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Original Article

PLAYBOY PLAYMATES, THE DOW JONES, CONSUMER SENTIMENT, 9/11, AND THE DOOMSDAY CLOCK: A CRITICAL EXAMINATION OF THE ENVIRONMENTAL SECURITY HYPOTHESIS

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Abstract
Drawing on evolutionary social psychology, Pettijohn and Tesser's (1999) Environmental Security Hypothesis (ESH) proposes that during threatening times, people seek mates with more mature features. Pettijohn and Jungeberg (2004) found that *Playboy* Playmates of the Year (PMOYs), who are determined partly by popularity, exhibited more mature features (older, taller, heavier, larger waist-to-hip ratios [WHRs], lower body mass indexes [BMIs]) during times of hardship. Their composite measure of hard times, however, was heterogeneous; it was unclear weather the effects were driven by economic (unemployment) or existential (suicides, homicides) hardships. The present study critically examined the ESH by replicating and extending Pettijohn and Jungeberg while distinguishing between economic and existential threats. Forty-eight years (1960-2007) of PMOY measures (age, bust, waist, hips, height, weight, WHR, and BMI), two economic measures (Dow Jones industrial average [DJIA], consumer sentiment index [CSI]), and two existential threat measures (pre-versus-post-9/11 years, Doomsday Clock changes) were analyzed. Changes in economic indexes were either unassociated (CSI) or contrary (DJIA) to the ESH, such that taller, heavier women were preferred during prosperous markets. Supporting the ESH, increases in existential threats such as nuclear annihilation (Doomsday Clock) were related to older women and lower BMIs. The efficacy of the ESH is discussed.

Keywords: anthropometry, economics, environmental security hypothesis, waist-to-hip ratio, body mass index, mortality salience, terror management theory, interrupted time-series analysis

In 1960, *Playboy* magazine's inaugural Playmate of the Year (PMOY) had a curvaceous waist-to-hip ratio (WHR) of 0.57, whereas the 2007 PMOY had a comparatively less curvy WHR of 0.77—an increase in WHR of over 35%! Given that PMOYs are chosen in part by *Playboy*'s readers, does this shift suggest that men's mate

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preferences for women's bodies have changed over time? More importantly, are such shifts meaningful? Specifically, do people's mate preferences change over time as a function of changing environmental conditions? And what conditions precipitate such changes?

One theory that may elucidate such questions is Pettijohn and colleague's Environmental Security Hypothesis (ESH; Pettijohn, 2003; Pettijohn & Jungeberg, 2004; Pettijohn & Tesser, 1999, 2003, 2005). The ESH draws on evolutionary and social psychology to predict that people's mate preferences will adapt to changing socioeconomic conditions. Specifically, the ESH predicts that men will prefer younger, shorter, lighter, more curvaceous (i.e., lower WHR and higher bust-to-waist ratio [BWR]) women with more body fat (i.e., higher body mass index [BMI]) when socioeconomic conditions are promising. Inversely, the ESH predicts that men will prefer older, taller, heavier, less curvaceous women with less body fat when socioeconomic conditions are threatening. The rationale behind this prediction is that, during times of socioeconomic hardship, energy directed at acquiring the resources necessary for survival may be more adaptive than energy spent on reproduction. Men may prefer taller, more mature women to help them collect and protect resources during hard times. In contrast, during times of socioeconomic prosperity, energy can be redirected toward reproduction because day-to-day sustenance is less of a concern. Men may prefer younger, more curvaceous women because of their increased reproductive value during times of plenty.

Several empirical studies have supported the ESH. Most of these studies have focused on preferences for women's facial characteristics (Pettijohn & Tesser, 1999, 2003, 2005). Historically, during difficult socioeconomic times, popular female film actresses had more mature features (e.g., small eyes, thin cheeks, large chins), whereas during prosperous economic times, female actresses had more neotenous or baby-faced features (e.g., large eyes, prominent cheeks, small chins; Pettijohn & Tesser, 1999); however, this trend was not evident for popular film actors' facial features (Pettijohn & Tesser, 2003). Nevertheless, male actors, but not older actors, were preferred during socioeconomic downturns, showing mixed support for the ESH (Pettijohn, 2003). When threat was manipulated in two laboratory experiments by making participants believe they were to receive either benign or harmful shocks, male and female participants under threat preferred photos of women with decreased eye size, whereas when threat was absent, they preferred women with increased eye size (Pettijohn & Tesser, 2005).

Pettijohn and Jungeberg (2004) extended the ESH to examine men's preferences for women's body shapes by examining the historical relationship between socioeconomic trends and characteristics of women selected to be *Playboy*'s PMOY from 1960 to 2000. The ESH was generally supported. Not only did PMOYs have more mature facial features during hard times (i.e., smaller eye heights, widths, and areas), but PMOYs also had more mature body features during hard times (i.e., older, taller, and heavier with larger waists and WHRs, and smaller hips, BWRs, and BMIs). One potential limitation of Pettijohn and Jungeberg's research, however, was that its composite measure of "general hard times" included so many variables (nine) that it was difficult to determine whether the effects were driven by social changes (marriage rate, birth rate, divorce rate), economic fluctuations (unemployment rate, disposable personal income, consumer price index), or existential threats (death rate, suicide rate, homicide rate).

Although Pettijohn and colleagues have been the only researchers to examine the ESH empirically, research performed by other investigators has either supported or refuted the underlying tenets of the ESH. For example, by comparing models in magazines targeted toward men (*Playboy*) or women (*Vogue*), Barber (1998a) showed not only that men preferred more curvaceous women than did women (assessed via BWR), but also that men's preferences for curvaceous women were more consistent over time than women's preferences for the same. Inconsistent with the ESH, however, Barber (1998b) also showed that prosperous economic times (increases in the Standard and Poor's stock market index and per capita gross national product) were associated with less curvaceousness in *Playboy* models, as indexed by positive correlations with WHR over a 20-year span. Recall that difficult times, not prosperous times, were positively correlated with WHR in Pettijohn and Jungeberg's (2004) more comprehensive study. Despite this inconsistency, cross-cultural research has peripherally supported the ESH by showing that people's attitudes toward women's fatness varied substantially from culture to culture, and a nontrivial amount of this variation was explained by socioecological variables, suggesting that men's preferences for women's body fat may be context-dependent (Anderson, Crawford, Nadeau, & Lindberg, 1992). More recently, a series of four studies showed that men's preferences for women's weight was contingent on whether they felt poor (vs. wealthy) or hungry (vs. full; Nelson & Morrison, 2005; see also Nelson, Pettijohn, & Galak, 2007). The direction of these effects was consistent with the ESH, such that men with fewer resources (less money or food) preferred heavier women.

