

## Original Article

# The effect of ecological harshness on perceptions of the ideal female body size: an experimental life history approach<sup>☆,☆☆</sup>

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## ARTICLE INFO

## Article history:

Initial receipt 27 June 2013

Final revision received 13 December 2013

## Keywords:

Life history theory

Mortality

Socioeconomic differences

Body fat

Pubertal timing

Ideal body size

## ABSTRACT

Why do researchers regularly observe a relationship between ecological conditions and the heaviness of female body weight ideals? The current research uses insights from life history theory and female reproductive physiology to examine whether variability in female body ideals might emerge from the different life history strategies typically adopted by individuals living in harsh versus benign ecologies. Across three experiments, we demonstrate that women who were sensitized to faster life history strategies during childhood – as indexed by earlier menarche or lower childhood SES – respond to cues of ecological harshness by shifting away from the thin body weight typically favored by Western women toward a heavier female body ideal. Additionally, although men's perceptions of the ideal male body size did not shift in response to these cues, their perceptions of the ideal female body size did, with developmentally sensitized men also preferring a heavier female body size in the context of harsh ecologies.

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## 1. Introduction

When it comes to women's body size, is it true that thin is in? Or is shapely sexy? The answers to these questions vary considerably across regions and cultures. Although a relatively thin female body is idealized in Western nations like the United States, individuals living in areas of the world characterized by harsh ecologies (i.e., environments where resources are scarce and/or the mortality rate is high) tend to prefer a heavier female body size (Anderson, Crawford, Nadeau, & Lindberg, 1992; Brown & Konner, 1987; Ember, Ember, Korotayev, & de Munck, 2005; Swami et al., 2010). Similar variation is observed when comparing the preferences of women living in different regions within the same nation. Specifically, women living in safer, more economically advantaged communities tend to prefer a thinner female body than do those residing in less developed communities and villages (Calogero, Boroughs, & Thompson, 2007; Sobal & Stunkard, 1989; Swami et al., 2010). Examining the relationship between ecological harshness and men's mate preferences reveals a complementary pattern of results. Both resource scarcity and stress increase the heaviness of the body size that men most desire in their romantic partners (Nelson & Morrison, 2005;

Swami & Tovée, 2012), though not necessarily for themselves (Sobal & Stunkard, 1989).

Why do researchers regularly observe a relationship between ecological conditions and the heaviness of female body weight ideals? The causes underlying this relationship are undoubtedly complex and varied. For example, research demonstrates that factors as diverse as media exposure (Nasser, 1997; Voracek & Fisher, 2002), ability to store food (Ember et al., 2005), stress (Swami & Tovée, 2012), and susceptibility to starvation (Anderson et al., 1992; Marlowe & Westman, 2001; Nelson & Morrison, 2005; Swami et al., 2010) each contribute to this association. Here, we seek to build on these findings using insights from female reproductive physiology and life history theory. This integrative approach suggests that the divergent life history strategies typically adopted by those living in harsh versus benign ecologies may also play a role in shaping the heaviness of female body weight ideals. We examined this possibility across three experiments using multiple methods and measures. We hypothesized that conditions that promote the contingent expression of faster life history strategies (i.e., ecological harshness) would produce a shift away from the relatively thin female body size typically preferred by Western women toward a preference for a heavier female body.

### 1.1. Life History Theory, Metabolic Load, and Fertility

Life history theory is an evolutionary biological framework used to predict how and when organisms will allocate effort to the various demands of survival and reproduction across the lifespan (Charnov, 1993; Roff, 1992; Stearns, 1992). Because energy and somatic resources are inherently limited, organisms face important trade-

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<sup>☆☆</sup> This research was conducted with grant funding from the Anthony M. Marchionne Foundation.

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offs in how they allocate these resources among the several competing demands of life: growth, maintenance, reproduction, and parental care. Life history theory predicts that organisms will allocate effort to each of these components in a way that maximizes fitness in their local ecologies. How and when organisms resolve such trade-offs constitute their *life history strategy*.

