

SUPPLEMENTARY ONLINE MATERIALS

Messages about Brilliance Undermine Women's Interest in Educational and Professional Opportunities

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Appendix S1

Do the Brilliance vs. Dedication Descriptors Differ in Their Presumed Malleability and Controllability?

Experiments 2–4. We recruited a separate sample of 41 Mechanical Turk participants (22 women, 19 men) to determine whether, as expected, the characteristics mentioned in the Dedication condition of Experiments 2–4 were perceived to be (1) more malleable and (2) more under one’s control than the characteristics in the Brilliance condition. Indeed, participants indicated that the Dedication characteristics were a closer fit to these criteria than the Brilliance characteristics were, $M = 78.0\%$ selections of the Dedication characteristics ($SD = 29.7$), which was significantly higher than chance (50%), $t(40) = 6.05, p < .001$.

Experiment 5. A separate sample of 40 Mechanical Turk participants (22 women, 18 men) were asked to read the three job ads used in Experiment 5 and consider the extent to which they mentioned characteristics that were (1) malleable and (2) under one’s control. Next, participants ranked the three job ads on this dimension (1 = *most* characteristics that are malleable/under one’s control, 3 = *fewest* such characteristics). Consistent with the preceding studies, fewer of the characteristics required for the Brilliance job were perceived as being malleable and under one’s control ($M_{rank} = 2.46, SD = .67$) compared to those required for the Dedication job ($M_{rank} = 1.75, SD = .64$), $t(39) = 3.78, p = .001$, and for the Control job ($M_{rank} = 1.79, SD = .55$), $t(39) = 4.05, p < .001$. Again, these results are in line with the evidence that the potential to be brilliant is often thought to be biologically determined (Rattan, Savani, et al., 2012).

Appendix S2

Linguistic Analysis of Participants' Open-Ended Justifications

Participants in Experiments 1–4 had to justify their responses to the items assessing their interest in opportunities described as requiring brilliance vs. dedication (see Table S1). We used these open-ended justifications to provide an additional test of the effects of messages about brilliance. Specifically, we analyzed participants' justifications with the word-count software LIWC2007 (Pennebaker, Booth, & Francis, 2007), focusing on three categories from the default LIWC2007 dictionary that could capture the negative effects of brilliance-focused messages, if present: negation words (e.g., “not,” “never,” “can’t”), negative emotion words (e.g., “uncomfortable,” “tense,” “overwhelm”), and anxiety words (e.g., “worry,” “pressure,” “fear”). As in the main text, we predicted a Gender \times Condition interaction, with women (but not men) showing more negativity in the Brilliance than in the Dedication condition.

To perform this analysis, we first used LIWC2007 to obtain word counts for the four cells of the Gender \times Condition design for each of the first four experiments. We then submitted these word counts, separately for each of the three dimensions (negation words, negative emotion words, and anxiety words), to a multilevel mixed-effects model with gender, condition, and their interaction as fixed effects; a random intercept for study; and random slopes for gender and condition. The predicted Gender \times Condition interaction was significant in all three analyses (negation words: Wald $\chi^2 = 7.24$, $p = .007$; negative emotion words: Wald $\chi^2 = 56.82$, $p < .001$; anxiety words: Wald $\chi^2 = 10.33$, $p = .001$). These interactions emerged because, as predicted, women exhibited more negativity in the Brilliance than in the Dedication condition on all three dimensions (Wald χ^2 s ≥ 6.37 , $ps \leq .012$), whereas men did not (Wald χ^2 s ≤ 1.64 , $ps \geq .20$; see Figure S1 on the next page). These results provide additional support for our prediction of a

negative effect of messages about brilliance on women (vs. men).