Although the ESH provides a powerful theoretical framework for explaining how evolutionary and socioeconomic pressures interact to produce dynamic, adaptive mate preferences, the studies that have tested it are not without their limitations. First, no one other than Pettijohn and his coauthors have empirically tested the ESH. Thus, it might benefit from a critical examination by other researchers. Second, and more importantly, Pettijohn and Jungeberg's (2004) study did not distinguish among social, economic, and existential threats contained in its "general hard times" measure. Thus, a more detailed investigation that attempts to tease apart economic and existential stressors may help explain more precisely why men's preferences for women's body features shift over time. Given these limitations, and the theory and empirical research described above, three specific predictions were developed for the present study:

1. Replicating and extending Pettijohn and Jungeberg (2004), prosperous economic times (as indexed by the Dow Jones industrial average [DJIA] and the Consumer Sentiment Index [CSI]) will be positively correlated with hip circumference, BWR, and BMI, and negatively correlated with age, height, weight, waist circumference, and WHR in *Playboy* PMOYs over a 48-year span (1960-2007).
2. It is further predicted that a more explicit—and inverse—measure of existential threat (minutes until midnight on the Doomsday Clock, which is a consensus measure of the likelihood of nuclear annihilation), will also be positively correlated with hip circumference, BWR, and BMI, and negatively correlated with age, height, weight, waist circumference, and WHR in *Playboy* PMOYs over time.
3. On an exploratory basis, it is also predicted that another existential threat—the terrorist attacks of September 11, 2001—will be associated with either intercept or slope shifts (assessed via interrupted time-series analyses) in preference for PMOYs over time, such that after the attacks,

men will tend to prefer older, taller, heavier women with larger waists and WHRs, and smaller hips, BWRs and BMIs.

Method

Sample and Procedure

Following Pettijohn and Jungeberg (2004), anthropometric data were collected on *Playboy* PMOYs. These variables included bust, waist, and hip circumferences (inches), WHR and BWR, height (inches) and weight (pounds), BMI (BMI = 703 x weight / height^2), and age (years; Table 1). Data from Pettijohn and Jungeberg's Appendix and Wikipedia.org (http://en.wikipedia.org/wiki/List_of_Playmates_of_the_Year) were used. The year 1960 was chosen because it was the first year the title of PMOY was conferred; 2007 was chosen because it was the most recent year at the time of this study. According to Pettijohn and Jungeberg:

> "Hef [Hugh Hefner, *Playboy*'s owner] chooses the PMOY after taking into account votes cast by readers" (http://www.playboy.com/playmates/faq/pmoy.html). Subscribers send letters to *Playboy* expressing their preference for particular Playmates during the year and Playboy regularly provides a more formal voting opportunity to help decide who becomes Playmate of the Year. In previous years, this voting has taken place by mail, telephone, and the Internet. Although Mr. Hefner makes the final determination, popular opinion is ultimately expressed through his choice. (p. 1189)

Thus, popular sentiments appear to play a crucial role in choosing PMOYs. In other words, PMOY characteristics can be viewed as a tacit endorsement of bodily features at the time.

Whereas Pettijohn and Jungeberg (2004) used a broad composite measure of "general hard times" that confounded socioeconomic and existential threats, the present study used two common measures of economic health and two unique measures of existential threat. The two economic measures were (a) annual percentage change in the Dow Jones industrial average (DJIA) stock market index and (b) the consumer sentiment index (CSI), which is a monthly consumer confidence index published by the University of Michigan (http://www.sca.isr.umich.edu/data-archive/mine.php; it is normalized to have a value of 100 in December 1964). Because these economic indicators were collected in August 2007, the annual percentage change in the DJIA was estimated as the percentage change for the first six months of 2007. Similarly, the CSI for 2007 was estimated by using the first six months of data. The DJIA was chosen because it is a widely cited measure of economic market health that is a composite of 30 leading "blue-chip" corporations. Annual percentage change was chosen because (a) percentage change over time in the DJIA is a more meaningful metric than actual numeric changes and (b) the ESH would predict that relative shifts in economic hard times would be more influential on mate preferences that absolute shifts. The CSI was chosen because it provides a broad measure of consumer confidence in the United States economy.

Table 1: Descriptive Statistics, Zero-Order Correlations (above the Diagonal), and Partial Correlations Controlling for Year (below the Diagonal) for Economic, Existential, and Anthropometric Variables from 48 *Playboy* Playmates of the Year (1960-2007)

Variable	Mean	*SD*	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Year	1983.50	14.00	.19	.12	**.57**	-.03	**.32**	**-.52**	**.31**	**-.31**	**.33**	.10	**.55**	**-.61**	**-.35**
2. DJIA	7.54	15.41	—	.15	-.04	.05	.01	.20	.24	.08	**.41**	**.35**	.19	-.08	-.05
3. CSI	88.17	10.87	.13	—	.05	.01	.02	-.12	-.16	-.06	-.10	.01	-.11	.07	.16
4. 9/11	–0.75	0.67	-.19	-.02	—	-.24	.17	**-.46**	.10	-.25	-.21	-.28	**.30**	**-.36**	-.14
5. Doom	9.06	3.83	.05	.02	-.27	—	**-.35**	.15	.09	.23	.02	.22	-.08	.01	**.30**
6. Age	22.54	2.85	-.05	-.01	-.01	**-.36**	—	**-.30**	.22	-.09	.24	.09	.28	**-.38**	-.22
7. Bust	35.42	1.44	**.36**	-.07	-.24	.15	-.17	—	.13	**.46**	.09	**.33**	-.20	**.50**	**.40**
8. Waist	23.50	1.34	.19	-.21	-.11	.10	.13	**.36**	—	**.39**	**.43**	**.49**	**.74**	**-.79**	.12
9. Hips	35.07	1.37	.15	-.03	-.09	.24	.01	**.37**	**.54**	—	.27	**.57**	**-.33**	-.04	**.51**
10. Height	66.77	2.36	**.38**	-.15	**-.51**	.04	.15	**.33**	**.37**	**.41**	—	**.79**	.24	**-.34**	-.24
11. Weight	117.48	8.95	**.34**	.00	**-.41**	.22	.06	**.44**	**.48**	**.64**	**.80**	—	.09	-.23	**.41**
12. WHR	0.67	0.04	.10	-.22	-.03	-.07	.13	.12	**.72**	-.20	.08	.04	—	**-.78**	-.23
13. BWR	1.51	0.10	.05	.18	-.03	-.01	-.25	.27	**-.80**	**-.31**	-.18	-.22	**-.67**	—	.14
14. BMI	18.52	0.89	.01	.22	.07	**.31**	-.12	.27	.26	**.45**	-.14	**.48**	-.05	-.09	—

