbidity and mortality in the local environment, known as *harshness* (Ellis,

Figueredo, Brumbach, & Schlomer, 2009). In Western societies, harshness is typically indexed by socioeconomic status, which is linearly related to most forms of morbidity and mortality (e.g., Adler, Boyce, Chesney, Folkman, & Syme, 1993; Chen, Matthews, & Boyce, 2002). Harsh environments increase the risk of dying before reproduction, so they should often promote faster life history strategies and more unrestricted sociosexuality. However, harsh environments should also promote behaviors that mitigate environmental risks and reduce mortality rates, especially for offspring. One way parents can reduce juvenile mortality rates is through biparental investment, which generally requires the formation of long-term committed relationships. Accordingly, the overall harshness in an environment might have differing effects on life history strategies, depending on whether individuals can plan for and counteract the risks in their local environment (Ellis et al., 2009).

One pivotal factor that should impact an individual’s ability to plan for and mitigate risks within the local environment is how stable and predictable this environment is. This dimension of environmental risk is referred to as *unpredictability* (Ellis et al., 2009). Unpredictability is typically indexed by frequent changes in the family environment that directly affect parents and children (Belsky, Schlomer, & Ellis, 2012; Simpson, Griskevicius, Kuo, Sung, & Collins, 2012; Szepesenwol, Simpson, Griskevicius, & Raby, 2015). Taking the time to invest in long-term relationships that produce fewer but higher-quality offspring makes sense when an environment is highly predictable and individuals can be reasonably sure that their long-term plans will come to fruition. In unpredictable environments, in contrast, such long-term investments would have catastrophic results if conditions took an unexpected turn-for-the-worse. A sudden sharp increase in juvenile mortality rates for any reason could cause slow strategists to lose their entire investment at one fell swoop. In such unstable and unpredictable conditions, it makes more sense to take advantage of reproduction opportunities as they come along and have more offspring to increase the odds that some will survive to adulthood (Ellis et al., 2009). It may also be beneficial to diversify the genetic material of one’s offspring by mating with different partners (i.e., bet hedging;

Donaldson-Matasci, Lachmann, & Bergstrom, 2008). Fast strategies characterized by unrestricted sociosexuality, therefore, should be more advantageous in unpredictable environments, whereas slow strategies and restricted sociosexuality should be more advantageous in predictable ones.

The Importance of the Early Environment

Because the adaptive value of life history strategies is partially dependent on the levels of harshness and unpredictability in the local environment, the psychobiological mechanisms that regulate these strategies should be responsive to specific cues of harshness and unpredictability. Indeed, associations between fast life history strategies and indicators of environmental harshness and unpredictability have been found at both the population level (e.g., Low, Hazel, Parker, & Welch, 2008; Walker et al., 2006) and the individual level (e.g., Kotchick, Shaffer, Miller, & Forehand, 2001). These associations reflect strategic fine-tuning not only in response to current environmental conditions, but also in response to early life exposure to cues of harshness or unpredictability (Belsky, Steinberg, & Draper, 1991; Ellis et al., 2012). As in other organisms, human developmental systems appear to direct development in response to cues signaling the nature of the environment in which the individual will most likely live (Del Giudice & Belsky, 2011; West-Eberhard, 2003). As a result, early rearing environments should have enduring effects on life history strategies, above and beyond current environment effects.

Based on this logic, exposure to more unpredictable early life environments should promote the development of faster life history strategies and more unrestricted sociosexuality, whereas exposure to more predictable early environments should promote the development of slower life history strategies and more restricted sociosexuality. Findings consistent with this prediction were reported in several prospective longitudinal studies that simultaneously examined harshness and unpredictability. For example, experiencing a more predictable environment during the first years of life uniquely forecasted fewer sexual partners by age 15 (Belsky et al., 2012) and later age of first pregnancy (Nettle, Coall, & Dickins, 2011). Experiencing

a more predictable adolescent environment indirectly predicted more restricted sociosexual behaviors and greater contraceptive use in early adulthood (Brumbach, Figueredo, & Ellis, 2009). Simpson and colleagues (2012) directly pitted predictability levels in the first years of life against predictability levels at middle-childhood and adolescence, and found that only the former uniquely forecasted fewer sexual partners by age 23. Considered as a whole, these findings indicate that early life predictability has a unique effect on life history outcomes, above and beyond the impact of environmental harshness.