Theory and research on human life history strategies suggest that people calibrate their strategies in response to specific features present in their early childhood environments (Belsky, Steinberg, & Draper, 1991; Griskevicius, Delton, Robertson, & Tybur, 2011, Griskevicius, Tybur, Delton, & Robertson, 2011, Kuzawa, McDade, Adair, & Lee, 2010; Simpson, Griskevicius, Kuo, Sung, & Collins, 2012). Specifically, predictable and stable early-life environments tend to encourage the development of slower life history strategies, characterized by prolonged growth, delayed sexual maturation, and increased bodily robustness. Conversely, early environments characterized by high levels of harshness and unpredictability (e.g., high mortality, low SES, low-quality parental investment) tend to sensitize individuals to faster life history strategies by accelerating their physiological and sexual development (Belsky et al., 1991; Ellis, 2004; Kuzawa et al., 2010). Although expedited development leads to a decrease in developmental stability, this strategy is favored in ecologies lacking the resources necessary to build somatic capital because it allows for earlier reproduction should ecological conditions remain harsh (Chisholm, 1993; Ellis, Figueredo, Brumbach, & Schlomer, 2009; Kuzawa, 2005, 2008; West-Eberhard, 2003).

Although adults from diverse backgrounds often behave similarly in benign and non threatening conditions, when exposed to ecological harshness (e.g., environments characterized by resource scarcity, high rates of extrinsic morbidity/mortality), individuals' behavioral strategies are expected to diverge based on differences in early-childhood sensitization (Griskevicius et al., in press; Griskevicius, Delton et al., 2011, Griskevicius, Tybur, et al., 2011; Hill, Rodeheffer, DelPriore, & Butterfield, 2013). For example, recent experimental research found that individuals sensitized to a faster life history strategy (as indexed by low childhood SES) reliably responded to experimentally-activated harshness cues by indicating a desire to begin having children sooner (Griskevicius, Delton, et al., 2011). Similar results have been found regarding their preferences for immediate (versus delayed) monetary gains and for spending (versus saving) money (Griskevicius, Tybur, et al., 2011; Griskevicius et al., 2013), psychological shifts that are also consistent with a relatively fast life history strategy. Shifting toward a faster strategy in harsh ecologies helps minimize the risk of perishing without having reproduced among individuals who lack the embodied capital to effectively postpone reproduction until conditions improve (see Ellis et al., 2009; Kuzawa, 2008; West-Eberhard, 2003).

Although life history strategies may appear to have little bearing on the heaviness of female body ideals, a woman's relative metabolic load plays an important role in regulating her reproductive capacity—a key component of life history strategies (see Ellison, 2001; Frisch, 1976, 1985; Trevathan, 2010). Successful reproduction requires that women commit an uninterrupted supply of energy to the metabolic demands of pregnancy and lactation while simultaneously meeting their own energy needs. To minimize the risk of investing limited energetic and reproductive resources on beginning a pregnancy that is unlikely to be maintained, selection has shaped female fertility to be sensitive to the energetic conditions of women's bodies. If a woman's existing energy stores and relative metabolic load make it unlikely that she will be able to maintain a pregnancy to term, ovarian function declines and fertility is suppressed. Fertility remains suboptimal or suppressed until metabolic or environmental conditions change such that the woman's energy intake begins to surpass her current energy needs. Once a woman's energy intake is sufficient to meet these demands, fat stores become replenished, ovarian function increases, and fertility is restored.

Given the close relationship between a woman's dynamic energy balance and reproductive capacity, researchers have hypothesized that women's energy regulation psychology may be sensitive to ecological cues that influence life history strategies (*the reproductive suppression hypothesis*: Wasser & Barash, 1983; see also Hill et al., 2013; Salmon, Crawford, Dane, & Zuberbier, 2008; Surbey, 1987). According to this hypothesis, when ecological conditions promote the expression of slower life history strategies, women may favor behaviors that promote a negative energy balance (e.g., dieting, weight loss). Conversely, when ecological conditions promote the expression of faster strategies, women may favor behaviors promoting a positive energy balance (e.g., increased calorie consumption, weight gain). This hypothesis has been supported by both correlational and experimental research (Hill et al., 2013; Salmon et al., 2008). Here, we build on this research by examining whether ecological conditions that influence life history strategies have a similar impact on the heaviness of female body ideals. Although women's body fat does not itself impact ovarian function, it is an easily-observable proxy of a woman's current energetic state. Accordingly, we sought to examine whether cues to ecological harshness would lead women sensitized to a relatively fast life history strategy to shift their ideals away from the thin body size generally favored in benign ecologies, toward a preference for a heavier (potentially more fertile) female body size.