Note. DJIA = Annual percentage change in the Dow Jones Industrial Average. CSI = Consumer Sentiment Index. 9/11 = Years before and including (-1) or after (+1) 2001. Doom = Doomsday Clock (min to midnight). WHR = Waist-to-hip ratio. BWR = Bust-to-waist ratio. BMI = Body Mass Index. All other non-ratio measures appear in standard U.S. units (inches, pounds). Boldfaced correlations are significant (*p*s < .05) and exceed .30 in absolute magnitude. *N* = 48.

The two measures of existential threat were (a) pre-versus-post-9/11 years (i.e., 1960-2001 vs. 2002-2007) and (b) changes in the Doomsday Clock over time (http://www.thebulletin.org/minutes-to-midnight/timeline.html). The Doomsday Clock is an inverse consensus measure of the likelihood of nuclear annihilation, where fewer minutes to midnight indicate that catastrophic destruction in increasingly imminent. The Board of Directors of the Bulletin of the Atomic Scientists at the University of Chicago determines changes in the Doomsday Clock's minutes to midnight. The Doomsday Clock was chosen because it provides a temporal, quantitative measure of existential threat via nuclear annihilation. The events of September 11, 2001 were chosen because they represent the fairly recent—and seemingly omnipresent—threat of existential terror.

Data Analysis

Two general types of analyses were run to test the predictions. First, correlation and partial correlation analyses (controlling for time) were run to examine the direction and strength of the relationships among the PMOY anthropometrics, the economic measures, and the existential threats. Controlling for time (year) was important because it accounted for temporal changes in the measures of interest that might otherwise bias their underlying relationships. Second, a series of exploratory interrupted time-series analyses (see Shadish, Cook, & Campbell, 2002) were conducted. These analyses addressed the prediction that the events of September 11, 2001 would change the mean (intercept shift) or change-over-time trajectory (slope shift) of the PMOY anthropometrics as a result of existential threat (see Appendix for details).

Results

Preliminary Analyses

Over linear time, PMOYs became significantly older and taller with larger waists and WHRs, and smaller breasts, hips, BWRs and BMIs; only weight remained constant (Table 1). Because time was confounded with nearly every PMOY characteristic, partial correlations that controlled for time were tested in addition to simple, zero-order correlations.

Correlations

Descriptive statistics for all measures, as well as zero-order and partial correlation matrices (controlling for year), are shown in Table 1. Although the dichotomous 9/11 variable was included in the correlation matrices for completeness, note that correlations involving this variable are point-biserial correlations; more formal test of the 9/11 effect are presented later as interrupted time-series analyses.

Inconsistent with the ESH, annual percentage increases in the DJIA were related to taller, heavier women, rather than shorter, lighter ones (Figures 1 and 2, respectively). Increases in the DJIA were also related to bustier women (Figure 3); however, Pettijohn and Jungeberg (2004) made no specific prediction regarding the ESH and men's preferences for women's bust sizes.

Crucially, when the Doomsday Clock loomed closer to midnight and presumed nuclear annihilation, older women and women with lower BMIs were preferred (Figures 4 and 5, respectively). Note the strength of the age-Doomsday relationship was due in part to two potential outliers (i.e., two women who were in their 30s; see hollow circles and shallower slope in Figure 4); however, excluding both cases did not substantially alter the strength of the partial relationship ($pr = -.28$, $p = .06$).

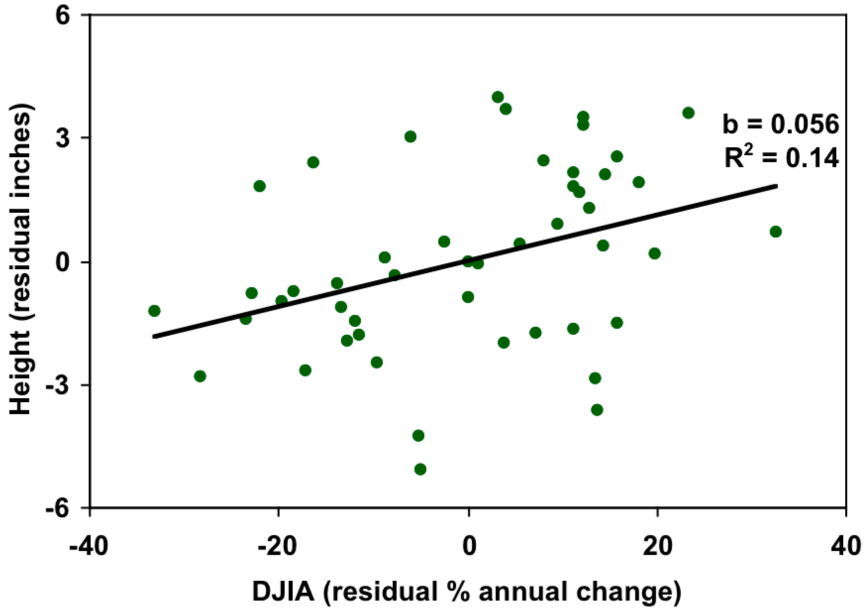

Figure 1 – PMOY height as a function of DJIA percentage changes, controlling for year.