Parenting and Attachment as Mediating Mechanisms

The information contained in early local environments must be detected by the growing child's developmental system to guide his or her future development. Young children, however, are not fully aware of the conditions in their local environment. Parents normally serve as the mediating agents, providing their children with information about the local environment through the quality of their parenting (Belsky et al., 1991; Simpson, 1999). Indeed, the quality and reliability of parental care varies depending on the local environment (e.g., Conger et al., 2002; McLoyd, 1990, 1998; Quinlan, 2007), with parents finding it more difficult to provide high-quality care in stressful conditions (Belsky & Jaffee, 2006; Crnic & Low, 2002). The quality of parental care, therefore, should serve as a cue to conditions in the local environment (Del Giudice & Belsky, 2011; Simpson, 1999).

Several developmental theories suggest that harsh or unpredictable early life environments suppress the quality of parental care that children receive, fostering the development of faster life history strategies and more unrestricted sociosexuality (e.g., Belsky et al., 1991; Chisholm et al., 1993; Ellis, 2004; Simpson, 1999). This proposition has received some support in prospective longitudinal studies investigating how girls' sexual development is affected by various types of parental disturbances, such as father absence (Ellis & Essex, 2007), maternal separation and lack of paternal involvement (Nettle et al., 2011), and maternal depression (Belsky et al., 2012). Parental disruption has also been linked to lower-quality

romantic relationships (Conger et al., 2000; Cui & Fincham, 2010). Thus, the quality of parental care might be a key mechanism through which early environmental conditions shape life history strategies.

However, we still do not know *how* early parental care shapes life history strategies in adulthood, and sociosexual orientations in particular. One possibility is that the quality and reliability of early parental care is translated by children into a set of beliefs and expectations about future interactions with the surrounding world, which then directs their psychological and behavioral adjustment (Del Giudice, 2009; Simpson & Belsky, 2008). This process is regulated by the attachment system, a species-universal, innate psychobiological system that motivates individuals to seek proximity to supportive others in times of need (Bowlby, 1969/1982). When a threat is detected, the attachment system launches behavioral, psychological, and physiological sequences designed to elicit support from caregivers and restore a sense of physical or emotional safety. More important, early caregiving experiences shape beliefs and expectations about the availability of supportive others in times of need, thereby providing information to the child about the safety and predictability of the environment in which s/he lives. Caregivers who provide reliable support tend to instill positive expectations about the availability of supportive others, referred to as secure attachment. Caregivers who provide inconsistent or poor support instill negative expectations about availability, referred to as insecure attachment. Insecure attachment takes two main forms: anxiety, which entails concerns about the availability of significant others and a strong desire for closeness and intimacy; and avoidance, which entails a desire to limit intimacy and maintain psychological and emotional distance from significant others. These attachment orientations continue to affect individuals' interpersonal relationships throughout their lives (Bowlby, 1969/1982; Mikulincer & Shaver, 2007). Thus, by fostering more positive caregiving environments, predictable early environments may lead to secure attachment representations that are carried forward into adulthood.

A large body of research has confirmed that securely attached individuals prefer long-term relationships and function better when in them

(see Mikulincer & Shaver, 2007). For example, individuals classified as securely attached in infancy display better conflict resolution skills and more positive emotions in their adult romantic relationships (Simpson, Collins, Tran, & Haydon, 2007), and they are rated as having higher-quality romantic relationships (Roisman, Collins, Sroufe, & Egeland, 2005). Moreover, inducing attachment security experimentally via priming increases the desire for long-term relationships (Gillath & Schachner, 2006). Cross-sectional correlational studies have also found that securely attached individuals tend to be more committed and supportive in their relationships (e.g., N. L. Collins & Feeney, 2000; Simpson, 1990), whereas avoidantly attached individuals want short-term relationships, and are less emotionally involved when in longer-term relationships (Birbaum, 2010; Brennan & Shaver, 1995; Schachner & Shaver, 2004).

In summary, these findings suggest that attachment representations should play an important role in mediating the relation between early environments and sociosexuality (Del Giudice, 2009; Simpson & Belsky, 2008). More predictable early environments should facilitate more reliable, higher-quality parental care, which in turn should generate secure attachment representations, ultimately resulting in longer-term mating preferences and more restricted sociosexuality.

