



## Envy: Functional specificity and sex-differentiated design features

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### ABSTRACT

In two studies, we explore causal domains of envy and test predictions about whether it is sex differentiated in nature. Study 1 explored the contexts in which envy is most frequently experienced by men and women. Study 2 built on these results, explicitly testing predictions about sex differences in envy. The results provide needed insight into sex differences in envy and provide the basis for a deeper understanding of the function served by this unpleasant emotion.

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### 1. Introduction

Envy is a subjectively unpleasant response to unfavorable social comparisons made with advantaged others in domains of personal relevance (Salovey & Rodin, 1984; Smith, 1991; Smith & Kim, 2007). Although conceptually distinct, envy is often confused with jealousy, an aversive emotion experienced when a valued social relationship is threatened (e.g., Daly, Wilson, & Weghorst, 1982). Envy is experienced as a mix of unpleasant psychological states – including inferiority, subjective injustice, and resentment – that tend to be intentionally concealed from others (Smith, 1991; Smith & Kim, 2007). Accordingly, this aversive emotion may motivate a number of antisocial behaviors, including criminality, sacrificing one's outcomes to diminish another's advantage, and joy in response to another's failure or suffering (e.g., Smith et al., 1996; Thernstrom, 1998; Zizzo & Oswald, 2001).

Researchers have recently proposed that envy – despite being unpleasant – may provide a necessary alert to individuals being outperformed in domains historically tributary to survival and reproductive success (Hill & Buss, 2006, 2008; Hill, DelPriore, & Vaughan, 2011). Although this model has been used as the foundation for research into the effects of envy on cognitive processing (e.g., Hill et al., 2011), many hypotheses derived from the model – particularly those about sex-differentiation – have not been explicitly tested. In the current research, we sought to redress this gap in the literature by addressing the following questions: (a)

what are the contexts that most frequently elicit envy? (b) is envy a sex-differentiated emotion?

#### 1.1. The contexts of envy: sex-differentiated by design

From an evolutionary perspective, envy should most frequently occur in domains corresponding to major classes of adaptive challenges historically faced by humans. Among these challenges are establishing coalitional ties, gaining and maintaining status and resources, and attracting and retaining mates (Buss, 1988a, 1988b; Kenrick, Li, & Butner, 2003). The types of advantages most likely to elicit envy are thus expected to reflect one or more of these functionally-derived categories. Further, because differential reproductive success is the engine that drives the process of selection, this perspective predicts that men and women within the age of reproductive competition will most frequently report envying others who possess qualities that increase their desirability to prospective romantic partners.

This functional logic also suggests that the contexts most likely to evoke envy will be sex-differentiated in ways that correspond to differences in adaptive problems reliably confronting men and women based on discrepancies in minimum obligatory parental investment (Trivers, 1972). Because women's mate preferences reliably reflect a desire to secure partners able to invest in themselves and their offspring (Buss, 1989a; Symons, 1979), resource acquisition is a domain in which men have had to compete more fiercely for access to romantic partners than have women (Buss, 1988b). Accordingly, we should find that men are more likely to experience envy than women in response to their mating competitors' superiority in this domain. For men, such an advantage would

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likely correspond to their competitors being better able to attract desirable women as romantic partners. Women's ability to attract desirable mates, on the other hand, is largely contingent on displaying cues related to youth and physical attractiveness (Buss, 1989a; Symons, 1979). For them, a peer's attractive appearance should be more likely to elicit envy than it would for men. Although previous research provided preliminary evidence that envy is sex-differentiated in mating-relevant domains (e.g., physical attractiveness, sexual experience; Hill & Buss, 2006), the current research extends this work by testing several novel predictions regarding a wider range of domains in which sex differences in envy are – or are not – expected based on adaptive problems confronting the sexes throughout our evolutionary past.

## 2. Study 1: exploring domains of envious affect

Study 1 is an exploratory investigation into the types of advantages most likely to evoke envy. To this end, participants were asked to recall and describe situations in which they envied someone. This autobiographical narrative methodology has been successful in documenting similarly subjective and secretive phenomena (e.g., Baumeister, Stillwell, & Wotman, 1990). We predicted that the narratives would most frequently describe advantages meeting adaptive challenges facing humans over evolutionary time (Kenrick et al., 2003).