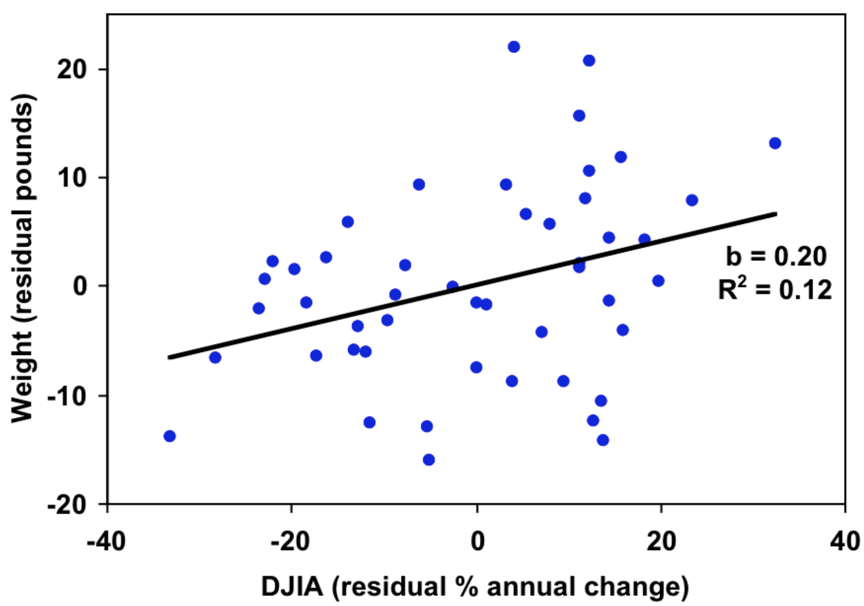

Figure 2 – PMOY weight as a function of DJIA percentage changes, controlling for year.

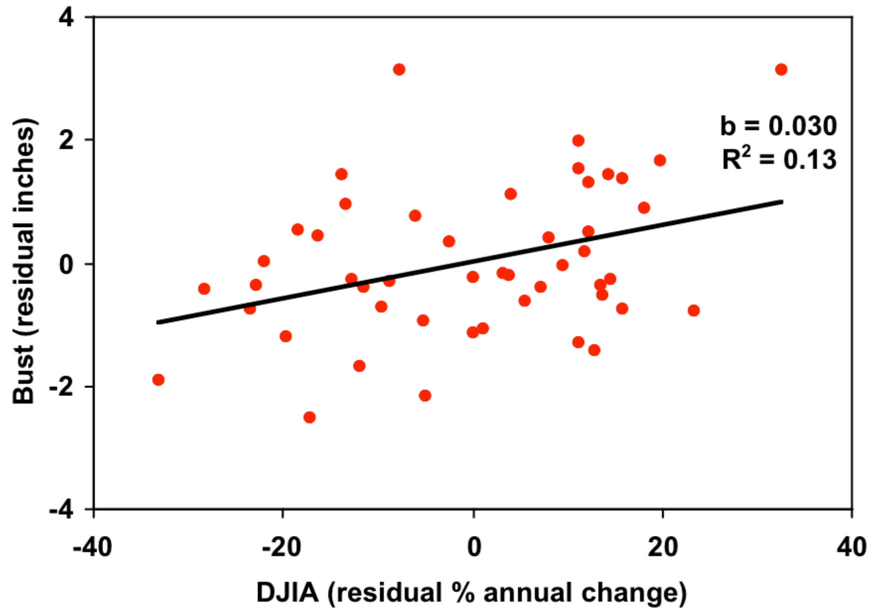

Figure 3 – PMOY bust sizes as a function of DJIA percentage changes, controlling for year.

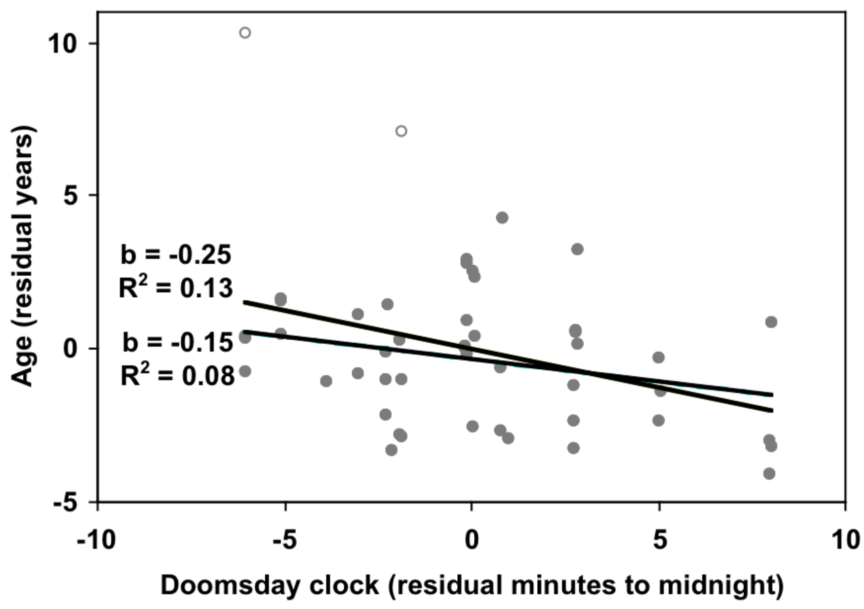

Figure 4 – PMOY age as a function of Doomsday Clock changes, controlling for year. The upper slope and statistics include two potential outliers (PMOYs over 30 years old; grey hollow circles); the lower slope and statistics exclude these two cases.