The Current Study

We tested whether the amount of predictability in the early environments of children prospectively predicts their sociosexuality in early adulthood. Using the MLSRA data, Simpson and colleagues (2012) reported a relation between early life unpredictability and one marker of unrestricted sociosexuality (having more sexual partners by age 23). In the current study, we extend these findings by: (a) examining a more robust measure of sociosexuality based on coder ratings of participants' responses to 14 interview questions about their current romantic relationships, their relationship history, and their ideal relationship; and (b) testing a parenting-attachment mechanism through which early life predictability may affect adult sociosexuality.

The MLSRA is a prospective longitudinal study that has followed approximately 170 individuals from before they were born into mid-

dle adulthood (see Sroufe et al., 2005). All of these individuals were born in the mid-1970s in Minneapolis, MN to first-time mothers living below the poverty line at the time of birth. Although initial mean socioeconomic status (SES) levels were low, means and *SDs* increased substantially for many participants from early infancy through adolescence, making the sample more typical and less homogenous in terms of SES at later assessments (for more information on changing SES levels in the MLSRA, see Sroufe et al., 2005). The MLSRA has prospective measures of early environments, observational measures of early parental support, and interview-based measures of both attachment representations and romantic relationships in late adolescence and early adulthood.

Our first hypothesis was that exposure to a more predictable environment early in life (measured prospectively between ages 1–4) would forecast more restricted sociosexuality in early adulthood (coder-rated from interviews at age 23), controlling for early life SES (harshness) and the amount of predictability in the current environment (at age 23). Our second hypothesis was that the effect of early life predictability on adult sociosexuality would be serially mediated through the quality of early life parenting and attachment security in late adolescence. Specifically, we hypothesized that being exposed to more predictable environments early in life would be associated with receiving more supportive parenting from mothers during this time-period (based on coder-rated observations made at ages 1.5 and 3.5), which should lead to more secure attachment representations in late adolescence (i.e., higher coherence of mind score on the Adult Attachment Interview at age 19). This, in turn, should result in more restricted sociosexuality in early adulthood.

Method

Participants

Our sample included all MLSRA participants who completed a relationship interview at age 23 and on whom we also had early life predictability data ($N = 155$; 51% men). At the time of the relationship interview (at age 23), 32.3% of participants were single, 45.2% were in a dating relationship, 11.0% were engaged, and 11.5%

were married. Relationship length ranged from 1 to 90 months ($M = 32.11$, $SD = 25.67$). Of those who were in a relationship, 58.1% were living with their partner.

Measures

Almost all of the data used in this study were coded prospectively as part of the ongoing MLSRA project. The one exception is the coding of sociosexuality at age 23, which was done specifically for this study. No data, relevant measures, or conditions were excluded.

Early predictability. Consistent with previous research (Belsky et al., 2012; Simpson et al., 2012; Szepeswol et al., 2015), our predictability measure was based on three items from the Life Events Schedule (LES; Egeland, Breitenbucher, & Rosenberg, 1980). The LES is an audio-recorded interview that was conducted with each mother at different points of her child's development. The predictability items asked about the disruptive nature of three types of changes in the mothers' lives during the prior year: (a) changes in employment status (e.g., periods of unemployment), (b) changes in residence (e.g., moving to a different house or apartment), and (c) changes in cohabitation status (e.g., whether and how often romantic partners moved in or out of the house/apartment). Each item was then rated by trained coders for the level of disruption associated with the event on a scale of 0 (*no disruption*) to 3 (*severe disruption*). Interrater reliabilities (ICCs) were above .90 for all items.

Our early predictability measure encompassed participants' first four years of life, during which the LES was administered three times: at 12, 18, and 48 months. We used a 4-year cutoff so we could test the potential mediating role of maternal support that was also assessed during this period (see below).¹ Following prior studies (Simpson et al., 2012; Szepeswol et al., 2015), we first created an accumulated unpredictability measure by summing the three items from all three assessments. We then subtracted this score from the maximum possible score (27) to obtain an accumulated predictability score. This score was

¹ We also ran the analyses using a 64-month cutoff, similar to Simpson and colleagues (2012). The results were the same.

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then divided by three to form a 0 (*highly unpredictable*) to 9 (*highly predictable*) scale.²

Early SES. The MLSRA has two assessments of SES relevant to participants' first years of life. The first assessment, at 42 months, was based on mothers' educational attainment and the revised version of the Duncan Socioeconomic Index (SEI; Duncan, 1961; Stevens & Featherman, 1981). The second assessment, at 54 months, was based on mothers' SEI alone. SES scores were transformed to *t* scores ($M = 50$, $SD = 10$) within each assessment to remove negative values, which generated positively scaled scores. We treated the average of the 42- and 54-month scores ($r = .45$, $p < .001$, Spearman-Brown coefficient = .62) as our measure of early SES (i.e., harshness).

