

Under Pressure: The Effects of Competition on Performance

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The present study was conducted in order to assess sex differences in scores on word search puzzles in which participants are given information intended to incite competitive emotions. Forty participants—18 men and 22 women—were recruited from the Lindenwood Participant Pool. Participants were randomly assigned into four groups designed to prompt two different kinds of competitive emotions: one which put the participants against the other sex, and one which put them against all other participants. It was hypothesized that men would do better than women under all competitive conditions, and that the overall scores of participants would increase in all experimental conditions, regardless of sex. Results did not significantly support the hypotheses. There was a significant result that giving the participants time result information increased performance. Future research could be conducted to test whether time constraints have an effect on academic performance.

The element of competition in school environments is an important subject to research. Many educators use competition in the hope of positively influencing student performance on assignments and exams. The purpose of this study was to determine whether or not competition actually leads to such an effect. Research findings suggest that competition has an overall positive effect on student performance on routine tasks, which has led to greater understanding

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of how individuals react to certain situations (Cashdan, 1998; Niederle & Vesterlund, 2008; Weber, Wittchen & Hertel 2009).

Gneezy, Niederle, and Rustichini (2003) presented participants with mazes and misinformed a portion of them that the opposite sex performed better on mazes than their respective sex did. Gneezy et al. (2003) conducted their study in a tournament style setting and compensated participants with money. They also tried to invoke competitive feelings by setting up some of the tournaments in a “winner-takes-all” format (Gneezy et al., 2003). They found that participants’ performance increased when they were told about sex differences (Gneezy et al., 2003).

Consistent with my hypothesis, the researchers found notable sex differences among their results (such that men outperformed women when given the task along with the false information (Gneezy et al, 2003). Past research has consistently shown that there are differences between the performance of men and women on competitive routine tasks (Cotton & McIntyre, 2010). Cotton and McIntyre (2010) also note that men take more pleasure from engaging in competition than females, who are likely to avoid such environments. Gneezy et al. (2003) suggest that there was a significant gender gap in performance in their trials, such that men far outperformed women.

Kusá (2010) makes the proposition that if women are made to believe that there is a gender difference, and the task is mentally or physically taxing, then women would put in less of an effort. Kusá (2010) offers that women may experience a “stereotype threat” in which women become anxious while doing the task, which leads to decreased competitive drive.

Furthermore, Niederle and Vesterlund (2008) felt that women compete, but they are not likely to do so against men. They note that women might think that they have little chance of

winning, so they do not try as hard as men (Niederle & Vesterlund, 2008). Niederle and Vesterlund (2008) also suggest that women might seem to underperform because men might try too hard when competing.

Interestingly, studies have shown that women actually perform better than men during certain conditions (Cashdan, 1998). Cashdan (1998) found that in cases in which women must provide for themselves and their offspring, opposite sex differences prevail much more so than in the other studies. Arguably, it can be assumed that these women are forced to be competitive in both school and work environments. Furthermore, Weber et al. (2009) states that, although men are more motivated by social competition in general, environmental motivational facts, in which the woman was indispensable, resulted in increased competition of women over men. These women were tested on various routine tasks that would be commonplace in classrooms, and turned out to be more competitive than their male counterparts (Weber et al., 2003).

The present study tested whether or not competition plays a significant role in determining college student performance on routine tasks that they may encounter in everyday life. Using a 2 x 2 x 2 factorial design, participants in the study were asked to find as many words as possible within a given amount of time. The current research compared the scores of men and women on word puzzles in four different conditions. It was hypothesized that students who are told of gender differences will do better than those who are not, with men performing better than women. It was also hypothesized that those students who are told about other students' scores on the word search prior to attempting it would also score better than the control group, who were not told any false information. Results from the present study could help educators find out whether or not competition has a positive effect on performance.

Method

Participants

Forty-two Lindenwood University undergraduate students were recruited from the Lindenwood Participant Pool (LPP) to participate in the present study. The LPP is designed to allow researchers to test participants who willingly sign up to partake in studies in exchange for bonus points toward their respective classes. All students who signed up for the present study were at least 18 years old. In order to recruit participants, a sign-up sheet and a recruitment description form (see Appendix A) were pinned on the LPP bulletin board. Two participants were excluded from the data analyses for reasons stated below. Of the 40 students who were included in the aggregate data analyses, 22 were women and 18 were men. Nine undergraduate participants were freshmen, 19 were sophomores, 8 were juniors, and 4 were seniors. The mean age of participants was 20.4 years ($SD = 2.06$) with a mode of 19. Twenty-nine participants were native English speakers and 11 were non-native English speakers. Of the 42 participants, one had a self-reported reading disability and one student expressed discomfort before beginning the word search puzzle. The data from both students was not included in the aggregate data analyses. The student who felt uncomfortable was allowed to leave, but still received bonus points.