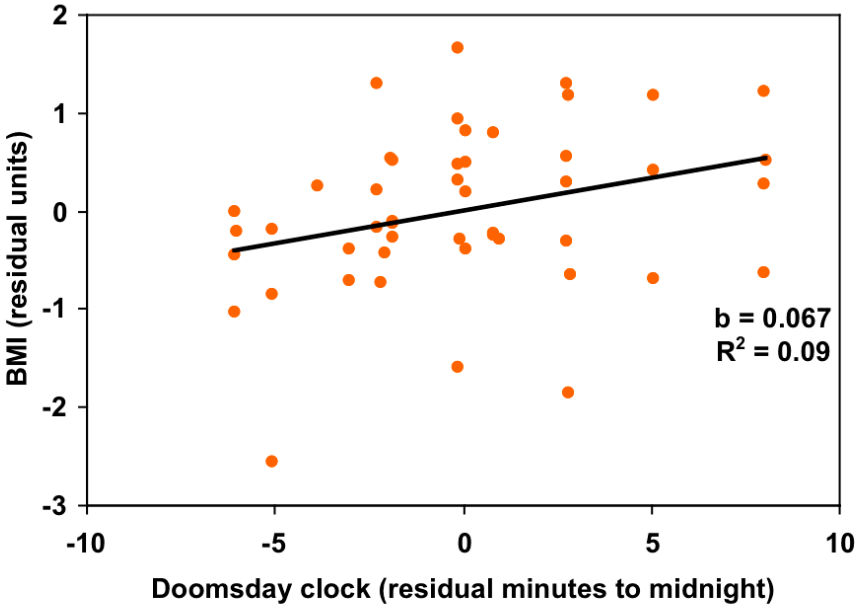

Figure 5 – PMOY BMI as a function of Doomsday Clock changes, controlling for year.

Interrupted Time-Series Analyses

The interrupted time series analyses also yielded mixed support for the ESH (Table 2). First, inconsistent with the ESH, shorter, lighter women were preferred after 9/11, rather than the tall, heavier women that ESH would predict during threatening times (Figures 6 and 7, respectively). After 9/11, less busty women were also preferred, albeit marginally so (p = .11; Figure 8); however, recall that Pettijohn and Jungeberg (2004) made no specific prediction regarding the ESH and men's preferences for women's bust sizes. Second, supporting the ESH, after 9/11, the change-over-time slope for hip circumference was marginally (p = .10) more negative than it was before 9/11 (Figure 9), suggesting that the existential threat of terrorism may have shifted men's preferences over time toward favoring women with smaller hips.

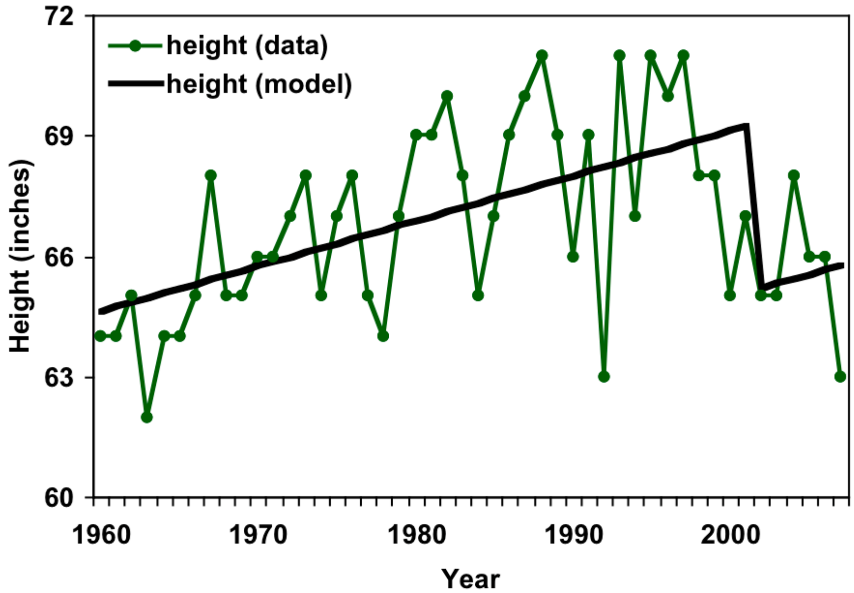

Figure 6 – PMOY height as a function of time and the September 11, 2001 terrorist attacks.

Table 2: Interrupted Time-Series Regression Results for the Effects of September 11, 2001 on Anthropometric Variables from 48 *Playboy* Playmates of the Year (1960-2007)

	Bust (inches)			Hips (inches)			Height (inches)			Weight (pounds)		
	b	*T*	*pr*	*b*	*t*	*pr*	*b*	*t*	*pr*	*b*	*t*	*pr*
						Step 1: Intercept shift						
Intercept	34.31	114.0*	.99	34.46	105.8*	.99	67.24	139.1*	.99	116.9	57.07*	.99
Year	-0.04	-2.52*	-.35	-0.02	-1.46	-.21	0.11	4.51*	.56	0.24	2.30*	.32
9/11	**-0.53**	**-1.63‡**	**-.24**	**-0.22**	**-0.64**	**-.09**	**-2.07**	**-3.97***	**-.51**	**-6.62**	**-2.99***	**-.41**
						Step 2: Slope shift						
Intercept	34.69	64.24*	.99	35.26	61.75*	.99	67.80	78.11*	.99	119.1	32.35*	.98
Year	-0.16	-1.10	-.16	-0.28	-1.82†	-.27	-0.07	-0.30	-.05	-0.48	-0.48	-.07
9/11	-0.17	-0.31	-.05	0.54	0.94	.14	-1.53	-1.76†	-.26	-4.50	-1.22	-.18
Year×9/11	**-0.12**	**-0.84**	**-.13**	**-0.26**	**-1.68†**	**-.24**	**-0.19**	**-0.79**	**-.12**	**-0.72**	**-0.72**	**-.11**

Note. Effects of interest appear in boldface.
‡$p \leq .11$. †$p \leq .10$. *$p \leq .05$.