Early maternal support. The MLSRA recruited only mothers, nearly all of whom were the primary (and oftentimes single) caregivers of their children (the study participants). Early parenting assessments, therefore, focused on only mothers. When participants were 24 and 42 months old, they and their mothers were observed in the lab while completing problem-solving and teaching tasks. These tasks gradually increased in complexity until they became too difficult for each child to solve on his or her own. Mothers were instructed to first allow their child to attempt the task independently, and then to step in and provide help if/when they thought it was appropriate to do so. Each videotaped session was rated by trained coders for mothers' supportive presence on 7-point scales. High scores were given to mothers who showed interest and were attentive to the needs of their child, who responded contingently to their child's emotional signals, and who reinforced their child's success. Low scores were given to mothers who were distant, hostile, and/or unsupportive (ICCs = .84 and .87 for the 24- and 42-month assessments, respectively). We treated the average of the 24- and 42-month scores ($r = .45$, $p < .001$, Spearman-Brown coefficient = .62) as our measure of early maternal support.

Attachment representations in late adolescence. When participants were 19 years old, they were given the Adult Attachment Interview (AAI; George, Kaplan, & Main, 1985). This was the only available measure of adult attachment in the MLSRA before age 23. The AAI is a well-validated, semistructured interview that assesses the degree to which individuals have a coherent narrative about their early experiences

with caregivers, primarily between the ages of 5–12. As such, it differs from self-report measures of adult attachment that focus on conscious appraisals and attributions that individuals make about themselves and their romantic partners/relationships (see Roisman et al., 2007; Shaver, Belsky, & Brennan, 2000). Participants were asked to describe their early relationships with their caregivers and to reflect on episodes of separation, rejection, abuse, and loss. The transcribed AAIs were then rated on 9-point scales that assessed attachment-related states of mind and inferred experiences according to Main and Goldwyn's (1998) coding system.

In the current study, we used the *coherence of mind* scale (ICC = .77), which assesses each individual's ability to freely explore his or her feelings about childhood experiences with caregivers in an organized/emotionally well-regulated versus a nonorganized/emotionally dysregulated manner, as our measure of attachment security. Attachment security is inferred from coherence and cooperation during the interview along with believable memories of specific instances of care or support provided by parents. The coherence of mind scale correlates almost perfectly with a linear combination of AAI coding scales that reliably distinguish between the secure and insecure categories on the AAI (Fyffe & Waters, 1997). For this reason, it is commonly used as a dimensional measure of attachment security (e.g., Raby, Cicchetti, Carlson, Egeland, & Collins, 2013; Roisman, Fraley, & Belsky, 2007; Roisman, Madsen, Hennighausen, Sroufe, & Collins, 2001).

Sociosexuality in early adulthood. When participants were 23 years old, they were interviewed about their friendships, family, and romantic relationships. The coding of sociosexuality was based on participants' responses to 14 interview items that asked about their current romantic relationship, their relationship history within the past 2 years, and their ideal relationship (see the Appendix). Two trained coders, one male and one female, rated participants' responses to all 14 items for evidence of restricted versus unrestricted sociosexuality on a

² This final step had no bearing on the results. It was conducted to attempt to equate the early predictability and current predictability scales.

5-point scale. The coders were blind to participants' gender and all other information about them. A rating of 5 was given to participants who displayed no evidence of short-term dating or sexual promiscuity, who wanted to be in a romantic relationship with one person, and/or who were in an ongoing, long-term romantic relationship (or had been in one recently). A rating of 1 was given to participants who reported multiple dating and sexual partners (all of which were short-term), and who were interested in dating multiple people. Interrater reliability was very high ($ICC = .96$). Therefore, we used the average rating of the two coders as our measure of sociosexuality in early adulthood.

Current predictability. As part of the 23-year assessment, participants also completed the LES. Current predictability was assessed by the same three items used to assess early predictability. These items inquired about changes in employment status, changes in residence, and changes in cohabitation status during the past year. Trained coders rated each item for level of disruption on a scale of 0 (*no disruption*) to 3 (*severe disruption*; $ICCs > .90$). A current predictability measure was then computed in a similar way to the early predictability measure by summing the ratings and subtracting the sum from the maximum possible sum (9) to obtain a 0 (*highly unpredictable*) to 9 (*highly predictable*) scale.