In the following, we present the results of three experiments examining the interactive effects of ecological harshness and developmental history on the heaviness of female body size ideals. To date, two of the most established indices of developmental sensitivity to faster life history strategies are early menarche and low childhood SES (Belsky et al., 1991; Ellis, 2004; Ellis et al., 2009; Griskevicius, Delton, et al., 2011, Griskevicius, Tybur, et al., 2011; Griskevicius et al., 2013). Accordingly, we primed participants with ecological harshness cues (resource scarcity in Study 1, heightened mortality risk in Studies 2–3) and measured their pubertal timing (Studies 1 and 2) or childhood SES (Study 3) and body ideals. We predicted that women sensitized to a faster life history strategy would respond to ecological harshness cues by idealizing a heavier body size relative to controls (Studies 1–3). Because the relationship between energy status and fertility is specific to women, we predicted that these cues would not influence men's own body ideals (Study 2). We did, however, predict that they would influence men's perceptions of the ideal *female* body size (Study 3).

## 2. Study 1

### 2.1. Method

#### 2.1.1. Participants

Seventy-nine female university students served as participants in this study (38 in the harshness condition). Participants' ages ranged from 17 to 23 ( $M = 18.86$ ,  $SD = 1.21$ ) years, and participation partially fulfilled a course requirement.

#### 2.1.2. Design and procedure

Participants came into a research laboratory in small groups and were seated at individually partitioned computers. All participants were randomly assigned by Qualtrics Experimental Software to read a fictitious news article about the current economic recession or a control article about increasingly strict academic standards. Participants then indicated their ideal body size and answered a series of questions about themselves, including their age of menstrual onset.

#### 2.1.3. Ecological harshness manipulation

To prime ecological harshness, we activated concerns about resource scarcity using an established priming procedure (for details, see Griskevicius, Delton, et al., 2011, Griskevicius, Tybur, et al., 2011;

Hill, Rodeheffer, Griskevicius, Durante, & White, 2012). Participants read a newspaper article ostensibly printed in the *New York Times* about the current economic downturn (titled “Worst Economic Crisis Since ‘30s with No End in Sight”). Participants in the control condition read an article about increasingly stringent academic standards being adopted by universities in the area (titled “Making the Grade: No Longer a Walk in the Park”).

#### 2.1.4. Body size

Women indicated their ideal body size using a modified version of the female contour drawing figure rating scale (CDFRS; Swami et al., 2010; Thompson & Gray, 1995). To this end, we presented nine female figures ranging in body size. Women were asked to select the number of the figure drawing that they considered to (a) be ideal for women and (b) most closely approximate their own body size. The latter item was included to control for the demonstrated association between the size of one's body ideals and one's actual body size (Swami et al., 2010; Tovée, Emery, & Cohen-Tovée, 2000).

#### 2.1.5. Pubertal timing

Pubertal timing – the primary physiological measure of women's life history strategies – was measured by asking participants to report the age at which they had their first period (age at menarche) (see Ellis, 2004, for a review).

#### 2.2. Results

Before testing our primary statistical model, we first examined whether participants' own body size was predictive of the heaviness of their chosen body ideal. To this end, we regressed ideal body size on participants' reported body size. Consistent with past research (e.g., Sobal & Stunkard, 1989; Swami et al., 2010; Tovée et al., 2000), results revealed a significant main effect of participants' body size on the heaviness of their reported ideal body size, with heavier participants idealizing heavier bodies than thinner participants,  $\beta = .29$  ( $SE = .15$ ),  $t(77) = 2.62$ ,  $p = .01$ ,  $R^2 = .08$ . Therefore, we included participants' ratings of their own body size as a covariate in our primary statistical model.