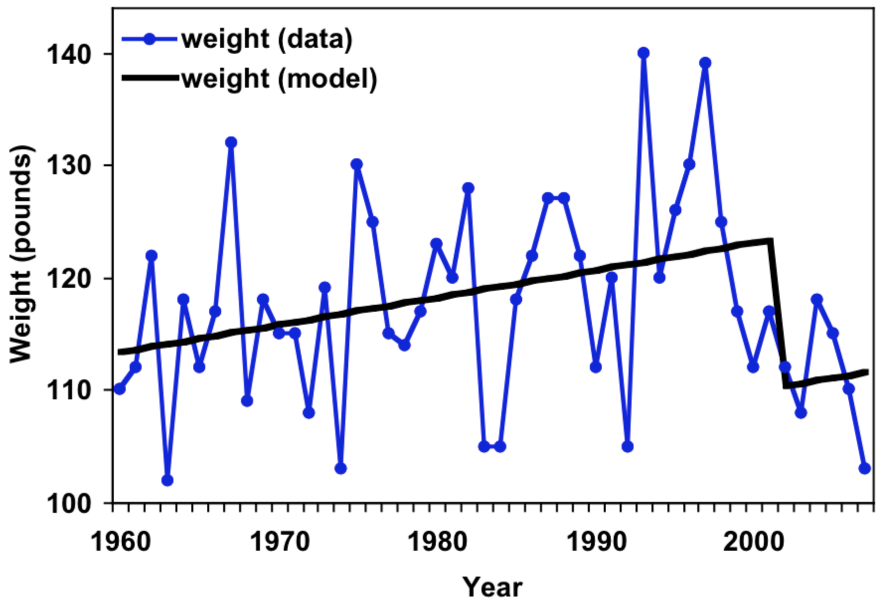

Figure 7 – PMOY weight as a function of time and the September 11, 2001 terrorist attacks.

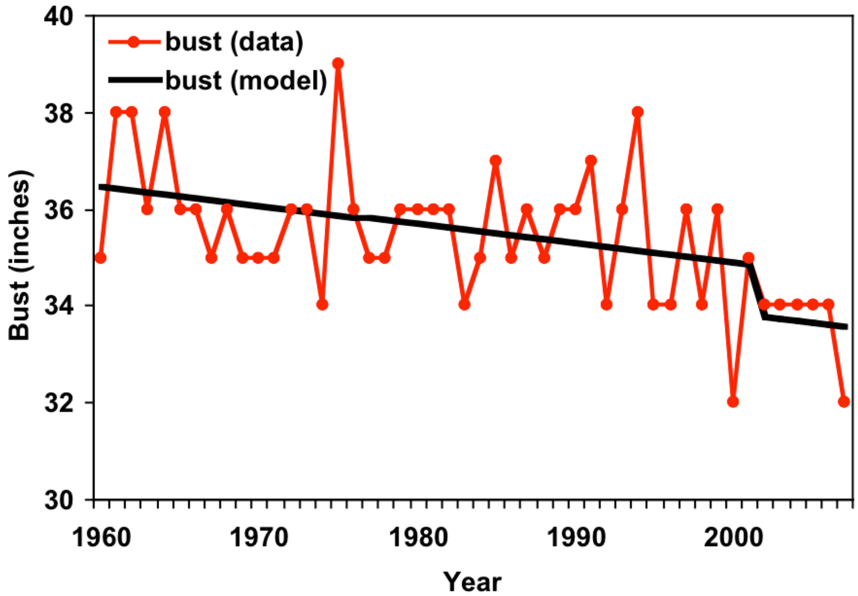

Figure 8 – PMOY busts as a function of time and the September 11, 2001 terrorist attacks.

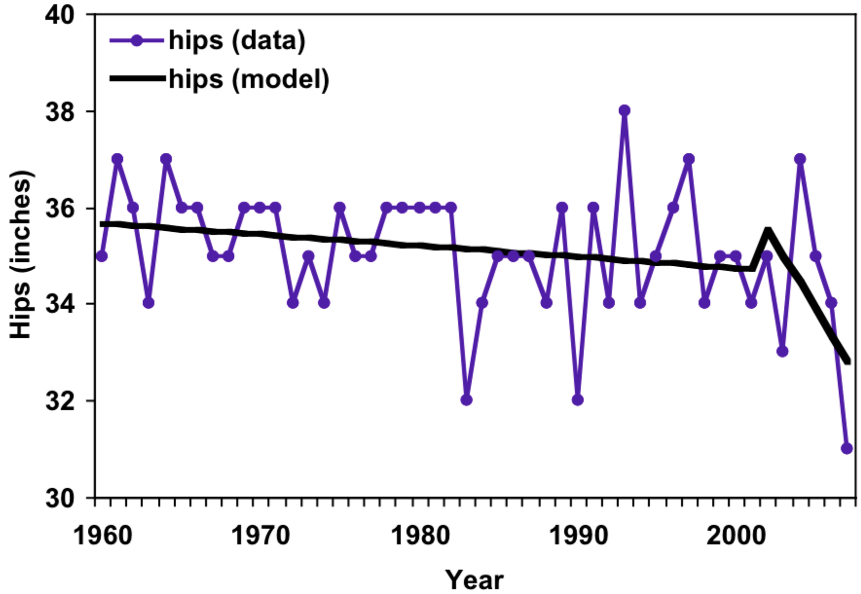

Figure 9 – PMOY hips as a function of time and the September 11, 2001 terrorist attack.

Discussion

Support for the ESH was mixed. Inconsistent with the ESH, partial correlations controlling for time revealed that annual percentage increases in the DJIA were related to men's preferences for taller, heavier women instead of shorter, lighter women. Although Pettijohn and Jungeberg (2004) made no a priori predictions for PMOY bust sizes, the positive partial correlation between the DJIA and bust circumference may nevertheless support the ESH, because bust size is positively related to BMI, and higher BMIs are theorized to be preferred in prosperous times. Consumer confidence (SCI) was unrelated to PMOY anthropometrics. Supporting the ESH, however, the existential threat of impending nuclear annihilation was related to men's preferences for older women with less body fat (i.e., lower BMIs). Thus, according to the ESH, economic and existential threats were differentially associated with men's preferences for women's ideal body characteristics.

The exploratory interrupted time-series analyses used to test the 9/11 effects were similarly mixed. Inconsistent with the ESH, men's preferences shifted to prefer shorter, lighter women following the 9/11 terrorist attacks instead of taller, heavier women. Despite being inconsistent with the ESH, these results were consistent with the correlations among the DJIA, height, and weight. In contrast, supporting the ESH—albeit marginally so (*p*s $\leq$ .11)—men tended to prefer less busty women immediately following the 9/11 terrorist attacks, and men's preferences tended to shift toward preferring increasingly smaller women's hips over time following the attacks.