Results

Descriptive statistics and zero-order correlations for all study variables are presented in

Table 1. As expected, participants who were exposed to more predictable early environments were more restricted at age 23. Subsequent analyses were conducted in two stages. First, we examined whether early predictability forecasted more restricted sociosexuality, above and beyond early SES (harshness) and current predictability. We also tested for possible gender moderation. Second, we tested the proposed mediation model, namely, whether the effect of early predictability on adult sociosexuality is mediated through early supportive parenting and secure attachment in late adolescence.

Effects of Early Predictability on Adult Sociosexuality

To test whether early predictability uniquely predicts more restricted sociosexuality at age 23, we conducted a hierarchical regression analysis (see [Table 2](#)). Early predictability was entered with early SES in Step 1. Current predictability was then entered in Step 2 to control for any effects of common environment between early childhood and early adulthood. We then examined possible gender moderation by entering gender and its two-way interactions with early and current predictability in Steps 3 and 4. SPSS syntax for this analysis is provided as online supplemental material.

Consistent with our first hypothesis, early predictability forecasted more restricted sociosexuality across all models (see [Table 2](#)). Current predictability was an additional unique predictor, incrementally predicting more restricted sociosexuality ([Table 2](#), Models 2–4). Not sur-

Table 1
Means, SDs, and Zero-Order Correlations Between Study Variables

	1	2	3	4	5	6
1. Early predictability						
2. Early SES	.10					
3. Early maternal support	.19*	.14 [†]				
4. AAI coherence of mind	.10	.02	.20*			
5. Current predictability	.08	.03	.06	.01		
6. Restricted sociosexuality	.17*	-.05	.01	.18*	.21**	
<i>M</i>	7.58	50.78	4.53	3.97	6.90	4.17
<i>SD</i>	.93	9.19	1.31	1.72	1.60	1.08

Note. $N = 155$. For correlations involving maternal supportive presence, $N = 153$. For correlations involving AAI coherence, $N = 144$. AAI = Adult Attachment Interview; SES = socioeconomic status.

[†] $p < .10$. * $p < .05$. ** $p < .01$.

Table 2
Regression Coefficients and 95% Confidence Intervals (CIs) for Restricted Sociosexuality Regressed on Early Socioeconomic Status (SES), Early and Current Predictability (P), Gender, and Two-Way Interactions Between Gender and Early and Current Predictability

	Model 1		Model 2		Model 3		Model 4		95% CI (B)
	B(SE)	β	B(SE)	β	B(SE)	β	B(SE)	β	
Early SES	-.01 (.01)	-.06	-.01 (.01)	-.07	-.01 (.01)	-.05	-.01 (.01)	-.05	[-.02, .01]
Early P	.20 (.09)	.17*	.18 (.09)	.16*	.21 (.09)	.18*	.23 (.09)	.20**	[.06, .41]
Current P			.14 (.05)	.20*	.17 (.05)	.26**	.19 (.05)	.28***	[.09, .29]
Gender					.30 (.08)	.28***	.31 (.08)	.29***	[.15, .48]
Gender × Early P							-.08 (.08)	-.07	[-.24, .09]
Gender × Current P							-.11 (.08)	-.10	[-.28, .05]
ΔR ²		.03 [†]		.04*		.08***		.01	
R ²		.03 [†]		.07**		.15***		.16***	

Note. N = 155. Confidence intervals are provided for Model 4 only. Gender: -1 = men, 1 = women.
[†] p < .10. * p < .05. ** p < .01. *** p < .001.

prisingly, gender was another unique predictor, revealing that men were more unrestricted than women (Table 2, Models 3–4). Gender, however, did not moderate any of the effects of early and current predictability on sociosexuality (Table 2, Model 4).

Mediating Roles of Supportive Parenting and Secure Attachment

Next, we tested whether early supportive parenting (based on observations of maternal supportive presence at ages 2.5 and 3.5) and secure attachment representations in adolescence (based on AAI coherence of mind scores at age 19) serially mediated the relation between early predictability and sociosexuality at age 23. Because there were some missing data in the supportive parenting (2 cases) and attachment (11 cases) measures, we used a structural equation modeling (SEM) approach.³ This approach enabled us to estimate effects in an unbiased manner using full information maximum likelihood (FIML) estimates. The path model is displayed in Figure 1. This model included two potential indirect paths from early predictability to adult sociosexuality: (a) a single mediation path through early maternal support, and (b) a serial mediation path through early maternal support and attachment coherence of mind (see Figure 1). We also included in the model direct paths from early and current predictability and early SES to adult sociosexuality (see Figure 1). This model fit the data very well ($\chi^2_{(4)} = 0.81, p = .94$; root mean square error of approximation

[RMSEA] = 0.00, comparative fit index [CFI] = 1.00).