Next, we tested our hypothesis using established protocol for conducting multiple regression analyses (see Aiken & West, 1991). Condition (dummy-coded) and menarcheal timing (centered) were entered simultaneously as predictors in the first step, followed by the two-way interaction in the second step. Participants' own body size was also included in the first step to control for its demonstrated association with ideal body size (see supplemental materials, available on the journal's website at [www.ehonline.org](http://www.ehonline.org)). As predicted, the analysis revealed an interaction between condition and menarcheal timing on the heaviness of women's ideal body size,  $\beta = .29$  ( $SE = .15$ ),  $t(74) = 1.99$ ,  $p = .05$ , semi-partial  $r^2 = .04$  (see Table 1 for descriptive statistics). Simple slope tests (Rosenthal & Rosnow, 1985) revealed that for women in the harshness condition, earlier menarche predicted a heavier ideal body size,  $\beta = -.31$  ( $SE = .10$ ),  $t(74) = -2.03$ ,  $p = .05$ , semi-partial  $r^2 = .05$ . No such relationship was present for women in the control condition ( $p = .42$ ). Furthermore, examining the effects of harshness (vs. control) cues among women with earlier (1 SD below the mean) and later (1 SD above

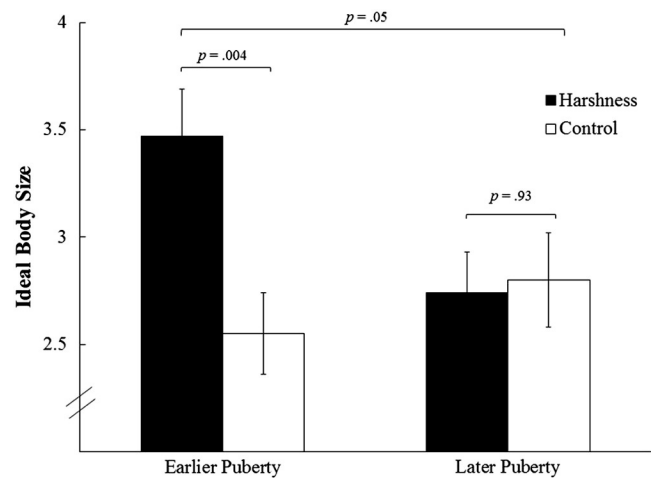


Fig. 1. The size of women's ideal body as a function of priming condition (harshness vs. control) and pubertal timing (Study 1). Plotted means represent one standard deviation above and below the mean of pubertal timing. Error bars reflect the standard error.

the mean) menarcheal timing revealed that harshness cues led earlier developing women to idealize a heavier body size relative to comparable women in the control condition,  $\beta = -.45$  ( $SE = .29$ ),  $t(74) = -2.95$ ,  $p = .004$ , semi-partial  $r^2 = .10$  (see Fig. 1). Similar effects of condition were not found among later developing women,  $p = .93$ .

#### 2.3. Discussion

Study 1 provided initial experimental evidence that priming ecological harshness cues interacts with women's developmental history to influence their perceptions of the ideal body size. Earlier developing women idealized a heavier female body size following exposure to ecological harshness cues, a shift that was not evident among women in the control condition or later developing women. These results are consistent with the hypothesis that women's body weight ideals might emerge in response to individuals' ecologically-contingent life history strategies.

### 3. Study 2

Because the logic of our hypothesis suggests that differences in the heaviness of female body weight ideals result from variation in women's life history strategies, Study 2 was designed to test whether we could conceptually replicate the pattern of results obtained in Study 1 using a different marker of ecological harshness: heightened extrinsic mortality risk. Replicating the results of Study 1 using this alternative harshness cue would help detract from the possibility that our results emerged exclusively due to larger body sizes rendering women more resistant to starvation, which is a plausible alternative explanation for the relationship between resource scarcity and the preference for heavier body sizes (see e.g., Anderson et al., 1992; Brown & Konner, 1987; Marlowe & Westman, 2001; Nelson & Morrison, 2005; Swami et al., 2010). Study 2 also included male participants to test whether the observed shift in body ideals is specific to female body size preferences, as predicted by our hypothesis. We predicted that priming harshness cues would lead women experiencing earlier puberty – but not later developing women or men – to prefer a heavier body size.