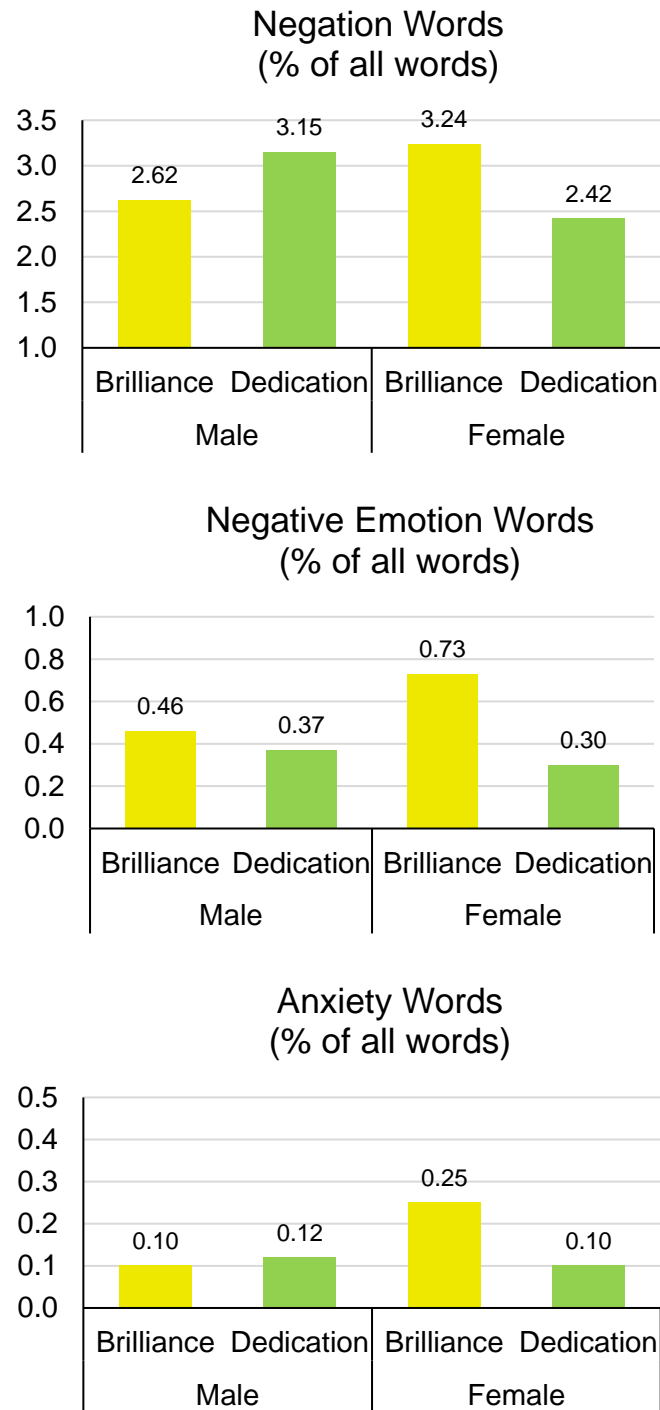


Figure S1. The frequency of negation, negative emotion, and anxiety words in participants' open-ended justifications, by gender and condition. Justifications from Experiments 1–4 were combined for purposes of this analysis. These frequencies were computed from linguistic corpora of the following sizes: men in the Brilliance condition = 6,335 words; men in the Dedication condition = 6,961 words; women in the Brilliance condition = 10,617 words; women in the Dedication condition = 10,327 words.

Appendix S3

Participants' Inferences about the Content of the Educational and Professional Opportunities Described

Experiment 2. We asked participants whether the description of the major made them think of a particular type of discipline. If participants answered “yes” (33.8%), they then had to choose a type of discipline from a list of options (mathematics, computer science, etc.). Participants' guesses were grouped into the same four categories as in Experiment 1: STEM (23.6% of participants), social sciences and humanities (12.8%), business (8.7%), and other (4.6%). Note that, since participants could choose more than one discipline from the list, the percentages for these four categories add up to more than 33.8%, which is the percentage of participants who said “yes” (i.e., that the description of the major brought to mind a specific discipline). Importantly, however, participants' guesses did not moderate the crucial interaction between the Brilliance vs. Dedication manipulation and participants' gender.

Experiment 5. At the end of the sessions, participants were asked if a particular type of job came to mind as they were reading the advertisement at the beginning of the study. Those who answered “yes” (31.4%) were then asked to select the job that came to mind from a list: business (25.9%), STEM (11.5%), social sciences and humanities (3.3%), and other (11.2%). (The sum of the percentages across the four categories is greater than 31.4% because participants could select multiple options.) As in Experiments 1 (see main text) and 2 (see above), participants' guesses did not moderate the predicted results (i.e., the Gender \times Condition interaction).

Experiment 6. At the end of the sessions participants were asked if a particular type of job came to mind as they were reading the advertisement at the beginning of the study. Those

who answered “yes” (18.3%) were then asked to select the job that came to mind from a list: business (13.6%), STEM (11.2%), social sciences and humanities (3.9%), and other (4.4%). (The sum of the percentages across the four categories is greater than 18.3% because participants could select multiple options.) As in previous experiments, participants’ guesses did not moderate any of the main results.

Table S1

The Interest Measure Used in Experiments 1–4 and 6

- Assuming you were looking for an internship, how interested would you be in finding out more about this particular internship program?
 - Assuming you were looking for an internship, how likely would you be to apply for this particular internship program?
 - Assuming you were looking for a long-term career, how likely would you be to consider turning this internship into such a career?
-

Note. The items were randomly ordered. In Experiments 2–4, the items were adapted so that they asked about a major instead of an internship. In Experiment 6, the items were adapted so that they asked about a job instead of an internship.