In concert, none of the three predictions received unequivocal support, although each of the three saw partial support for the ESH. Taller, heavier women were not preferred following either economic or existential threat—in fact, the opposite was true. In contrast, women with more body fat—larger bust circumferences and BMIs—were preferred by men during times of high economic prosperity and low likelihood of nuclear annihilation, respectively.

The generalizability of these findings should be carefully circumscribed. First, the stimuli used in this study represent a unique sample—playmate models chosen in part by readers of *Playboy*—and are unlikely to adequately represent the full diversity of individual differences in men's preferences for women's bodies. Second, although readers vote on PMOYs, the pool of 12 Playmates of the Month from which they are chosen are not picked by *Playboy* readers. Thus, although PMOYs may reflect current popular preferences, the initial pool of playmates is probably far more homogeneous in their bodily characteristics than a random sample of women. Nevertheless, the fact that this selection process leads to a stimulus sample with comparatively little variance over time can only work against the detection of significant effects, because restricting the range of a variable only reduces statistical power. Moreover, other influential studies that have examined men's preferences for women's bodies have been based on similarly modest stimulus samples of a dozen or so photos or line drawings (e.g., Singh, 1993), Third, the present findings should only generalize to North American male readers of *Playboy*. It remains unclear whether these results would replicate in other cultures where access to sexual imagery is repressed or where economic and existential threats are far more pressing. Finally, the present study specifically focused on men's preferences for women's bodies rather than faces. Although both social and evolutionary psychologists have made great strides in understanding what makes faces attractive and why (e.g., Cunningham, 1986; Rhodes, 2006), to speculate on whether distinguishing between economic and existential threats are important to shifts in men's preferences for women's facial features remains premature and is beyond the scope of the present research.

As with any correlational investigation of archival data, this present study has a few potential limitations. First and foremost, the critical-thinking mantra of "correlation does not imply causation" cannot be stressed enough. Although care was taken to control for at least one possible confound—common covariation with linear time—it is certainly possible that some of the observed correlations represent spurious relationships that may be more accurately attributed to a "third-variable" explanation. For example, the present study did not assess the role that mass media may play in influencing standards of bodily attractiveness for women (see Silverstein, Perdue, Peterson, & Kelly, 1986). Nevertheless, correlation is a necessary—although certainly not sufficient—condition for causation, and some of the observed relationships are at least compelling enough to warrant further investigation. For example, future studies should strive to employ experimental threat manipulations (Pettijohn & Tesser, 2005; Pettijohn, Walzer, & Yerkes, 2007; Walzer, Pettijohn, & Sacco, 2007) in the context of examining men's preferences for women's bodily characteristics. Such an experiment could be accomplished using line drawings of women's WHRs and body fat (Singh, 1993; Tassinary & Hansen, 1998) or actual photographs of women's bodies (Braun & Bryan, 2006; Perilloux, Webster, & Gaulin, 2007) as targets.

Second, it is not entirely clear how much of an influence the probability of nuclear annihilation (as measured via Doomsday Clock changes) has on people's day-to-day psychological functioning. Although small shifts in the Doomsday Clock probably have little impact, few would argue that larger shifts—such as those associated with key nuclear treaties signed between the United States and the Soviet Union in the 1980s—did not assuage people's fears of being instantly vaporized without warning. A more salient existential threat measure might be the United States Department of Homeland Security's color-coded National Threat Advisory System, which represents a five-point ordinal scale ranging form *low* (green) to *severe* (red). Unfortunately, the System has only been in use since 2002. Thus, there were too few time points available to allow for meaningful analyses. Future studies of the ESH may wish to use the System as a measure of existential threat.

Another potential limitation of the present research is that the interrupted time-series analyses had relatively little statistical power to detect reliable effects because there were only six post-9/11 data points (2002-2007). The recommend number of observations appearing after an event of interest in a typical interrupted time-series design is usually much higher (Shadish et al., 2002). Thus, the parameter estimates derived from these analyses may be somewhat unstable, which is why they were labeled as "exploratory." More definitive tests of the 9/11 effect can be conducted in the future as more data points become available over time. Nevertheless, although two of the effects of interest attained only marginal significance (ps ≈ .10, two-tailed), it is noteworthy that their corresponding effect sizes were on the moderate end of the small-to-moderate range (both prs = –.24). In other words, despite the lack of post-9/11 data points, the effect sizes that supported the ESH were clearly non-trivial in magnitude.

A broader theoretical implication of the present findings is that distinguishing between economic and existential threats reveals a clearer picture of changes in men's preferences for women's body features as a function of changes in environmental security. From an evolutionary perspective, economic threats are threats to resources. According to evolutionary psychology, men's reproductive success is at least partially determined by the resources they possess (Buss & Schmitt, 1993). Because of biologically-based sex differences in reproductive and parental investment costs (it is more costly for women to reproduce and raise children than men; Trivers, 1972), women often prefer men with resources to help them raise offspring. Thus, economic threats may be particularly salient to men who are currently trying to attract or keep a mate. In contrast, existential threats are threats to survival. Without survival, reproduction is simply impossible. Thus, although changes in both economic and existential threats should be related to shifts in men's mating preferences, changes in existential threats should typically be the more salient of the two. This distinction was at least partially supported by the current investigation. One limitation of scope of the present research is that it did not investigate the extent to which social threats may influence men's preferences for women's bodies. Future studies may wish to study whether shifts in men's individual or coalitional status are related to shifts in their preferences for women's bodies.

On a more specific theoretical level, the current results imply that men's preference for women's height and weight may not reflect the ESH as it was originally conceived. In contrast, the ESH was clearly supported for shifts in men's preferences for women's body fat: Not only did men prefer bustier women during economic prosperity, but they also preferred younger women with higher BMIs during less-life-threatening times. Together, these results suggest men are able to adaptively adjust their preferences for women's ages and fat distribution as environment conditions warrant. But why are a woman's age and fat distribution so important?