#### 3.1. Method

##### 3.1.1. Participants

Male ( $n = 50$ ) and female ( $n = 76$ ) university students served as participants in this study (67 in the harshness condition). Participants'

Table 1  
Descriptive Statistics (Study 1).

	Harshness		Control	
	M	SD	M	SD
Body Ideal	3.05	1.06	2.66	0.79
Puberty Age (Years)	12.92	1.48	12.54	1.34
Own Body	4.08	0.82	4.12	.51

ages ranged from 17 to 35 ( $M = 19.14$ ,  $SD = 2.00$ ) years, and participation partially fulfilled a course requirement.

### 3.1.2. Design and procedure

The design and procedure were the same as in Study 1, except that participants in the harshness condition read a news article about escalating levels of violent crime and homicide titled “Dangerous Times Ahead” (adapted from Griskevicius, Delton, et al., 2011, see Hill et al., 2013, for details). For women, pubertal timing was again measured by having them report their age of menarche. For men, pubertal timing was assessed by having them report the age at which they began going through puberty. We measured perceptions of the ideal body size using male and female versions of the CDFRS (Swami et al., 2010; Thompson & Gray, 1995). Again, participants were asked to select the figure drawing that they considered to (a) be ideal for someone of their own gender and (b) most closely approximate their own body size.

### 3.2. Results

Before testing our primary statistical model, we examined whether participants' own body size was predictive of the heaviness of their chosen body ideal so that we could control for it if necessary. To this end, we regressed participants' ideal body size on their own reported body size. Consistent with the results from Study 1, this analysis revealed a significant main effect of participants' body size on the heaviness of their chosen body ideal such that heavier participants idealized heavier bodies than thinner participants,  $\beta = .25$  ( $SE = .09$ ),  $t(124) = 2.91$ ,  $p = .004$ ,  $R^2 = .06$ .

We tested our hypothesis using multiple regression (see Table 2 for descriptive statistics). Participant sex (dummy-coded), condition (dummy-coded), and pubertal timing (centered) were entered simultaneously as predictors in the first step, followed by all two-way interactions in the second step, and the three-way interaction in the third step. Participants' own body size was also included in the first step to control for its effect on ideal body size (see supplemental materials, available on the journal's website at [www.ehbonline.org](http://www.ehbonline.org)). As predicted, results revealed a significant three-way interaction between sex, condition, and pubertal timing on the heaviness of participants' ideal body size,  $\beta = -.29$  ( $SE = .20$ ),  $t(117) = -2.54$ ,  $p = .01$ , semi-partial  $r^2 = .02$ .

We probed this interaction by examining the effects of priming condition and pubertal timing on ideal body size separately for men and women. For women, the results revealed the predicted interaction between condition and pubertal timing on ideal body size,  $\beta = .39$  ( $SE = .12$ ),  $t(71) = 2.58$ ,  $p = .01$ , semi-partial  $r^2 = .08$ . Simple slope tests revealed that for women in the harshness condition, earlier puberty predicted a heavier body ideal,  $\beta = -.30$  ( $SE = .08$ ),  $t(71) = -1.93$ ,  $p = .06$ , semi-partial  $r^2 = .05$ . No such relationship was present for women in the control condition ( $p = .09$ ). Furthermore, examining the effects of harshness (vs. control) cues among women with earlier (1  $SD$  below the mean) and later (1  $SD$  above the



**Fig. 2.** The size of women's ideal body as a function of priming condition (harshness vs. control) and pubertal timing (Study 2). Plotted means represent one standard deviation above and below the mean of pubertal timing. Error bars reflect the standard error.

mean) menarche revealed that harshness cues led earlier developing women to idealize a heavier body size relative to comparable women in the control condition,  $\beta = -.47$  ( $SE = .22$ ),  $t(71) = -2.92$ ,  $p = .005$ , semi-partial  $r^2 = .10$  (see Fig. 2). No such effects of harshness were found for later developing women,  $p = .48$ .