Materials & Procedure

Sessions were conducted inside the psychology lab in Young Hall rooms 105a, 105b, and 105c. Each room had at least two desks and two chairs—one of each for the researcher the participant. Participants were provided with writing utensils to fill out all forms and the word search puzzle. An iPhone stopwatch was placed in front of participants so they could monitor their time. Participants received an informed consent form, a word search puzzle with a word

key, a demographic questionnaire, and a feedback letter, respectively. The participants signed an informed consent form (see Appendix B). Groups 1, 2, and 3 were read scripts to incite competitive emotions and to ensure credibility of deception (see Appendix C). Group 4—the control group—was not read a script. After participants signed an informed consent form, and the respective groups were read scripts, a word search puzzle was administered.

A word search puzzle was used because it represented a commonplace task that a person, regardless of sex, would do in everyday life. The word search puzzle included 6-letter and 7-letter words of roughly the same difficulty. The purpose for the words being of the same difficulty was to ensure that some participants would not look for or easier words first (thus finding more words within the given time), while other participants might have chosen to do the list in order (thus finding fewer words within the given time). Words on the sheet were horizontal, vertical, or diagonal (see Appendix D). Participants received a word key in order to know what words appeared on the word search puzzle (see Appendix E). The researcher used a word search key because it was believed that the number of words non-native English speakers found would be much higher if they knew what words to look for. The researcher came to this conclusion after pilot testing indicated that the scores of non-native English speakers who received a word key were closer to the scores of native English speakers who received a word key than if both groups received no word key.

Participants were divided into four groups. As previously mentioned, Groups 1 through 3 were read scripts to incite competitive emotions. Group 1 was told that the opposite sex is shown to find more words on word search puzzles within 4 minutes than the other sex, and that the opposite sex had found an average of 12 words in that time period. Group 2 was told that participants had been finding an average of 12 words in 4 minutes. Group 3 was only told that

the opposite sex did better on word search puzzles. Group 4 was not given any false information. The dependent variable for the present study was the number of words participants found within 4 minutes.

After the word search puzzle was given, participants were asked to fill out a demographic questionnaire (see Appendix F). The form consisted of questions concerning a participant's gender, age, current class status at Lindenwood University, native language, and potential reading disabilities. Participants in Groups 1 through 3 were asked if they felt competitive when they were given the information intended to provoke competitive emotion. The question about competitiveness featured a Likert scale in which participants rated 5 for "very competitive" 4 for "more competitive," 3 for "not competitive," 2 for "not competitive," 1 for "less competitive," and 0 for "much less competitive." Once they had filled out the questionnaire, participants received a feedback letter which informed them of the purpose of the study and the researcher's hypothesis (see Appendix G). Before participants left, the research ensured that all parts of their bonus point receipts were filled out, and then were informed that they were free to leave.

Results

It was hypothesized that men are more competitive than women, and will perform better than women when told that the opposite sex does better on tasks that either sex would encounter on a daily basis. Therefore, men who are told false information about gender differences will perform better than women who are told the same information. It was also hypothesized that all participants who are given false information intended to incite competitive emotions will perform better on the word search puzzles than the control group, who are not given such information.

Analyses were focused on the levels of competitiveness in participants and the scores of men and women on the word search forms. The present study used a 2 (opposite sex) x 2 (time results) x 2 (sex) factorial design. Main effects included: opposite sex information (OSI), time result information (TRI), and sex of participant (Sex). Interactions included: OSI x TRI; OSI x Sex; TRI x Sex; OSI x TRI x Sex.

Results from the 2x2x2 ANOVA indicated a significant main effect of TRI, $F(1, 32) = 6.070$, $p < .05$. There was an approaching significant interaction of OSI x Sex, $F(1, 32) = 3.735$, $p = .062$. In other words, the time results information provided to Group 2 had a significant effect on participants' performance while the interaction between opposite sex information and sex of participant showed an approaching significant interaction. Thus, my results partially supported my main hypothesis.

There were 10 participants in all four groups, and each group had roughly the same number of men as women. Men in Group 1 ($N = 4$) found an average of 14.25 words in four minutes ($SD = 3.20$), while women ($N = 6$) found an average of 11 words ($SD = 2.09$). Participants in Group 1 all felt competitive when given the false information regarding sex differences and the amount of words the opposite sex found in four minutes. Of the men in Group 1, 100% rated more competitive. Of the women in Group 1, 16% rated very competitive and 83% rated more competitive.