### 2.1. Method

#### 2.1.1. Participants

Participants were 116 men and 99 women ( $M_{age} = 18.67$ ,  $SD = 1.49$ ) from a large state university.

#### 2.1.2. Procedure

Upon logging in to a password protected online survey, participants were provided with a definition of envy (i.e., “a feeling of resentful awareness that someone else is enjoying an advantage that you want but do not have”). Next, they were asked to describe a maximum of ten times they felt envious, specifying who they envied and why.

**Table 1**

What types of advantages elicit Envy? (Study 1).

	Total (%) (N = 215)	Women (%) (n = 99)	Men (%) (n = 116)	$\chi^2, p$
Has more success attracting romantic partners	13.00	11.40	14.70	4.25*
Is more physically attractive	13.00	17.80	7.70	39.13***
Has greater access to financial resources	10.40	8.40	12.60	8.35**
Owns a status item that I desire (e.g., luxury car, designer handbag)	8.30	6.30	10.70	10.87**
Achieving greater academic success	8.30	6.20	10.60	10.96**
Is more popular/has a better social life	7.90	9.20	6.40	4.41*
Is in a position of status or authority	6.80	6.80	6.70	.02, ns
Is more athletically talented	6.10	4.20	8.10	11.78**
Is more talented than I am in a domain of self-importance (e.g., piano playing, painting)	5.00	4.90	5.20	.12, ns
Is more intelligent	4.90	5.20	4.60	.30, ns
Is more socially at ease than I am	3.80	4.70	2.80	4.47*
Is in a committed romantic relationship	2.70	3.10	2.30	1.00, ns
Has an easier life than I do (e.g., works less, has easier classes)	2.70	2.40	3.00	.61, ns
Comes from a more socially/financially prominent family	2.40	3.10	1.60	4.25*
Receives more parental investment	2.30	2.40	2.20	.11, ns
Has better/more attractive clothes	1.50	2.50	0.40	13.76***
Is more sophisticated, worldly	0.90	1.40	0.40	5.39*
Total	100	100	100	

Note: Numbers correspond to the percentage of all participant responses falling into each category.

\*  $p < .05$ .

\*\*  $p < .01$ .

\*\*\*  $p < .001$ .

### 2.1.3. Data coding

Participants' responses were independently coded for content by two trained research assistants (one male, one female) blind to the study purpose. The research assistants were instructed to group the narratives based on similarity regarding the cause of envy, and the response category labels were generated based on the assistants' grouping. The inter-coder agreement was 96%, and one of the authors resolved disagreements between coders.

## 2.2. Results

Table 1 presents the major categories into which participants' envy was classified. The contexts most frequently mentioned in the narratives were: (1) a peer having greater success attracting romantic partners (e.g., “he/she goes on dates frequently”; 13.0% of all responses), (2) a peer being more attractive (13.0%), (3) a peer having greater access to financial resources (10.4%), (4) a peer acquiring a status item (e.g., an expensive car, a designer watch; 8.3%), and (5) a peer achieving greater academic success (8.3%).

Although men's and women's responses were similar in many ways, the sexes differed in some of their most frequently cited causes of envy. We performed chi-square tests (two-tailed) to examine whether there was a relationship between participant sex and the frequency with which participants noted different advantages in their narratives. Relative to women, men more frequently cited the following peer advantages: (1) greater success attracting romantic partners [ $\chi^2(1) = 4.25, p = .04$ ], (2) greater access to financial resources [ $\chi^2(1) = 8.35, p = .004$ ], (3) ownership of a status item [ $\chi^2(1) = 10.87, p = .001$ ], (4) greater academic success [ $\chi^2(1) = 10.96, p = .001$ ], and (5) superior athletic talent [ $\chi^2(1) = 11.78, p = .001$ ]. Women's narratives, on the other hand, more frequently described a peer's: (1) physical attractiveness [ $\chi^2(1) = 39.13, p < .001$ ], (2) popularity [ $\chi^2(1) = 4.41, p = .04$ ], (3) social ease [ $\chi^2(1) = 4.47, p = .03$ ], (4) prominent family [ $\chi^2(1) = 4.25, p = .04$ ], and (5) better clothing [ $\chi^2(1) = 13.76, p < .001$ ] (see Table 1 for statistics).

