

Research Article

Female Choice and Male Stoicism

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Abstract Men consistently report that they are healthier than women but have higher mortality rates. We hypothesized that men were sexually selected to present themselves as healthy to possible mates, according to predictions from health selection theory. The present study tested this theory by contrasting known influences of female mate choice with male's reactions to a health problem (flu symptoms, reaction to vog (air pollution associated with volcanic emissions in the Hawaiian islands) or a headache). Participants viewed three sets of slides contrasting male facial symmetry, physique, and status with stoicism (defined as ignoring a health problem) and were asked to choose which male they preferred as a long-term or a short-term mate. Participants preferred stoic men who worked even though they were experiencing health problems as long-term mates, disregarding the male's facial symmetry and physique. Status also significantly affected long-term mate choice. In short-term mate choice, participants shifted their preferences to symmetrical faces and mesomorphic bodies, signals of attractiveness, disregarding stoicism. In conclusion, our data provide support for health selection theory. Additionally, preventive health measures directed at men should recognize their reluctance to recognize minor health problems and focus on techniques that enhance men's perception of their health symptoms.

Keywords evolutionary medicine; stoicism; symmetry; physique; prestige; health selection theory

1. Introduction

It might well be axiomatic that “women get sick, and men die” [1]. While it is true that men have higher mortality rates at most, if not all, ages than women [2,3], this is not the only gender difference in health. Men self report better health [4,5] and higher quality of life than women [6,7], regardless of their increased mortality rates. Consequently, despite the fact that men die at younger ages than women, men are not correspondingly reporting poorer health. In fact, they are doing quite the opposite; men appear to disregard their health problems to their overall detriment. For example, more men died in the H1N1 epidemic in New Mexico despite the fact that similar number of males and females were admitted to the hospital [8], of trauma-related shock [9] and of cardiovascular disease [10].

Brown et al. [11] in health selection theory hypothesized that the perceived good health and quality of life in men resulted partly from women's intersexual selection of male

partners. It was theorized that women preferred stoic men who presented themselves as healthy mates. Stoic men also have traits that aid them in male competitive interactions such as risk taking because stoicism is the ability to endure hardship without complaint. Brown et al. [11] argued that women who selected mates who worked and hunted despite fatigue and illness produced more surviving offspring than women who did not select such stoic mates. This selection process ultimately resulted in men, consciously or unconsciously, disregarding some signs of illness and led to men dying at younger ages than women. To test the theory, we designed an experiment that contrasted known female preferences in mates with stoicism.

Factors affecting human mate choice include characteristics of the chooser as well as the potential mate. For example, men show a greater preference for physical attractiveness than women [12,13,14,15] while women's mate choice preferences vary across the menstrual cycle [16,17,18,19,20]. Because the costs of reproduction in women are high including oögamö, gestation, parturition, and child care, women should be choosy about their mates. As such, female mate choice is influenced by whether the potential mate is likely (long-term (LT) mate) or unlikely (short-term (ST) mate) to invest in the woman and her offspring. For ST mates, women preferred moderate risk-takers [21], more attractive men [22], and men with mesomorphic bodies [23,24,25]. Dixon et al. [23] found that women's preferred waist to shoulder ratio (WSR) was .6. Likewise, Hughes and Gallup [25] found that a male's shoulder to hip ratio (SHR) was positively correlated with the number of sex partners and the number of extra-pair copulations he reported. Consequently, for ST partners, women show a distinct preference for physically attractive men [26]. However, the traits women prefer in ST mates who will not be investing in the women and their potential offspring are theoretically different from the traits women prefer in LT mates and some would argue that over evolutionary time females did not invest as much in ST as compared to LT

mate choice. A woman's overall reproductive success would decrease if her LT partner abandoned her for someone else or if her LT partner was consistently unhealthy requiring her to take care of him in addition to her offspring, a prediction of health selection theory [11].