In general, what humans find to be physical attractive has been regarded as healthy-looking (Weeden & Sabini, 2005) and, evolutionary speaking, attractiveness is in the adaptations of the beholder (Sugiyama, 2005). Thus, a woman's age and fat distribution are important to men because they are two crucial signals of her reproductive value. Men generally prefer younger women as mates because they are typically more fertile than older women and, assuming a long-term relationship, can produce more children over time than older women (Buss, 1989; Buss & Barnes, 1986; Symons, 1979). Developmental increases in women's body fat distribution are correlated with increased health (Folsom et al., 1993), fertility (Zaadstra et al., 1993), and cognitive ability (Lassek & Gaulin, 2008). Thus, from an evolutionary perspective, it is reproductively advantageous for men to attend to individual differences in women's ages and body fat that are adaptively congruent with environmental conditions. Indeed, Nelson and Morrison (2005) found that even temporary affective states associated with feeling poor or hungry were able to sway men's mating preferences in an adaptive direction—toward preferring heavier women.

In addition to being consistent with evolutionary theory, the present findings also dovetail with social psychological perspectives on mortality salience. Specifically, some of the existential threat results are consistent with terror management theory (TMT; Solomon, Greenberg, and Pyszczynski, 1991). TMT examines the emotional, cognitive, and behavioral reactions of people when they are reminded of their mortality. When notions of mortality are salient, TMT theorizes that people experience psychological terror, and this sense of terror often alters their thoughts, motivations, and behaviors. In the present context, one could argue that mortality salience may mediate the observed relationships between changes in environmental security (e.g., increased likelihood of terrorist attacks or nuclear annihilation) and corresponding changes in men's mate preferences for women's body features. Recent work suggests that TMT is compatible with an adaptive, evolutionary perspective (Landau, Solomon, Pyszczynski, and Greenberg, 2007); however, other researchers suggest that coalitional psychology may provide a better account of some TMT effects (Navarrete and Fessler, 2005). Nevertheless, future researchers of the ESH may wish to integrate aspects of TMT as possible psychological mechanisms of mediation.

In conclusion, although support for the ESH was mixed, the present findings show that men's preferences for women's body types may indeed adapt to environmental conditions. Although women's preferences for men's body types may exhibit shifts over the menstrual cycle (Thornhill, Gangestad, and Garver-Apgar, 2004), it appears that men's preferences for women's body types may exhibit their own shifts as a function of changes in existential threats and the resource availability. Thus, the ESH remains a viable theoretical perspective that deserves attention from evolutionary and social psychologists alike. It is hoped the present research will not only expose evolutionary psychologists to the ESH, but also inspire them to examine its efficacy in novel contexts using a variety of innovative methods.

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Appendix: Analyses of Interrupted Time Series

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A detailed discussion of interrupted time-series designs and analyses can be found in Shadish et al. (2002). Essentially, interrupted time-series designs are a family of quasi-experimental methods whereby the dependent variable (DV) is measured repeatedly over several (preferably equal) intervals of time (Time) and the independent variable (IV) often represents a single important (often historical) event or the presence or absence of something important over the course of the time series (e.g., an influential new work is published, a terrorist attack occurs, a new law is passed, a drug is administered, etc.). The IV is typically coded dichotomously, with dummy codes (0, 1) or effects codes (–0.5, 0.5) representing observations before and after the event of interest. The first step tests for an intercept shift by regressing the DV onto Time and the IV simultaneously. The effect of interest is the IV, which tests the intercept shift—the extent to which the IV's introduction is associated with a discontinuity in the regression line over time. The second step is to tests for a slope shift by regressing the DV onto Time, the IV, and the Time x IV interaction simultaneously. The effect of interest is the interaction, which tests the slope shift—the extent to which the change-over-time slope differs before and after the introduction of the IV. Any combination of null and significant effects for intercept and slope shifts is possible (Figure 3). Mean-centering the time variable (by subtracting its mean from each observation) and the IV (by using effects codes [–0.5, 0.5] instead of dummy codes [0, 1]) can often aid in the interpretation of the regression coefficients.

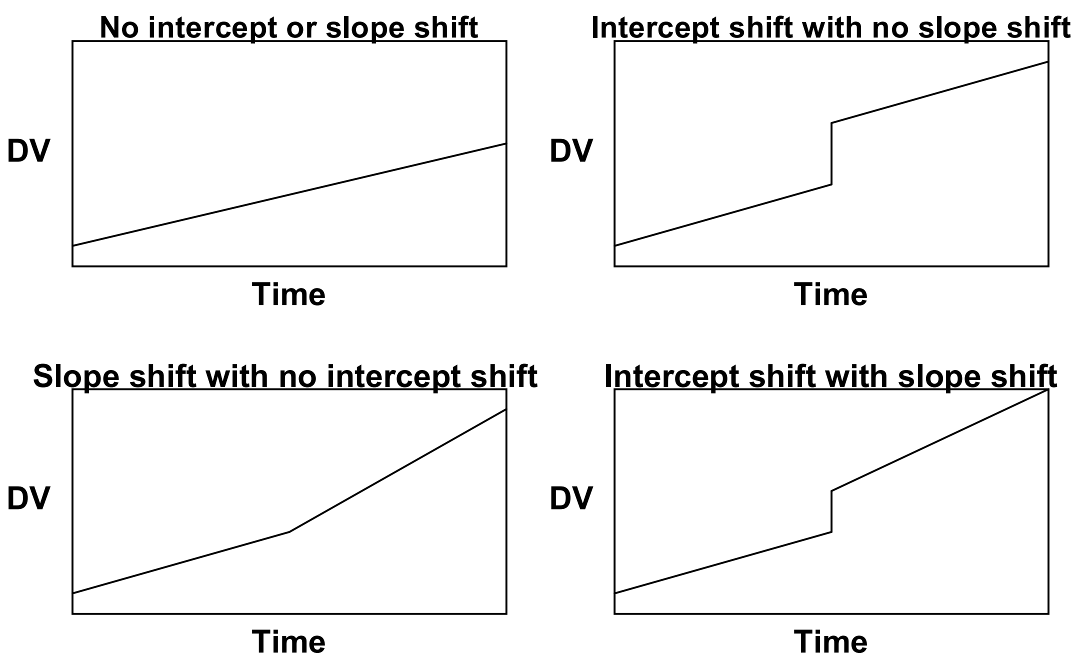

Figure 10 – A schematic diagram of four possible interrupted time-series outcomes.