The average score of men ($N = 4$) in Group 2 was 11.75 ($SD = 3.09$), while the average score of women ($N = 6$) was 13 ($SD = 4.88$). Participants in Group 2 all felt more competitive when given the false information on time differences. Of the men in Group 2, 100% rated more competitive, while 33.32% of women rated very competitive and 66.68% rated more competitive.

The average score of men ($N = 5$) in Group 3 found an average of 11 words ($SD = 3.80$), while women ($N = 5$) found an average of 10 words ($SD = 3.67$). Of the men in Group 2, 100% rated very competitive, while 80% of women rated more competitive and 20% rated not competitive.

Group 4 served as the control group. On average, men ($N = 5$) in the control group found 7.4 words ($SD = 3.20$). Women ($N = 5$) in Group 4 found an average of 10.6 words ($SD = 3.00$).

Discussion

As previously stated, it was hypothesized that men are more competitive than women, and will perform better than women when told that the opposite sex does better on tasks that either sex would encounter on a daily basis. Consequently, men who are told false information about gender differences will perform better than women who are told the same information. It was also hypothesized that all participants who are given false information intended to incite competitive emotions will perform better on the word search puzzles than the control group, who are not given such information.

Numerous researchers have found that competition has a positive effect on performance (Cashdan, 1998; Niederle & Vesterlund, 2008; Weber, Wittchen & Hertel 2009). However, data from the current study did not strongly support their findings because cores of individuals who rated themselves as being very competitive did not significantly differ from those who rated not feeling competitive. That being said, (Opposite Sex Information) \times (Sex) was approaching a significant value ($p = .062$). Gneezy, Niederle, and Rustichini (2003) found that participants' performance positively increased when they were told about sex differences on maze puzzle scores. The fact that the current study implemented a different type of puzzle could explain why the present study did not indicate such results. Weber, Wittchen, and Hertel (2009) found that

women scored better on competitive tests that did not include information about sex differences. However, the present study did not find any significant values after the data analyses.

Findings from the analysis of the aggregate data did not support the hypothesis that men perform better than women on tasks if they are told about the superior performance of the opposite sex. Therefore, I failed to reject the null hypothesis. Data from the present study did not support the hypothesis that telling information intended to incite feelings of competition will increase scores, regardless of sex. Therefore, I failed to reject the null hypothesis.

The present study had several limitations that could have influenced the accuracy of the results. If similar study with more participants were conducted that found participants perform better when told about differences in performance, then educators could use this information to help their students perform better academically. Educators might also better understand that telling women about sex differences is not as beneficial as simply telling them about differences in competition, regardless of sex. More extensive studies might find that women compete better in same-sex environments, in which case parents might consider the benefits of their girls attending same-sex schools.

The primary limitation of the present study was the small sample size. Additionally, participants were only recruited from the LPP. Even though a script was used to ensure the credibility of deception, not all participants believed in the deceptive information. Participants could have told other individuals involved with the LPP the basic premises of the study, because all participants were recruited from one source. Another limitation is that, toward the end of the semester, participants seemed not to perform as well, and it was evident that they simply wanted to finish the study and leave with their bonus point's receipt.

One suggestion for future study would be to collect data from more participants, preferably over 100. The Likert scale for competitiveness could be expanded from 1-5 to 1-10 to more accurately gauge how competitive participants felt. The type of competition emotion inducing information could be changed to attractiveness or to test for athletic competitiveness to see if each sex would feel more competitive in those scenarios.

The finding from the present study that time information has the most significant effect on performance could lead to a future study. Scores of participants did not improve until the element of time statistics was given, and some participants indicated that they performed differently when under the pressure of time. Thus, research could test the influence of time constraints on test scores.

Future research could be conducted to find out what other variables besides time constraints and competition could be responsible for the differences in scores. Such research could eventually lead to an exceedingly significant result that educators could employ to their students' benefit.

References

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Appendix A

Recruitment Description

In this study, you will be asked to complete word search puzzle and a demographics questionnaire. First, you will be given a word search puzzle requiring you to find words within the puzzle to the best of your ability. You will then be asked a few questions pertaining to your own demographics. The entire procedure should take no more than 10 minutes of your time.

Appendix B
Informed Consent Form

I, _____ (print name), understand that I will be taking part in a research project that requires me to complete a word search puzzle, and a survey which requires me to fill out demographic information about myself. I understand that I should be able to complete this project within 10 minutes. I am aware that I am free to skip any questions at any time. I am also aware that my participation in this study is strictly voluntary and that I may choose to withdraw from the study at any time without any penalty or prejudice. I should not incur any penalty or prejudice because I cannot complete the study. I understand that the information obtained from my responses will be analyzed only as part of aggregate data and that all identifying information will be absent from the data in order to ensure anonymity. I am also aware that my responses will be kept confidential and that data obtained from this study will only be available for research and educational purposes. I understand that any questions I may have regarding this study shall be answered by the researcher(s) involved to my satisfaction. Finally, I verify that I am at least 18 years of age and am legally able to give consent or that I am under the age of 18 but have on file with the LPP office, a completed parental consent form that allows me to give consent as a minor.