For men, the follow-up analysis did not reveal a significant main effect of priming condition ( $p = .37$ ) or an interaction between condition and pubertal timing on ideal body size ( $p = .21$ ).

### 3.3. Discussion

Study 2 provided further evidence that priming ecological harshness cues interacts with women's developmental history to influence their perceptions of the ideal body size. Earlier developing women idealized a heavier body size following exposure to ecological harshness cues, a shift that was not evidenced among women in the control condition or later developing women. Further, this shift in response to local harshness cues was not exhibited among men, regardless of their developmental history. Taken together with Study 1, these results lend support for the hypothesis that women's body weight ideals might be influenced by their life history strategies.

## 4. Study 3

Studies 1 and 2 demonstrated that ecological harshness – primed via cues to resource scarcity and heightened mortality risk, respectively – influences women's body ideals. Study 3 was designed to extend these findings in three key ways. First, we sought to examine whether harsh ecologies have implications for men's perceptions of the ideal female body size. Because successful enactment of faster life history strategies is critically dependent on women's energy balance, both men and women sensitized to faster reproductive strategies should respond to harshness by idealizing a heavier, potentially more fertile, female body.

Second, because pubertal timing is not the only developmental marker of life history strategies, Study 3 was also designed to test whether we could conceptually replicate the pattern of results found in Studies 1 and 2 using a different index of developmental history—childhood SES (see e.g., Griskevicius, Delton, et al., 2011). We therefore predicted that ecological harshness cues would interact with both men's and women's childhood SES, such that individuals growing up in lower SES environments would idealize a heavier female body size relative to individuals growing up in higher SES

**Table 2**  
Descriptive Statistics (Study 2).

	Harshness		Control	
	M	SD	M	SD
Body Ideal				
Men	4.12	1.11	4.21	0.78
Women	2.88	0.64	2.69	0.72
Puberty Age (Years)				
Men	12.88	1.40	12.71	1.37
Women	13.07	1.33	12.63	1.33
Own Body				
Men	4.08	1.60	3.79	1.35
Women	3.90	0.70	4.14	0.55

environments. Lastly, Study 3 included a more objective measure of participants' own body size – body mass index (BMI) – to control for its influence on the heaviness of their reported body ideals.

#### 4.1. Method

##### 4.1.1. Participants

One-hundred and twenty-four university students (75 female; 64 in the harshness condition) served as participants in exchange for course credit. Participants' ages ranged from 17 to 25 ( $M = 19.35$ ,  $SD = 1.62$ ) years.

##### 4.1.2. Design and procedure

Ecological harshness was manipulated by having participants read the news article used in Study 2. Participants in the control condition read a similarly-formatted article about Americans' overuse of laundry soap. After reading their randomly assigned article, all participants indicated the ideal female body size using the CDFRS. Finally, participants provided some information about themselves, including their height, weight, and perceived childhood SES.

##### 4.1.3. Childhood SES

We assessed participants' perceived socioeconomic status in childhood using an established measure (Griskevicius, Delton, et al., 2011; Griskevicius, Tybur, et al., 2011; Griskevicius et al., 2013). Specifically, participants indicated their agreement with the following three statements ( $\alpha = .83$ ) on a 7-point scale (anchors: "strongly disagree" and "strongly agree"): (1) "My family usually had enough money for things when I was growing up," (2) "I grew up in a relatively wealthy neighborhood," and (3) "I felt relatively wealthy compared to the other kids in my school."