Other variables in women's mate choice are male status and socioeconomic prospects [13,27,28]. Huber et al. [29] reported that women's probability of being childless decreased as her husband's income increased. Similarly, the number of children the partners conceived was positively correlated to the husband's income. The relationship between status and reproductive fitness is not necessarily linear. Women seem to be weighing the costs and likelihood of raising healthy children rather than simply increasing offspring number [30]. Therefore, as the average individual wealth of a country increases, the fertility rate drops as Fieder et al. [31] found in the Americas and part of Africa. One heuristic that Western women can use to distinguish high status is through a man's choice of clothing. For example, Cunningham et al. [32] reported that women were more attracted to men wearing high status clothing compared to T-shirts. Other factors that women consider when making LT, rather than ST, mate choices are the traits of industriousness and ambition [13]; older age [13]; warmth and trustworthiness [28]; open intellect [33]; kindness, consideration, and warmth [16,27]; intelligence [26]; fondness for children as well as the potential to be a good father [16,27]; and adaptable behavior [27].

In the current research, we contrasted known influences of LT and ST mate choices with a man's stoicism about minor health problems. We predicted that women consider stoicism in their LT mate choices but not their ST mate choices. Hrdy [34] elegantly argued that humans evolved as cooperative breeders within hunter-gatherer societies. Women needed help in raising their offspring and this help came from several sources including maternal relatives, older children, and LT male partners. Male partners helped with actual child care, as demonstrated by their carrying and playing with children, and subsidized the energy needs of women and children through hunting and foraging. Men in modern foraging societies (Ache, Hiwi, and Hadza) begin producing more energy than they consume at around 17 to 18 years and peak in energy production between 25 and 50, a time when women and children require more energy than they can produce [35].

We hypothesized that stoic men were more attractive as LT partners. These men would not only be more likely to provide the woman and their offspring with their energy needs but also would not place an additional burden on their mates through malingering. However, stoic men would not necessarily be attractive as ST mates because they would not be expected to provide for a woman and any offspring resulting from the ST mating opportunity. Therefore, we predicted

for ST mate choice that women would ignore the characteristic of stoicism but attend to other variables, like facial symmetry and mesomorphic body shape as reflections of attractiveness.

We tested three predictions in the current research. First, women prefer stoic men rather than men with symmetrical facial characteristics or mesomorphic physiques as LT mates based on health selection theory. Second, women reverse the above choices when choosing an ST mate, exhibiting a preference for symmetrical facial characteristics and mesomorphic physiques. The reversal was predicted because ST mates would not be involved in cooperative breeding. Finally, we predicted that women would prefer both stoicism and status, in terms of attire, in LT mate choice because both traits are favored in a cooperative breeder.

2. Materials and methods

2.1. Participants

All of the research was approved by the University of Hawaii Committee on Human Studies. Participants were recruited from a gender-normative population. Of the 109 participants recruited for the study, 86 were women and 23 were men from two colleges in Hilo, Hawaii: the University of Hawaii at Hilo (UHH) and Hawaii Community College (HawCC). Both institutions have a mixture of traditional and nontraditional students and are ethnically diverse. Participants were recruited from Survey of Psychology (PSY 100) courses at UHH, two upper division psychology courses at UHH, biology at HawCC, and chemistry lab sections at UHH. In the latter courses, participants were given extra credit for participation and in the PSY100 courses students received credit for a course requirement to participate in a research study. We tested whether the students from the upper division psychology courses skewed the results because they had a better understanding of sexual selection theory than students in the other courses. Their answers differed from the students in the other courses in two categories (LT symmetry and LT status) but they were less influenced by these variables than the other students. We performed the major analyses excluding participants recruited from the upper division psychology courses and the results were more extreme than when we examined all participants. We report results from the entire participant pool.

2.2. Visual stimuli

We created three separate sets of slideshows, each of men from the following ethnic groups: Caucasian, Asian, and Pacific Islander (PI) men. Participants were shown the slideshows of the ethnicity that they reported upon recruitment; this did not always correspond to the ethnicity they later reported in the Demographic Questionnaire. Each slideshow consisted of nine slides: two for symmetry

Table 1: An example of a PI slideshow; because images were randomized in the presentations no two participants viewed the same slideshow. The names are common for PI men living in Hawaii. Codes indicate ethnicity, name, major, sport, and illness.