(Signature of participant)

Date: _____

(Signature of researcher obtaining consent)

Date: _____

Student Researcher's Name and Number:

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Supervisor/Course Instructor

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Appendix C

Scripts

Group 1 Script:

A past research study conducted by two students in Advanced Research Methods found that _____ found more words on a word search puzzle than _____ within 4 minutes. _____ found 12 words within those 4 minutes. The present study is being conducted to test the accuracy of their results.

Group 2 Script:

The present study is being conducted to find out how many words on average participants can find within 4 minutes. So far participants have found an average of 12 words in 4 minutes.

Group 3 Script:

A past research study conducted by two students in Advanced Research Methods found that _____ found more words on a word search puzzle than _____ within 4 minutes. The present study is being conducted to test the accuracy of their results.

Appendix D

Word Search

Research ID Number: _____ (Assigned by Researcher)

d	t	o	e	n	c	r	l	X	l	g	e	b	l	i
o	h	c	p	h	g	y	n	Z	j	e	y	j	e	s
l	r	c	a	a	i	m	e	o	i	i	t	l	c	o
l	i	u	s	r	n	k	y	l	t	g	h	t	q	e
a	l	p	t	b	j	i	a	s	l	i	z	g	e	y
r	l	y	e	o	u	t	b	s	j	o	c	a	i	r
t	n	q	l	r	r	c	s	w	c	u	w	e	g	n
k	i	l	u	b	e	h	o	v	w	h	n	m	m	g
c	a	b	p	a	u	e	r	r	o	i	o	g	z	o
a	g	f	c	n	r	n	b	a	e	l	l	o	l	h
b	r	i	i	d	i	r	q	t	m	n	u	l	l	e
b	o	n	n	i	n	z	y	i	h	c	t	m	o	o
a	o	g	e	t	a	e	p	o	g	g	c	i	e	w
g	v	e	m	o	l	u	h	n	k	i	k	z	r	q
e	e	r	a	k	p	d	w	a	l	n	u	t	l	e

Appendix E

Word Key

ABSORB	BANDIT	CINEMA	DOLLAR
ENTIRE	FINGER	GROOVE	HARBOR
INJURE	JUNGLE	KITCHEN	LETTER
NOTICE	OCCUPY	PASTEL	QUARRY
RATION	SCHOOL	THRILL	URINAL
VOLUME	WALNUT	WILLOW	YELLOW
ZIGZAG	CABBAGE		

Appendix F
Demographics Questionnaire

Subject ID Number: _____ (Assigned by Researcher)

You may choose to decline to answer any of the following questions.

- 1) Are you MALE FEMALE

- 2) How old are you? ____ years

- 3) What year are you at Lindenwood University?
 - a. Freshman
 - b. Sophomore
 - c. Junior
 - d. Senior
 - e. Other _____

- 4) Are you aware of any disabilities that might have influenced your ability to solve the word search puzzle?
 - a. YES
 - b. NO

- 5) Is English your native language?

YES NO Other: _____

- 6) How competitive did you feel when given the information about differences in performance?
 - a. Very competitive
 - b. More competitive
 - c. Not competitive
 - d. Less competitive
 - e. Very uncompetitive

Appendix G
Feedback Letter

Thank you for participating in my study. The present study was conducted in order to determine whether participants would find more word search puzzle solutions in four minutes if they were presented with false information that suggested individuals of the opposite sex outperformed them on word puzzles printed in lowercase with or without the factor of being timed. I hypothesized that if participants were given false information about the superior performance of the opposite sex on word puzzles then they would be more likely to find more word search puzzle solutions in the given time than participants who were not given this information because I believe that the element of competition increases performance. I used deception because I believed it would invoke feelings of competition, thereby enhancing participant performance. Please note that we are not interested in your individual results; rather, we are only interested in the overall findings based on aggregate data. No identifying information about you will be associated with any of the findings, nor will it be possible for us to trace your responses on an individual basis.

If you are interested in obtaining the final results of this study based on aggregate data, or if you have any questions or concerns regarding any portion of this study, please do not hesitate to let us know now or in the future. Our contact information is found at the bottom of this letter.

Thank you again for your valuable contribution to this study.

Sincerely,

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