Consistent with our second hypothesis, more predictable early environments were associated with more supportive parenting from participants’ mothers during the same time-period, above and beyond the effects of early SES. Higher-quality early maternal support, in turn, predicted more secure attachment representations at age 19 (i.e., having a more coherent state of mind on the AAI). Finally, having more secure attachment representations at age 19 predicted more restricted sociosexuality at age 23. The resulting indirect effect, however, explained only 4% of the total effect of early predictability on adult sociosexuality ($\beta = .01$; 95% confidence interval [CI] [.00, .02]).⁴ Moreover, the direct effect of early predictability on adult sociosexuality remained significant, as did the effect of current predictability. Finally, early maternal support did not directly predict sociosexuality at age 23 (see Figure 1). In summary, while these results provide some evidence that the effect of early predictability on sociosexuality in early adulthood is partially mediated by early supportive parenting through attachment

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³ This analysis was conducted using AMOS version 19.0.

⁴ To test the significance of this indirect effect, we used a phantom model approach (Macho & Ledermann, 2011; for a similar application, see Szepesenwol et al., 2015). Because of missing data, bootstrapped confidence intervals for indirect effects could not be computed. Thus, we calculated Bayesian confidence intervals, which can be interpreted in a similar fashion.

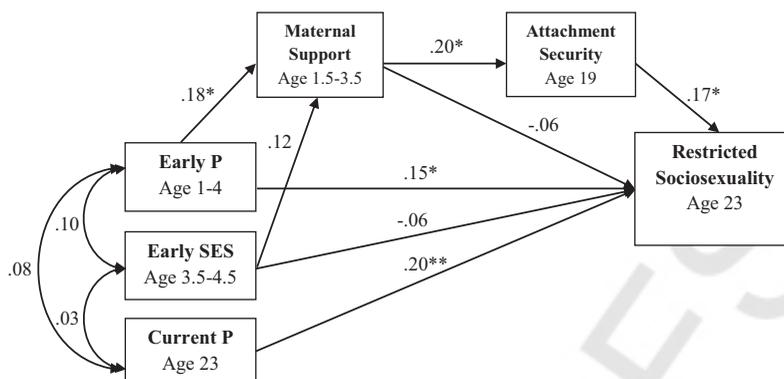


Figure 1. Mediation analysis: Standardized direct and indirect effects (β s) of early predictability (P) on restricted sociosexuality in early adulthood. Effects are estimated using full information maximum likelihood (FIML). $N = 155$. Unstandardized coefficients, SE s, and p values are provided in Supplemental Figure 5. * $p < .05$. ** $p < .01$.

security in late adolescence, the mediation is weak and marginally significant.

Sensitivity Analyses

To ensure that our findings were not influenced by our choice of covariates, we ran four additional models, the results of which are reported in the supplemental materials. First, we ran the original model without controlling for early SES (Supplemental Figure 1). Second, we ran the original model with an additional covariate, paternal presence and support at ages 2–6, which was rated on a scale from 1 (*no male in the home*) to 4 (*high quality*) (Supplemental Figure 2). This measure was based on mother reports (Pierce, 1999). Third, we ran the original model while controlling for an alternative measure of current predictability composed of seven LES items indexing exogenous stressful life changes (e.g., changes in the health of family members or the participant, death of family members, being the victim of a crime; Supplemental Figure 3). This was done because the original current predictability measure included items that might have been influenced by sociosexuality (e.g., changes in residence or cohabitation status) rather than influence sociosexual behaviors. Fourth, we ran the original model again controlling for both measures of current predictability simultaneously (Supplemental Figure 4).

Our primary results remained the same in all analyses. Namely, the specific paths composing

the indirect effect, as well as the indirect effect itself, remained the same. In three of the four models, however, the direct effect of early predictability became nonsignificant, strengthening the evidence for mediation. The only additional covariate that significantly predicted sociosexuality at age 23 was paternal presence and support at ages 2–6. Participants whose mothers reported greater paternal presence and support were rated as more restricted at age 23 (see Supplemental Figure 2).