## 2.3. Discussion and conclusions

Study 1 provides a preliminary taxonomy of the specific types of advantages likely to elicit envy on the part of college-aged

**Table 2**  
Predicted sex differences in envy.

Domain of advantage	Predicted sex difference?	Theoretical background	Predicted effects (men)	Predicted effects (women)
Status and resource acquisition	Yes	Resources signal a man's ability to invest in a woman and her offspring, and women prefer wealthy, high status men as romantic partners (Buss, 1989a)	Men will envy wealthy or high status peers	Women will envy peers with wealthy or high status romantic partners
Physical attractiveness	Yes	Physical attractiveness is a reliable cue to a woman's fertility and is a central component of women's mate value (Buss, 1989a)	Men will envy peers with attractive romantic partners	Women will envy physically attractive peers
Sexual experience	Yes	Sexual experience helps augment the reproductive success of men but not women (Symons, 1979)	Men will envy more sexually experienced peers	Women will envy virginal peers
Athletic talent	Yes	A man's size, strength, and athletic prowess signal his ability to protect his mate, and women prefer strong and athletic men as romantic partners (Buss, 1994/2003)	Men will envy peers with superior athletic talent	
Popularity/social ease Kindness/ understanding Success attracting romantic partners Sense of humor	No	Building social alliances and successfully attracting mates are equally beneficial for men's and women's fitness (Buss, 1995)		

men and women. Among these advantages are a peer: having greater access to romantic partners, being more attractive, and having more money than oneself. These findings are consistent with the hypothesis that envy is most likely to occur in response to a social competitor's advantage meeting proximate-level goals historically related to fitness (e.g., Hill & Buss, 2006, 2008).

Though the current study was designed to serve as an exploratory analysis, the frequency with which each sex cited specific domains of competitive advantage differed in ways consistent with an evolutionary account of envy. For instance, women cited their rivals' attractiveness as a source of envy more frequently than did men, with this advantage being the most frequently mentioned in women's narratives. Conversely, men cited their rivals' greater access to financial resources and athletic talent as evoking envy more often than women. The findings are consistent with previous research regarding sex differences in mate preferences and the domains in which men and women have had to compete most fiercely for access to mates (Buss, 1989a). We more rigorously test for sex differences in the intensity of envy evoked by these advantages in Study 2.

Finally, even advantages that participants listed relatively less frequently (e.g., having more attractive clothes) were arguably related to classes of advantage predicted in advance using evolutionary logic, albeit less directly so. For instance, although participants most frequently reported envying peers who enjoy greater success attracting romantic partners, wearing better clothing can certainly help attract a mate. Accordingly, it seems that even the scenarios cited least frequently by participants referenced advantages with indirect implications for fitness.

### 3. Study 2: explicitly testing sex differences in envy

The primary goal of Study 2 was to build on the results of our exploratory investigation by more rigorously testing sex differences in envy. To this end, we asked participants to rank order classes of advantages similar to those referenced by participants in Study 1 based on the strength of the envy each advantage would evoke.

Another goal of Study 2 was to conceptually replicate and extend Hill and Buss' (2006) preliminary investigation into sex differ-

ences in envy. We expected that men's and women's envious responses would diverge in domains where the sexes have solved recurrently different adaptive problems over the course of evolutionary history (e.g., Symons, 1979; Trivers, 1972; see Table 2 for predicted effects). Specifically, we predicted that women would rank their peers' physical attractiveness, romantic partner's financial prospects, and virginity as evoking stronger envy than would men. Women's greater envy in response to these advantages would be consistent with an evolutionary perspective on men's and women's mate preferences and the corresponding domains in which each sex has had to compete for access to mates. Because women have historically competed more fiercely than men in the domains of chastity and physical attractiveness (Daly et al., 1982; Sugiyama, 2005), we reason that selection has shaped women's envy response to be especially sensitive to cues that their rivals are advantaged in these areas. Similarly, because being mated to a man with access to financial resources has been a primary avenue via which women have historically augmented their reproductive success (Buss, 1994/2003; Symons, 1979), a rival being mated to such a man signals a potential competitive failure for women.