Table S2

The Anxiety and Belonging Measures Used in Experiments 2–5

-
- Imagine that you are taking a course that is part of this major. How would you feel?
 - [*Anxiety*:] I would feel anxious
 - I would feel tense
 - I would feel intimidated
 - I would feel excited (R)
 - I would feel relaxed (R)
 - I would feel motivated (R)
 - [*Belonging*:] I would feel like I belong
 - I would feel like I always have to prove myself (R)

 - As far as I can tell, this major sounds...
 - [*Anxiety*:] ... stressful
 - ... off-putting
 - ... enjoyable (R)
 - ... exciting (R)
 - [*Belonging*:] ... ideal for me
 - ... like it's not for me (R)
-

Note. The items marked with an (R) were reverse-scored. The two questions were always presented together, in random order. The order of the specific statements presented with each question was also randomized. These measures were adapted to ask about a job in Experiment 5.

Table S3

*Additional Measures Used in Experiments 4–6***Modesty Measure** (sample items; 21 items total; Experiments 4 and 6)

- It's difficult for me to talk about my strengths to others even when I know I possess them.
- If I've played a big role in bringing about some kind of success, I don't feel reluctant telling people about it. (R)

Prototype Matching Measure (5 items; Experiments 5 and 6)

- How similar do you think you are to the other people who work at this company?
- To what extent do you think you are the type of person the company is looking for?
- To what extent will the company think you are the type of person they are looking for?
- How well do you think you match the requirements for this job?
- What percentage of the current employees of this company do you think are men?

Stereotype Threat Measure (2 items; Experiment 5)

- I worry that people who work at this company will draw conclusions about me based on what they think about my gender.
- I worry that, if I perform poorly on this job, people at this company will attribute my poor performance to my gender.

Prestige Questions (2 items; Experiment 5)

- From reading the ad, what is your best estimate of what this job pays? (yearly)
(1 = less than \$25,000; 2 = \$25,001 to \$50,000; 3 = \$50,001 to \$75,000; 4 = \$75,001 to \$100,000; 5 = more than \$100,000)
- How prestigious do you think the job is?
(1 = not prestigious at all; 9 = extremely prestigious)

Self-Efficacy Measure (4 items; Experiment 6)

- The job described in the ad is well within my abilities.
- I don't think I have what it takes to succeed in the job described in the ad. (R)
- I'm one of the smartest people I know.
- I don't consider myself brilliant. (R)

Manipulation Check (4 items; Experiment 6)

- The abilities required for this position are ones that are you can't really acquire—you either have them, or you don't.
- The abilities required for this position are more like "hard-wired" traits.
- The abilities required for this position are ones that people can grow with time and effort. (R)
- The abilities required for this position are malleable rather than fixed. (R)

Chronic Self-Efficacy Measure (sample items; 8 items total; Experiment 6)

- I will be able to achieve most of the goals that I have set for myself.
- In general, I think that I can obtain outcomes that are important to me.

Note. The items marked with an (R) were reverse-scored. Item order was randomized within each scale, except for the Prototype Matching measure. The gender diversity question in this measure ("What percentage of the current employees of this company do you think are men?") was asked at the end of study, not with the other four questions.

Table S4

The Job Ads Used in Experiment 5

Brilliance condition

We are looking for a number of applicants to fill positions in our workforce. Because of the work we do, we are looking for a candidate who has a high IQ, superior reasoning skills, and a knack for big, bold ideas. That is, we'd like to hire someone whose intellectual abilities stand out from those of their peers. Our work environment values and emphasizes employees' natural intelligence, expecting everyone to perform at their peak. Therefore, we are especially interested in candidates who demonstrate an inherent aptitude for this position.

Control condition

We are looking for a number of applicants to fill positions in our workforce. Because of the work we do, we are looking for a candidate who possesses a broad range of skills and is comfortable with a modern, dynamic workplace. In addition, we'd like to hire someone who is willing and able to meet the high standards we set for ourselves. Our work environment also values productivity and positive thinking, expecting everyone to embody those values in their behavior in the workplace. Finally, we are especially interested in hiring candidates whose resumes are strong, demonstrating that they have the requisite skills for this position.

Dedication condition

We are looking for a number of applicants to fill positions in our workforce. Because of the work we do, we are looking for a highly motivated candidate with an outstanding work ethic and a superior commitment to doing their work as well as possible. That is, we'd like to hire someone who has demonstrated significant and sustained dedication in their past positions. Our work environment values and emphasizes employees' strivings and their consistent effort to achieve goals, expecting everyone to continuously improve their work performance. Therefore, we are especially interested in candidates who demonstrate continual diligence on the job.