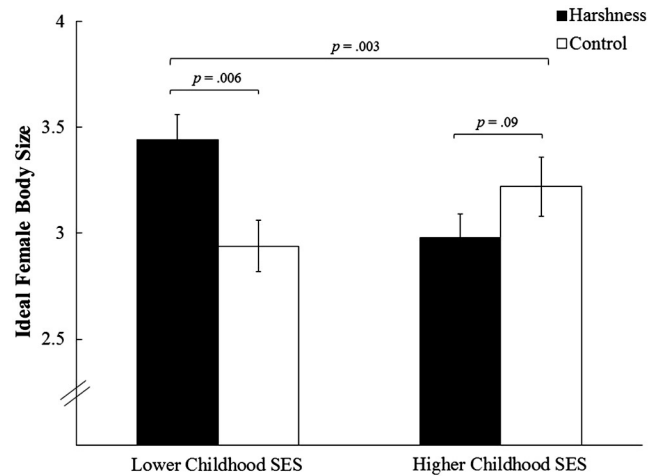
#### 4.2. Results

Before testing our primary statistical model, we examined whether participants' BMI influenced the size of their ideal female body. The results revealed a significant effect of participant BMI on the heaviness of their chosen female body ideal, with participants with higher BMIs idealizing a heavier female body,  $\beta = .22$  ( $SE = .02$ ),  $t(122) = 2.47$ ,  $p = .02$ ,  $R^2 = .05$ .

We used a multiple regression model of the same form used in Study 2 to test our predictions (see Table 3 for descriptive statistics). Results revealed no significant three-way interaction between sex, condition, and childhood SES on participants' body ideals ( $p = .55$ ). However, as predicted, there was a significant two-way interaction between priming condition and childhood SES on perceptions of the ideal female body size,  $\beta = .35$  ( $SE = .09$ ),  $t(116) = 3.08$ ,  $p = .003$ , semi-partial  $r^2 = .07$ . Simple slope tests revealed that for men and women in the harshness condition, lower childhood SES predicted a preference for a heavier female body,  $\beta = -.29$  ( $SE = .06$ ),  $t(119) = -2.53$ ,  $p = .01$ , semi-partial  $r^2 = .05$ . The opposite pattern was found for those in the control condition,  $\beta = .27$  ( $SE = .07$ ),

**Table 3**  
Descriptive Statistics (Study 3).

	Harshness		Control	
	M	SD	M	SD
Female Body Ideal				
Men	3.33	0.82	3.12	0.67
Women	3.10	0.67	3.03	0.66
Childhood SES				
Men	5.10	1.45	5.00	1.32
Women	5.41	1.41	5.13	1.14
BMI				
Men	25.42	3.86	22.98	2.39
Women	21.71	2.53	21.85	2.82



**Fig. 3.** Men's and women's perceptions of the ideal female body size as a function of priming condition (harshness vs. control) and childhood SES (Study 3). Plotted means represent one standard deviation above and below the mean of childhood SES. Error bars reflect the standard error.

$t(119) = 1.96$ ,  $p = .05$ , semi-partial  $r^2 = .03$ . Furthermore, examining the effects of harshness (vs. control) cues among participants with lower (1  $SD$  below the mean) and higher (1  $SD$  above the mean) childhood SES revealed a pattern of results consistent with Studies 1 and 2. Specifically, for individuals sensitized to a faster life history strategy in childhood (i.e., individuals with relatively low childhood SES), harshness cues increased the heaviness of their ideal female body relative to those in the control condition,  $\beta = -.34$  ( $SE = .17$ ),  $t(119) = -2.79$ ,  $p = .006$ , semi-partial  $r^2 = .06$  (see Fig. 3). This pattern persisted when analyses were conducted separately for each sex (see supplemental materials, available on the journal's website at [www.ehbonline.org](http://www.ehbonline.org)). No effect of priming condition was found, however, for men and women from relatively high SES backgrounds,  $p = .09$ .