Discussion

The role of early environments in calibrating sexual development and reproductive strategies is a central tenet of life-history models of development (Belsky et al., 1991; Chisholm et al., 1993; Del Giudice & Belsky, 2011; Ellis, 2004). These models have inspired several prospective longitudinal studies, some of which have focused on specific aspects of sociosexual development, such as pubertal timing (e.g., Deardorff et al., 2011; Ellis & Essex, 2007; Ellis, McFadyen-Ketchum, Dodge, Pettit, & Bates, 1999), sexual debut (e.g., James, Ellis, Schlomer, & Garber, 2012; Simpson et al., 2012), adolescent sexual activity (e.g., Belsky et al., 2012; Ellis et al., 2003), sexual risk-taking (e.g., Belsky, Steinberg, Houts, Halpern-Felsher, & The NICHD Early Child Care Research Network, 2010; James et al., 2012), and number of sexual partners in early adulthood

(e.g., Brumbach et al., 2009; Simpson et al., 2012). Few studies, however, have examined adult sociosexuality directly, and none to our knowledge have documented a direct link between exposure to more predictable environments during the first few years of life and sociosexuality patterns in adulthood. Our findings confirm that experiencing a more predictable environment during the opening years of life forecasts more restricted sociosexual tendencies in early adulthood, controlling for both early life SES (harshness) and current levels of predictability. Moreover, there is some evidence that this effect is partially mediated by a parenting-attachment process, whereby individuals who grow up in more predictable environments also receive more supportive parental care and subsequently become more securely attached in late adolescence. This, in turn, results in more restricted sociosexuality in early adulthood. These novel findings make an important contribution to the life-history literature on the development of mating and reproductive patterns.

Although our findings lend some support for the existence of a parenting-attachment mechanism, the indirect path through early supportive parenting and adolescent secure attachment did not explain much of the total effect of early predictability on adult sociosexuality, leaving a substantial direct effect. This suggests that there could be parallel psychological and/or physiological mechanisms through which early environments influence adult sociosexuality. For instance, if predictable early environments persist into later stages of cognitive development, they could lead to schematic beliefs that future events are predictable (Ross & Hill, 2002) or are under one's control (Mittal & Griskevicius, 2014). These beliefs could, in turn, lead to the adoption of slower life history strategies. The level of stress experienced in early home environments may also calibrate the physiological stress response system, producing strategic shifts in developmental trajectories through the operation of regulatory switch mechanisms (see Ellis & Del Giudice, 2014; West-Eberhard, 2003).

Our findings should be interpreted within the context of certain limitations. First, to remain consistent with prior studies (e.g., Belsky et al., 2012; Simpson et al., 2012; Szepesenwol et al., 2015), we conceptualized and measured predictability in a specific way (i.e., as the lack of changes in the immediate family environment). It remains an open question whether different

conceptualizations of predictability (e.g., consistent SES levels, stability in caloric intake) will show similar effects on adult sociosexual patterns. Second, similar to other studies (e.g., Belsky et al., 2012; Nettle et al., 2011; Simpson et al., 2012; Szepesenwol et al., 2015), we used SES as a global index of harshness. As noted above, however, different types of harshness can have different—and sometimes even opposite—effects on life history strategies (see Ellis et al., 2009). While SES is linearly related to most types of harshness (Adler et al., 1993; Chen et al., 2002), it does not differentiate between harshness that can be mitigated by behavior changes and harshness that cannot (i.e., extrinsic harshness). Future studies need to examine and test different types of harshness, and they may also benefit from using more heterogeneous samples in terms of harshness to increase generalizability and avoid range-restriction issues. Finally, we coded sociosexuality from interview responses rather than relying on self-report measures such as the Sociosexual Orientation Inventory (SOI; Simpson & Gangestad, 1991) or the revised Sociosexual Orientation Inventory (SOI-R; Penke & Asendorpf, 2008) because these self-report measures have not been collected for the MLSRA. Our coder-rated measure had a substantial behavioral component, whereas most self-report measures give considerable weight to attitudes and desires. Thus, caution should be exercised when comparing our results to studies using self-report measures of sociosexual orientation.