We expected that men, on the other hand, would experience greater envy than women in domains with greater mating-relevance for men. Among such advantages are male peers having: greater status and prestige, better financial prospects, greater sexual success, superior athletic talent, and a more attractive romantic partner. Because women exhibit a heightened preference for physically formidable mates with high status and good financial prospects, these are domains in which men have historically had to compete for access to mates more fiercely than women (Buss, 1989a, 1989b).

Finally, we did not expect that men's and women's envy would differ in response to a peer being more popular and socially at-ease, being more kind and understanding, or having more success attracting romantic partners than themselves. Although men and women have faced a number of divergent adaptive problems throughout evolutionary history stemming from differences in obligate parental investment (Trivers, 1972), there are also a number of domains in which the sexes have faced similar adaptive problems (Buss, 1995). Because both men and women have reliably benefited from fostering social alliances and attracting

prospective mates, both sexes should experience envy upon recognition that a peer is advantaged in these domains. Finally, though research has demonstrated that men display higher humor production ability than women (Greengross & Miller, 2011), there is also evidence that both men and women find humor attractive in potential long-term mates (Greengross & Miller, 2008). Therefore, we did not have a clear prediction regarding sex differences in envy in response to a peer having a better sense of humor.

Although Hill and Buss (2006) provided initial support for the sex-differentiated nature of envy by revealing four specific peer advantages that evoke relatively greater envy in men or women (men: sexual experience, an attractive mate; women: a more attractive appearance, receiving expensive gifts from a mate), the current study aims to conceptually replicate these findings while exploring additional predicted sex differences in envy that currently remain untested (e.g., chastity, status and prestige, athletic talent). Further, the current study also examines domains in which sex differences in envy would not be expected based on evolutionary logic.

### 3.1. Method

#### 3.1.1. Participants

Participants were 203 undergraduates (101 male;  $M_{\text{age}} = 18.66$  years,  $SD = 1.46$ ).

#### 3.1.2. Materials and procedure

We used a 19-item ranking scale consisting of scenarios likely to elicit envy in college-aged men and women. This scale has been used in prior research (Hill & Buss, 2006) and includes items such as “peer had better job prospects than myself” and “peer had a better body than I do.” Participants were asked to rank the items from 1 (would make you feel the most envious) to 19 (would make you feel the least envious).

### 3.2. Results

We created four composite variables from items that were highly intercorrelated and based on theory. The first of these variables (*possesses cues related to resource acquisition*) was comprised of the items “better job prospects”, “better financial prospects”, “more ambitious and goal-oriented”, and “more industrious” ( $\alpha = .65$ ). The variable *more attractive than I am* consisted of the items “more attractive face”, “more attractive body”, and “generally more attractive” ( $\alpha = .64$ ). The composite *greater sexual success* was composed of the items “has had a greater number of sexual partners” and “is more sexually skilled” ( $\alpha = .69$ ). Lastly, the

variable *more financially successful romantic partner* was comprised of “financial prospects of peer’s mate are better than my own” and “peer’s romantic partner buys him/her expensive gifts” ( $\alpha = .70$ ). The remaining eight items remained separate for analysis (see Table 3 for complete list of variables).