#### 5. General Discussion

Researchers reliably find that individuals living in harsh, resource scarce ecologies idealize a heavier female body size than do individuals living in more stable, resource abundant environments (e.g., Calogero et al., 2007; Swami et al., 2010). Although these differences are generally explained in terms of media exposure (Swami et al., 2010), food storage (Ember et al., 2005), or resistance to starvation (Anderson et al., 1992; Marlowe & Westman, 2001; Nelson & Morrison, 2005; Swami et al., 2010), the results of the current studies suggest that this variation may also reflect the expression of divergent life history strategies. Specifically, we demonstrated that when local ecological conditions and developmental history each promote faster life history strategies, this convergence produces a preference for a heavier female body size. This finding provides novel insight into the relationship between ecological harshness and the heaviness of women's body size ideals. Additionally, this is some of the first evidence that timing of menarche – a physiological indicator of life history strategy – can influence experimental outcomes. In all, these results contribute to theory and research on life history development, evolutionary psychology, and factors influencing women's body attitudes and ideals (e.g., Griskevicius, Delton et al., 2011; Kenrick, Griskevicius, Neuberg, & Schaller, 2010; Miller & Maner, 2010; Navarrete, Fessler, Fleischman, & Geyer, 2009; Swami et al., 2010).

The current research also provides additional evidence that the motivational network underlying women's relationships with their bodies may be profoundly influenced by factors outside of their conscious awareness, including their ecologically- and

developmentally-contingent life history strategies. Indeed, these deeper evolutionary processes may drive the proximally-observed patterns of variation in female body weight norms as well as the heaviness of female models portrayed by local media which, themselves, are oftentimes implicated as the cause of women's body weight preferences. Understanding the evolutionary roots of these preferences may yield novel insights into how to best intervene when unhealthy eating patterns begin to emerge. Nearly 10% of American women have some form of eating disorder (University of North Carolina at Chapel Hill, 2008), while at the same time, the obesity rate – particularly among individuals living in low SES environments – has reached epidemic proportions. In 2008, more than 1.4 billion adults worldwide were overweight and over half a billion were classified as obese (World Health Organization, 2013). The current research may thus prove useful in developing novel means of promoting healthy body attitudes and eating behaviors for women at both ends of the spectrum.

### 5.1. Limitations and Future Directions

One limitation of the current research is that our participants were all college students. This sample is more likely to be from middle- and upper-class backgrounds and to be following relatively slow life history strategies (e.g., demonstrating delayed pubertal and reproductive timing). This restriction may have reduced our power to fully detect the extent of the relationship between life history stress and women's body preferences, as these effects are largely driven by women following faster strategies. Although future research is needed to examine these effects in more diverse populations, one of the strengths and contributions of the current work is the emergence and replication of this robust effect within samples of individuals who grew up in relatively advantaged socioeconomic contexts.

Because we were interested in the effects of life history stress on women's body ideals specifically, we did not examine actual behaviors that influence weight gain and loss. Of course, a life history perspective suggests that these stressors should have comparable effects on behaviors that influence energy intake and expenditure. Some preliminary support has been found for this hypothesis. For example, experimental research has revealed that women sensitized to faster strategies in childhood respond to life history stressors in adulthood by demonstrating psychological shifts that promote greater calorie consumption, whereas those sensitized to slower strategies show the opposite (Hill et al., 2013). Additional experimental research is needed to explore the mechanisms guiding these shifts and whether they influence other determinants of a woman's dynamic energy balance (e.g., activity level) and, ultimately, their fertility. Given that our results are predicated on changes believed to play a role in regulating reproductive fat, explicitly testing these relationships is a critical next step for this theoretical framework.

### 5.2. Conclusion

Researchers have consistently noted the direct relationship between harsh ecological environments (e.g., characterized by low SES, famine) and women's body weight ideals. Both within and across cultures, women and men from more harsh, lower SES environments idealize a heavier female body size than individuals from more benign, higher SES environments (Sobal & Stunkard, 1989; Swami et al., 2010). Although this discrepancy is often attributed to social and biological factors ranging from media exposure to starvation resistance, the current research provides evidence that these findings may also reflect fundamental differences in life history strategies based on stressors present in men's and women's childhood and adult environments.

## Supplementary Materials

Supplementary data to this article can be found online at <http://dx.doi.org/10.1016/j.evolhumbehav.2013.12.005>.

## Acknowledgments

We thank Naomi Ekas for statistical consulting and Anna Castle, Shannon Coffey, Victoria Dao, Lindsey Ethington, Emily Ferris, Eric Russell, Shannon Shiels, and Marissa Torres for their research assistance with this project.

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