Table S5

The Job Ads Used in Experiment 6

Fixed-Brilliance condition

We are looking for a number of applicants to fill positions in our workforce. Because of the work we do, we are looking for a specific kind of person: someone with natural brainpower—someone whose inherent mental abilities far exceed the average. Our work environment encourages everyone to perform at their intellectual peak. We consult the empirical literature to inform our hiring practices, and the evidence (e.g., Summers, 2005) clearly shows that brilliant individuals are born, not made; intelligence remains stable across the lifespan and predicts virtually all important life outcomes. This empirical fact is woven into all our hiring and promotion policies—it is at the foundation of our identity as a company. If you feel this job is for you, we look forward to receiving your application!

Malleable-Brilliance condition

We are looking for a number of applicants to fill positions in our workforce. Because of the work we do, we are looking for a specific kind of person: someone who is interested in expanding their mental abilities—someone who's willing to grow their brainpower to where it far exceeds the average. Our work environment encourages everyone to perform at their intellectual peak. We consult the empirical literature to inform our hiring practices, and the evidence (e.g., Dweck, 2006) clearly shows that, no matter who you are, you can become a brilliant individual with the right strategies, the right amount of effort, and the right guidance. This empirical fact is woven into all our hiring and promotion policies—it is at the foundation of our identity as a company. If you feel this job is for you, we look forward to receiving your application!

Table S6

Summary of ANOVA Results for the Interest Measure across Experiments 1–4

Effect	Experiment 1 (Internship)		Experiment 2 (Unspecified major)		Experiment 3 (STEM major)		Experiment 4 (SocSci/Hum major)	
	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>
Gender	0.76	.384	7.39	.007	4.78	.030	8.18	.005
Condition	0.67	.416	0.71	.401	0.41	.522	3.06	.082
Gender × Condition	4.98	.027	13.86	<.001	5.71	.018	2.30	.131

Table S7

Summary of ANOVA Results for the Anxiety Measure across Experiments 2–5

Effect	Experiment 2 (Unspecified major)		Experiment 3 (STEM major)		Experiment 4 (SocSci/Hum major)		Experiment 5 (Job)	
	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>
Gender	0.19	.661	4.92	.028	0.01	.920	1.39	.239
Condition	3.43	.066	0.34	.560	0.59	.443	5.42	.005
Gender × Condition	3.51	.063	4.52	.035	4.52	.035	4.22	.015

Table S8

Summary of ANOVA Results for the Belonging Measure across Experiments 2–5

Effect	Experiment 2 (Unspecified major)		Experiment 3 (STEM major)		Experiment 4 (SocSci/Hum major)		Experiment 5 (Job)	
	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>
Gender	0.89	.346	5.31	.022	0.58	.449	1.66	.198
Condition	2.10	.149	0.04	.835	3.48	.064	5.71	.004
Gender × Condition	7.63	.006	3.77	.054	4.66	.032	4.72	.009

Table S9

Summary of ANOVA Results for the Prototype Matching and Stereotype Threat Measures in Experiment 5

Effect	Prototype Matching		Stereotype Threat	
	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>
Gender	45.21	<.001	44.30	<.001
Condition	5.98	.003	4.10	.017
Gender × Condition	8.42	<.001	2.28	.103

Table S10

Summary of ANOVA Results for the Manipulation Check, Interest, Prototype Matching, and Self-Efficacy Measures in Experiment 6

Effect	Manipulation Check		Interest		Prototype Matching		Self-Efficacy	
	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>
Gender	0.71	.401	16.14	<.001	44.18	<.001	10.71	.001
Condition	74.06	<.001	0.09	.771	3.92	.049	1.60	.208
Gender × Condition	0.67	.415	0.38	.538	2.57	.111	1.88	.172

Table S11
Correlations Between the Main Measures in Experiment 2

Measure	1	2	3
1. Interest	—	-.66***	.69***
2. Anxiety		—	-.79***
3. Sense of belonging			—

*** $p < .001$.

Table S12

Correlations Between the Main Measures in Experiment 3

Measure	1	2	3
1. Interest	—	-.73***	.80***
2. Anxiety		—	-.84***
3. Sense of belonging			—

*** $p < .001$.

Table S13
Correlations Between the Main Measures in Experiment 4

Measure	1	2	3
1. Interest	—	-.51***	.69***
2. Anxiety		—	-.78***
3. Sense of belonging			—

*** $p < .001$.

Table S14

Correlations Between the Main Measures in Experiment 5

Measure	1	2	3	4
1. Anxiety	—	-.84***	-.62***	.14***
2. Sense of belonging		—	.72***	-.09*
3. Prototype matching			—	-.19***
4. Stereotype threat				—

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table S15
Correlations Between the Main Measures in Experiment 6

Measure	1	2	3
1. Interest	—	.74***	.42***
2. Prototype matching		—	.64***
3. Self-efficacy			—

*** $p < .001$.