We conducted a Mann-Whitney  $U$  test (two-tailed) to examine whether the rankings given to each of the 12 envy variables (four composites, eight original scale items) differed based on participant sex. The results provided support for all seven predicted sex differences in envy (see Table 2 for predicted effects and Table 3 for descriptive statistics). Specifically, women ranked a peer’s superior attractiveness as evoking greater envy than did men,  $U = 2944.00$ ,  $z = -5.76$ ,  $p < .001$ ,  $r = -.40$ . Also, women reported a peer having a more financially successful romantic partner and no prior sexual experience as evoking greater envy than men [successful romantic partner:  $U = 3722.50$ ,  $z = -3.98$ ,  $p < .001$ ,  $r = -.28$ ; virginity:  $U = 3415.50$ ,  $z = -4.75$ ,  $p < .001$ ,  $r = -.33$ ]. Men, on the other hand, ranked a peer being higher in status and prestige and possessing cues related to resource acquisition as evoking greater envy than did women [status:  $U = 3849.50$ ,  $z = -3.41$ ,  $p = .001$ ,  $r = -.24$ ; resource acquisition:  $U = 4226.00$ ,  $z = -2.82$ ,  $p = .005$ ,  $r = -.20$ ]. Men also ranked a peer having a more attractive romantic partner, superior athletic talent, and greater sexual success as evoking greater envy than did women [attractive romantic partner:  $U = 3377.00$ ,  $z = -4.77$ ,  $p < .001$ ,  $r = -.33$ ; athletic talent:  $U = 3772.50$ ,  $z = -3.86$ ,  $p < .001$ ,  $r = -.27$ ; sexual success:  $U = 2100.50$ ,  $z = -7.69$ ,  $p < .001$ ,  $r = -.53$ ].

The findings were also consistent with predictions regarding the domains in which no sex differences were expected (see Table 2), with one exception. As predicted, there were no sex differences in the degree of envy evoked by a peer’s greater success attracting romantic partners or greater popularity ( $ps > .56$ ). In addition, the analysis did not reveal a sex difference in response to a peer’s superior sense of humor ( $p = .62$ ). Finally, although we did not predict a sex difference regarding the amount of envy evoked by a more kind and understanding peer, women ranked this dimension significantly higher than did men,  $U = 3531.00$ ,  $z = -4.42$ ,  $p < .001$ ,  $r = -.31$  (see Table 3). It is possible that this unexpected finding reflects men’s relative preference for kind, agreeable mates (Campbell, 2002), as well as women’s implicit association between mating goals and public displays of prosocial behavior (Griskevicius et al., 2007).

### 3.3. Discussion and conclusions

Study 2 provided further support for our function-based predictions about sex differences in envy. As expected, women ranked

**Table 3**  
Sex differences in envy rankings (Study 2).

Rank		Item	Prediction	Men		Women		Z, p
Men	Women			M	SD	M	SD	
1	3	Having more status and prestige	M > W	6.58	5.09	8.61	4.55	3.41*
2	2	More success attracting romantic partners	M = W	7.11	4.84	7.55	4.69	.57, ns
3	8	More attractive romantic partner	M > W	7.33	4.74	10.61	5.01	4.77**
4	7	Possesses cues related to resource acquisition ( $\alpha = .65$ )	M > W	8.25	3.71	9.68	3.39	2.82*
5	9	More athletically talented	M > W	8.83	4.61	11.33	4.93	3.86**
6	1	More attractive ( $\alpha = .64$ )	M < W	9.25	4.46	5.79	3.63	5.76**
7	4	Better sense of humor	M = W	9.52	4.93	9.02	4.87	.50, ns
8	6	More popular	M = W	9.75	5.22	9.3	4.77	.58, ns
9	12	Greater sexual success ( $\alpha = .69$ )	M > W	10.28	4.61	15.58	3.91	7.69**
10	5	More kind and understanding	M = W	12.8	5.56	9.09	6.07	4.42**
11	10	More financially successful romantic partner ( $\alpha = .70$ )	M < W	14.44	3.13	11.99	4.63	3.98**
12	11	No prior sexual experience (virginity)	M < W	17.78	3.47	14.55	5.7	4.75**

Note: Lower rankings correspond to greater envy. The z -scores reflect the absolute value of the calculated scores.

\*  $p < .01$ .