1st slide: the participant views and reads for 30 s	A PI male with a symmetrical face is pictured. Vignette: Kawika is a college student at the University of Hawaii at Hilo. He is a pre-pharm major and was just accepted into Pharmacy School. During his time at UHH he has frequently been on the Dean's Honor Roll. He is also on the volleyball team and spends a lot of time working out. He candidly admits that he catches almost every cold and flu that visits Hawaii during the flu season. (SYM; ILL) Code: 3,1,3,1,2.
2nd slide: the participant views and reads for 30 s	A PI male with an asymmetrical face is pictured. Vignette: Kaleo is a college student at the University of Hawaii at Hilo. He is a pre-engineering major and was just accepted into an aeronautical engineering program. During his time at UHH he has frequently been on the Dean's Honor Roll. He is also on the soccer team and spends a lot of time working out. He admits to getting the sniffles and feeling a bit off occasionally but never catches a cold or flu. (UNSYM; STOIC) Code: 3,2,4,2,1.
3rd slide: blank for 10 s; the participant indicates which male she would prefer as an LT and as an ST mate. She is informed that the same male can be selected for both but she must make a selection.	
4th slide: the participant views and reads for 30 s	A PI male dressed in a suit is pictured. Vignette: Mano is a college student at the University of Hawaii at Hilo. He is a business major and was just accepted into MBA program. During his time at UHH he has frequently been on the Dean's Honor Roll. He is also on the swimming team and spends a lot of time working out. He admits that he often wakes up with headaches that are so bad that he must remain in bed for the day. (HIGH STATUS; ILL) Code: 3,5,5,3,4.
5th slide: the participant views and reads for 30 s	A PI male dressed casually is pictured. Vignette: Mika is a college student at the University of Hawaii at Hilo. He is an accounting major and was just accepted into an international banking program. During his time at UHH he has frequently been on the Dean's Honor Roll. He is also on the track team and spends a lot of time working out. Even when he wakes up with a headache, he ignores it and goes to school and practice. (LOW STATUS; STOIC) Code: 3,6,6,4,3.
6th slide: blank for 10 s; the participant indicates which male she would prefer as an LT and as an ST mate. She is informed that the same male can be selected for both but she must make a selection.	
7th slide: the participant views and reads for 30 s	A PI male with medium mesomorphic torso (WSR = .8) is pictured. Vignette: Lono is a college student at the University of Hawaii at Hilo. He is a pre-law major and was just accepted into Law School. During his time at UHH he has frequently been on the Dean's Honor Roll. He is also a member of the surfing club and spends a lot of time working out. When the vog is bad, he might sneeze a bit but he's found that if he ignores it he can still attend practice. (LOW PHY; STOIC) Code: 3,4,1,5,5.
8th slide: the participant views and reads for 30 s	A PI male with a high mesomorphic torso (WSR = 6) is pictured. Vignette: Liko is a college student at the University of Hawaii at Hilo. He is a pre-med major and was just accepted into Medical School. During his time at UHH he has frequently been on the Dean's Honor Roll. He is also a member of the paddle-boarding club and spends a lot of time working out. Sometimes when the vog is bad, he is laid up with asthma and respiratory problems for a day or two. (HIGH PHY; ILL) Code: 3,3,2,6,6.
9th slide: blank for 10 s; the participant indicates which male she would prefer as an LT and as an ST mate. She is informed that the same male can be selected for both but she must make a selection.	

(SYM), a facially symmetrical versus asymmetrical man followed by a blank slide; two for physique (PHY), a mesomorph (waist to shoulder ratio (WSR) = .6) versus a less mesomorphic (WSR = .8) man followed by a blank slide; and two for status (STATUS), a man in a tie versus a man in a casual shirt followed by a blank slide (Table 1).

The stimulus slides which contained both a picture and a vignette (see below) were shown for 30 s and were followed by a blank slide shown for 10 s. All photographs were obtained using Google Image Search and were converted to black and white to control for color. Symmetry was assessed by six left and right measurements: eye to ear;

Table 2: Experimental protocol, randomization and counterbalancing.