When possible, future studies should also consider the different roles of attachment anxiety and avoidance. Attachment anxiety is thought to be rooted in inconsistent caregiving experiences (Bowlby, 1969/1982) and, therefore, it may be especially prevalent in inconsistent environments. Avoidant attachment, in comparison, is associated with discomfort with intimate relationships (e.g., Birnbaum, 2010), so it may be especially tied to unrestricted sociosexuality. Indeed, whereas attachment anxiety is more strongly related to early unpredictability in retrospective cross-sectional studies (Barbaro & Shackelford, in press; Szepesenwol et al., 2015), attachment avoidance is more strongly related to short-term mating preferences (e.g., Brennan & Shaver, 1995; Schachner & Shaver, 2004).

The current study also has some significant strengths. The prospective longitudinal design allowed us to use measures taken in “real time,” and the results support the causal pathway we predicted. We could also statistically control for predictability levels in the current environment, which permitted us to pinpoint the unique role of early environments in forecasting adult sociosexuality. In addition, we used high-quality observational and interview measures of important constructs such as parental support and attachment security. Finally, our coder-rated measure of sociosexuality is well-aligned with life history models that emphasize behavioral outcomes.

In conclusion, life history theory has the potential to generate novel hypotheses about romantic relationships. In the current study, we leveraged life history logic to predict and explain why certain people tend to engage in short-term, casual relationships instead of long-term, committed ones. Prior studies have linked such sociosexual tendencies with poorer functioning in committed romantic relationships. Unrestricted individuals, for example, report less sexual interest in their partners and view them as less sexually attractive (Hebl & Kashy, 1995), and they are more willing to engage in extradyadic sexual behaviors or view them as acceptable (Feldman & Cauffman, 1999; Seal, Agostinelli, & Hannett, 1994). These attitudes and behaviors should be detrimental to the formation of committed, long-term romantic relationships (Simpson, Wilson, & Winterheld, 2004). Thus, in addition to making a significant contribution to evolutionary psychology, the current study also contributes to relationship science by exploring the developmental origins of restricted attitudinal and behavioral tendencies that may foster more committed romantic relationships in adulthood. Our findings suggest that restricted sociosexuality is at least partially rooted in exposure to more predictable rearing environments early in life, perhaps reflecting an adaptive adjustment to such environments.

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AQ:2

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(Appendix follows)

Appendix



AQ: 3

Interview Items Used for Sociosexuality Coding

Current Relationship

1. Are with someone right now? (no / dating / engaged / married)
2. How long have you been together? (in months)
3. Is this a sexual relationship?
4. Do you expect to be in this relationship five years from now?

Relationship History

5. How many people have you dated or had a romantic relationship with since you were 21?
6. What was the longest relationship you had in the past two years? (in months)
7. What was the shortest relationship you had in the past two years? (in months)
8. In general, have your relationships since you turned 21 been:
 - a. Long-term (4 or more months)
 - b. Short-term (less than 4 months)
 - c. Mixed
 - d. No relationships
9. When you've dated since you turned 21, did you tend to see:
 - a. One person at a time
 - b. Two people at a time
 - c. Three or more people at a time
 - d. Do not date

10. Any other relationships other than the current one since you turned 21?
11. How many people have you had sexual intercourse with?

Relationship Aspirations

12. In your ideal world, what kind of relationship would you be in right now?
 - a. Not dating
 - b. Dating several people
 - c. Dating one person exclusively
 - d. Living together
 - e. Married
 - f. Married, but seeing other people
 - g. Other (specify)
13. In your ideal world, what would your relationship status be ten years from now (when you are 33)?
 - a. Not dating
 - b. Dating several people
 - c. Dating one person exclusively
 - d. Living together
 - e. Married
 - f. Married, but seeing other people
 - g. Other (specify)
14. How confident are you that this will happen?
 - a. Not at all
 - b. Somewhat
 - c. Very

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AUTHOR QUERIES

AUTHOR PLEASE ANSWER ALL QUERIES

1

AQau—Please confirm the given-names and surnames are identified properly by the colors.

■ = Given-Name, ■ = Surname

The colors are for proofing purposes only. The colors will not appear online or in print.

AQ1—Author: Please be sure to provide the name of the department(s) with which you and your coauthors are affiliated at your respective institutes if you have not already done so. If you or your coauthors are affiliated with an institute outside of the United States, please be sure to provide the city, province (if applicable), and country in which the institute is based. If you are affiliated with a governmental department, business, hospital, clinic, VA center, or other nonuniversity-based institute, please provide the city and U.S. state (or the city, province, and country) in which the institute is based.

AQ2—Author: Please cite Roisman et al. (2007) in the text or remove it from the reference list.

AQ3—Author: Please provide an appropriate title for the appendix.