\*\*  $p < .001$ .

their peers': physical attractiveness, romantic partner's financial prospects, and virginity as evoking greater envy than did men. Men, on the other hand, ranked advantages in domains in which men have had to compete more fiercely for access to mates as evoking stronger envy than women did (e.g., having an attractive romantic partner, greater athletic talent, or superior status and prestige). These findings are in accordance with previous research revealing sex differences in general upset in response to rivals who are superior in domains related to mating success (Buss, Shackelford, Choe, Buunk, & Dijkstra, 2000). Further, our results support the hypothesis that envy is sex-differentiated based on the discrepant adaptive challenges that have reliably influenced men's and women's fitness over evolutionary time.

Finally, men's and women's envy rankings did not differ in response to advantages corresponding to domains in which the sexes have faced similar adaptive challenges (Buss, 1995). Because both men and women have reliably benefited from having a number of social alliances and being able to attract prospective mates, the sexes reported experiencing similar amounts of envy when a peer was advantaged in these ways.

#### 4. General discussion

Although researchers frequently note that envy tends to occur in response to relative disadvantage in self-relevant domains (Salovey & Rodin, 1984; Tesser, 1991), little has been reported about the specific domains that are self-relevant to most people. Study 1 was conducted to address this issue, and the results provide a taxonomy of the types of advantages likely to evoke this unpleasant emotional response among college-aged men and women. In addition, the findings demonstrate that these envy-evoking advantages are not randomly distributed across all domains of social life. Instead, the events mentioned most frequently reflected major classes of adaptive challenges facing humans over evolutionary time (e.g., resource acquisition, mate attraction). Therefore, our results suggest that men and women are most sensitive to advantages that render peers better able to meet proximate-level goals related to fitness.

Across both studies, we also provide evidence that sex differences in envy correspond to divergent adaptive challenges reliably confronting men and women over evolutionary time (Buss, 1995). For instance, women most frequently experienced envy in response to a peer being more attractive than themselves. Conversely, men were more likely than women to note a peer's financial resources and athletic talent as evoking feelings of envy. Study 2 examined these sex differences more rigorously, and the results extend previous research (e.g., Hill & Buss, 2006) by revealing a wider range of domains in which the sexes experience different amounts of envy (e.g., athletic talent, chastity), as well as several advantages that evoke similar envious responses in men and women (e.g., sense of humor). In all, these findings are consistent with the function-based approach to envy from which our predictions were derived.

It should be noted that participants in the current studies were American college students, the majority of whom were solving myriad adaptive problems inherent in mate acquisition. Accordingly, evolutionary logic predicts that the advantages that most often elicit envy in this sample may not generalize to all men and women. It is expected that as the adaptive problems confronting an individual change over the lifetime, so too should the targets and content of one's envy. For instance, a woman who is raising children would likely experience greater envy in response to a peer moving into a better school district than she would from that peer's superior attractiveness. In addition, although envy is a universally experienced emotion, researchers have noted some

cultural differences in the types of advantages that are most likely to elicit envy (e.g., Foster, 1972). For example, whereas tribal men might envy a peer's superior hunting ability, an American academic might experience intense envy in response to a rival's lengthy curriculum vita. Despite the divergent sources, both men's envy target advantages that would correspond to greater status and resource acquisition in their respective cultures. Therefore, the degree and frequency with which individuals experience envy likely changes over the course of the lifetime and across contexts depending on the nature of the adaptive problems being faced. Finally, an additional limitation of Study 2 is that we did not directly assess the intensity of the envy evoked by the ranked scenarios. However, because the items largely reflected those scenarios generated by men and women in Study 1, it is likely that they reflect situations evoking intense envy in young adults.

Although researchers have hypothesized about envy's potential functions (e.g., Hill & Buss, 2006, 2008; Hill et al., 2011), little empirical evidence has been reported bearing on these hypotheses. By cataloging the types of peer advantage most likely to elicit envy on the part of men and women, the current studies provide initial support for predictions derived from a function-based account of envy. More important, we also provide evidence that envy is sex-differentiated in ways that correspond to differences in the adaptive problems reliably confronting men and women over evolutionary time. Therefore, our findings make both conceptual and empirical contributions to the understanding of this complex and pervasive emotion, providing a necessary foundation for future research into envy while yielding support for a view of envy as being functionally-tuned in sex-specific ways.

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