Protocol	Randomization	Counterbalancing
All participants viewed the three stimulus pairs (SYM, PHY, STATUS)	The six possible orders of stimulus pairs (SYM, PHY, STATUS)	Presentations within a pair (asymmetrical versus symmetrical; high mesomorph versus medium mesomorph; tie versus casual wear)
Most participants viewed a slideshow of their reported ethnicity	The six possible orders of illness (cold/flu, headache, vog)	Presentation of ignoring (stoicism) versus succumbing to an illness
No two participants viewed the same slideshow	The six possible counterbalanced orders of ignoring (I) versus succumbing (S) to an illness (ISS, ISI, IIS, SII, SIS, SSI)	

mid-upper lip to each corner of the mouth; tip of nose to the extension of each nostril; facial jaw proportions; top of eye to hairline; pupil of eye to eyebrow. The six proportions were averaged to provide a symmetry index. The difference (asymmetrical to symmetrical) was .93 to .98 for the Caucasians, .90 to .96 for the Asians, and .89 to .91 for the Pacific Islander (PI). Orders of the stimuli were randomized and/or counterbalanced where all possible orders of a variable's levels were presented (see Table 2).

2.3. Vignettes

Each stimulus slide was accompanied by a vignette which described the man in the photo (Table 1). All men were described as college students at the UHH who were on the Dean's Honor Roll, were accepted into a graduate program (law, medical, pharmacy, engineering, MBA or International Banking), and participated in a sport. Because each participant was going to see all six combinations of variables, we created six majors and six sports. Within a slide pair (SYM, PHY, STATUS), a pre-law major was always paired with a pre-med major, pre-pharmacy was always paired with pre-engineering, and business was always paired with an accounting major. All men were also described as athletic men who frequently exercised. Like the majors, we always paired similar sports: volleyball with soccer (team sports), swimming with track (team/individual sports), and surfing with paddle boarding (individual ocean sports popular in Hawaii).

We varied three different illnesses: cold, headache, and vog induced respiratory problems (vog is air pollution associated with volcanic emissions in the Hawaiian islands). The vignette stated that the man either ignored and worked through his illness (he admits to getting the sniffles and feeling a bit off occasionally but never actually catches a cold or flu; even when he wakes up with a headache, he ignores it and goes to school and practice; when the vog is bad, he might sneeze a bit but he's found that if he ignores it he can still attend practice) or admitted that he suffered from the illness (he candidly admits that he catches almost every cold and flu that visits Hawaii during the flu season; he often wakes up with headaches that are so bad and he must remain in bed for the day; sometimes when the vog is

bad, he is laid up with asthma and respiratory problems for a day or two).

2.4. Procedure

Each participant signed and dated the provided informed consent form and filled out a short demographic questionnaire. The demographic questionnaire obtained information on the participants' age, gender, use of hormonal birth control, start date of their last menses for women, which ethnicity they identified with, as well as their family's ethnicity. Estimated phase of the menstrual cycle was determined by a forward count method for each woman who was not using hormonal birth control and who provided the start date of their last menses (43/53). Menstrual phase was defined as Days 1–5, follicular phase as 6–10, ovulatory phase as 11–15, luteal phase as 16–22, and premenstrual phase as greater than Day 23. Analyses combined data from women in their follicular and ovulatory phases (potential fertile days) and women in their menstrual, luteal, and premenstrual phases (potential unfertile days). Participants were instructed that they were going to view a brief slideshow showing a variety of photographs and vignettes. Each female participant was shown a pair of slides/vignettes and then asked to choose which man would be more preferable, LT or ST partner, based on the information provided. Participants were told that they could choose the same man or a different man as an LT and an ST partner. Participants then saw two more pairs of slides. The three pairs of slides differed in whether SYM, PHY or STATUS was manipulated along with stoicism (for an example of a slideshow see Table 1). Male participants were asked to indicate which man they felt a woman would prefer as an LT or ST partner. Men should also prefer stoicism in LT mates for their female relatives. Stoic mates should increase a female's fitness resulting in an increase in the male relatives' inclusive fitness. Additionally, having a stoic brother-in-law would potentially provide a man with a reliable hunting partner. As a manipulation check, after participants recorded their preferences, they were asked to list the variables that they thought were being examined in the experiment. This question was on the reverse of their answer sheets to avoid influencing responses. The data were analyzed using Fisher Exact Tests, chi-square, and step-wise multiple regression.

3. Results

3.1. Demographics and controls

The women ($M_{\text{age}} = 21$ (SD = 4.8)) were significantly younger than the men ($M_{\text{age}} = 25$ (SD = 9.9); $F(1, 106) = 6.68$; $P = .01$). None of the participants was younger than 18. Slightly over 50% of the participants were currently in romantic relationships that had lasted, on average, about three years. Approximately one third of the women were using hormonal forms of birth control. Forty percent of the participants were tested using the Asian slideshow; however, this differed from the 44% of participants who identified themselves as Asian. Some of the latter, especially the Filipino women, initially said they were “local” and so were tested with the PI slideshow. PI also contained many participants who identified themselves to be of mixed ancestry as did some of the Caucasians (see Table 3 for demographic results).

Due to the intricacy of the slideshow, we first tested potential confounding effects. All of the P values reported were computed with Fisher Exact tests. We attempted to control for the majority of potential confounds through counterbalancing and randomization (Table 2). For each independent variable, there were six tests (LT vs. ST symmetry; LT vs. ST physiques; LT vs. ST status). Women and men did not differ in their preferences for stoic men (six P values $\geq .48$), being in an LT relationship did not influence preference (six P values $\geq .52$), use of hormonal birth control did not influence preferences (six P values $\geq .26$), participants who thought illness was a variable of interest did not differ from those who did not (six P values $\geq .25$), and participants who viewed Caucasian, Asian or PI men did not differ in their preferences (six P values $\geq .29$). Phase of menstrual cycle was related to women’s preferences for stoic men as ST mates. In their choices of ST mates in the physique ($P = .007$) and status ($P = .02$) conditions, they preferred stoic men. We also tested whether our descriptions of men in varying majors (law versus medicine; pharmacy versus engineering; business versus finance) or sports (volleyball versus soccer; swimming versus track; surfing versus paddleboard) influenced women’s mate choice. None of these variables was statistically significant (all P s $> .10$ and modal $P = 1.00$).

3.2. Stoicism

Step-wise multiple regression using illness, major, sport and either SYM, PHY or STATUS were used to predict LT and ST mate choices. We found that women preferred men who ignored their health problems for LT mates over those who had symmetrical faces or mesomorphic bodies. The only significant predictor in the models which contrasted illness with symmetry or physique was illness (Table 4). Neither symmetry nor physique added any predictive power to the participants’ choices of LT mates. In contrast, status did add

Table 3: Demographics of the participants. Under identified ethnicity, Asian included individuals who identified as Japanese, Korean, Chinese, Vietnamese, and Filipino; Pacific Islander individuals who identified as Portuguese, Hawaiian, Samoan, and Local; and other individuals who identified as Hispanic, Black, and mixed.

Gender	Women ($n = 86$)	Men ($n = 23$)
Currently in romantic relationship (RR)	58% (50/86)	48% (11/23)
Ave # of months in RR	35.5 (34.1)	41 (38.1)
Hormonal birth control	38% (33/86)	NA
Phase of menstrual cycle		
Menstrual (Days 1–5)	$N = 8$	NA
Follicular (Days 6–10)	$N = 8$	NA
Ovulatory (Days 11–15)	$N = 8$	NA
Luteal (Days 16–22)	$N = 8$	NA
Premenstrual (> 23 days)	$N = 11$	NA
Tested under ethnic stimuli		
Caucasian	30% (26/86)	30% (7/23)
Asian	43% (37/86)	30% (7/23)
Pacific islander (local)	27% (23/86)	39% (9/23)
Identified ethnicity		
Caucasian	19% (16/86)	26% (6/23)
Asian	50% (43/86)	22% (5/23)
Pacific islander (local)	17% (15/86)	26% (6/23)
Other	14% (12/86)	26% (6/23)

to the predictive power of illness in LT mate choice. Illness alone accounted for 14% of the variance in LT mate choice while illness and prestige accounted for 16% of the variance.

Participants’ variance in ST mate choice was predicted by men with symmetrical faces and mesomorphic body shapes (Table 5). In the physique analyses, participants’ responses were also predicted by illness but in the opposite direction of LT mate choice. A preference was observed for men who succumbed to rather than ignored their health problems. In the model which contained only illness 6% of the variance in ST choice was accounted for while illness and physique accounted for 11% of the variance. When prestige was examined for ST mate choice, the R was not significant (adj $R^2 = .001$; $P = .39$).

4. Discussion

As predicted by health selection theory, the participants preferred stoic men as LT mates. Health selection theory was derived from data which showed that men perceived themselves as having superior health but also experienced greater mortality than women at all adult ages. Additionally, the theory stems from the premise that humans are cooperative breeders [34] and as such women require help in raising their offspring. The theory hypothesizes that men ignore or are unaware of their minor health symptoms because women historically chose mates who ignored minor health problems rather than succumbed to them [11]. Our

Table 4: Step-wise multiple regression for LT partner choice.

Variable	Symmetry (SYM) choice			Physique (PHY) choice			Status (STATUS) choice		
	B	SE B	beta	B	SE B	beta	B	SE B	Beta
Ill*	−.40	.09	−.44	−.42	.06	−.46	−.38	.06	−.38
SYM			−.021						
PHY						.06			
STATUS							−.16	.06	−.16
Major			−.008			−.013			−.008
Sport			−.006			.010			.021
R^2			.19			.21			.16
F			51.98**			56.67**			21.32**

*Illness was coded so that a negative number indicates a preference for stoicism.

** $P < .0001$.

Table 5: Step-wise multiple regression for ST partner choice.

Variable	Symmetry (SYM) choice			Physique (PHY) choice		
	B	SE B	beta	B	SE B	beta
Ill*			.04	.22	.06	.24
SYM	−.36	.06	−.36			
PHY				−.24	.06	−.24
Major			−.025			−.014
Sport			−.005			−.007
R^2			.12			.11
F			31.72**			14.88**

*Illness was coded so that a negative number indicates a preference for stoicism.

** $P < .0001$.

experiment lends support to health selection theory but, more importantly, implies that health services for men and women should differ. If men have been selected to ignore or are not conscious of their health problems, then their health services should emphasize how to increase men's perceptions of their potential health problems so that they are more like to engage in preventive health care [36].

Women also showed a preference for high status men as LT mates. In fact, women's first preference was for high status and stoic men, which shows support for our third hypothesis. In this study, we controlled for mental and physical skills in that all men were described as being on the honor roll, being accepted into graduate training, participating in a sport, and keeping fit. Status was manipulated through attire. We assumed that participants either consciously or unconsciously perceived the clothing cue as a symbol of status. Given that all the potential partners were successful, higher status would predict even greater resources for a woman and her offspring.

We found that women switched their preferences away from status to physically attractive men, in terms of facial symmetry and increased mesomorphism when making ST mate choices, replicating previous findings [26]. Interestingly, for the physique manipulation, the participants

also showed a preference for men who succumbed to minor illness. These results provide support for Gangestad and Simpson's [37] sexual pluralism theory that women prefer men as ST partners with attractive facial and physical traits, traits that might be adaptive for offspring, while contradicting sexual strategies theory [38] which predicts that women should exhibit similar preferences in their choices of LT and ST mates. Preferences in ST mates were also influenced by phases of the women's menstrual cycle in the tests against physique and status. Women in the follicular and ovulatory phases of the menstrual cycle returned to the LT preference for stoic men in these conditions. Our sample sizes were small for this part of the study, and we used an indirect measure of menstrual cycle phase which decreases the reliability of the results [39] so this aspect of the study deserves further research.

Limitations of the present research include the fact that preferences were determined based on a vignette and a picture of a potential partner. Additionally, women might prefer stoic mates because stoicism is directly related to immune function in males but has a trade off in a shorter lifespan. Further exploration of the relationship between stoicism and immune function in males is warranted. Human LT mate choices are much more complex and involve a period of courtship in which potential partners become acquainted with each other. Perhaps a more accurate test of health selection theory would be to ask women about the characteristics that they like and dislike about their current partners including stoicism and malingering behavior. Additionally, this was a first test of the theory and it would be interesting to replicate the results using economic principles such as the design used by Li and Kendrick [26].

Conflict of interest The authors declare that they have no conflict of interest.

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