



Women's Creativity: is Avoidance Motivation Associated with Diminished Creativity?

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Women's Creativity: is Avoidance Motivation Associated with Diminished Creativity?

Susana Arango Gaviria

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Abstract

The present study investigated the effects of avoidance motivation on male and female creativity in competitions. A mediation analysis was carried out to determine if avoidance motivation carries the negative effects of competition in creativity, and if this effect was more pronounced in females than in males. The study also examined how gender-role endorsements influenced participants' performances on creativity competitions. Previous studies had uncovered two intriguing patterns: avoidance motivation diminishes creativity, and competitions tend to diminish the creativity of women. Yet, they had failed to make a critical connection that could provide a link between these two findings. The present study provides novel data on the connection between avoidance motivation and creativity in competitions. The study hypothesized that females would score higher than males on avoidance motivation when in competitions and that avoidance motivation would diminish their creativity. Furthermore, it was expected that the endorsement of feminine gender-roles would be positively correlated to avoidance motivation, while the endorsement of masculine gender-roles would show the opposite pattern. The study consisted of an experiment in which, via online survey, participants were instructed to complete two creativity tasks either in a competitive (experimental) or non-competitive (control) scenario. Participants were recruited through the Harvard Psychology Department's Study Pool. Creativity was measured with a Divergent Thinking Task and the Remote Associates Test. Avoidance motivation was measured with the Behavioral Inhibition Scale. Other

outcome measures included gender-role orientation, measured by the BEM Sex-Role Inventory, and personality traits, measured by the NEO-FFI. Results revealed that avoidance motivation scores were not related to creativity scores in either sex. What is more, most female creativity scores were not significantly decreased by competition. Men's performance, on the other hand, diminished significantly in the competition group across all creativity measures. Masculinity gender-roles were associated to lower levels of avoidance motivation, but being male was not a good predictor of masculinity. This study provides evidence suggesting that females may feel increasingly comfortable and willing to engage in creativity competitions, and thus, their creative performance is unaffected by them.

Dedication

To my parents.

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Chapter I

Introduction

Previous research has shown that competition hinders creativity in women, but not in men. (Amabile, 1982; Conti, Collins, & Picariello, 2001). This sex difference cannot be explained by differences in creative ability or potential. Research assessing creative ability using tests of cognitive processes, such as divergent thinking, have shown a marginal advantage for women. And yet, when it comes to creative performance in competitions, the creativity of females is negatively affected by the competitive situation, while the creativity of males is not (Conti, Collins, & Picariello, 2001). Why is there a creative achievement and performance gap between males and females, despite no differences in creative ability? Further research is needed to clarify why competitions have a negative impact in female creativity. The motivational orientation that females bring to competitive scenarios could account for differences in performances.

For decades, researchers studying creativity have been interested in sex differences. Most – if not all – of these studies reveal no differences in creative ability between males and females (Abraham, 2016). In order to reach this conclusion, these studies have measured creative ability in males and females with divergent thinking tests, associative thinking tests and creative products made in real world or lab settings (Carver & Scheier, 2002). In the rare cases where differences are found, creativity scores tend to marginally favor females (Abraham, 2016). In line with these findings, studies measuring creativity in children reveal that girls and boys are equally creative (Baer & Kaufman, 2008). And yet, studies that measure creative performance in competitive situations

reveal that competition diminishes creativity in females and enhances creativity in males. It is still not known why competition impacts the sexes differently.

In short, research on creative ability shows no substantial sex differences, but research on creativity in competitive scenarios reveals that competition tends to negatively affect female creativity. An overview of literature on female creativity and the findings on performance in competitions is provided below. An understanding of these topics is a crucial first step in determining the need for future research on female creativity in competitive settings.

The Assessment of Creativity

Creativity is the ability to produce novel ideas and products that are both original and adaptive: they solve a problem or make a contribution in a specific context (Carver & Scheier, 2002). Researchers studying creativity have assessed the creative process, the creative person and the creative product.

To evaluate the creative process, researchers examine creative thinking styles: the cognitive processes involved in developing creative ideas (Carver & Scheier, 2002). Divergent thinking tests and remote association tests, the two most common measures of creative thinking, evaluate a person's ability to generate various solutions to a problem and access remote information stored in memory in order to do so. Higher scores on these tests indicate more creative ability in an individual.

To evaluate the creative personality, researchers examine personality traits that are endorsed by creative people. Previous studies have found correlations between high levels of creative ability, as measured by the Remote association test, and high scores in the personality trait of Openness to Experience - one of the dimensions of personality of

Eysenk's Five-Factor Model of Personality (Aitken Harris, 2004; Javed, Arjoon, & Bashir, 2016). Thus, it is concluded that the personality of highly creative individuals is frequently characterized by high levels of Openness to Experience.

Lastly, researchers evaluate creative products with one of two approaches. The first of these is the Consensual Assessment Technique (Amabile, 1982), in which two or more experts rate products created by participants in research scenarios. Examples of these products include collages, poems and paintings. Products with higher -or better- expert ratings are considered more creative. In the second approach, researchers look at markers of creative eminence such as scientific publications, prizes and exhibitions in prominent museums. Creative products that have been awarded such prizes, as well as their authors, are labeled as highly creative (Carver & Scheier, 2002).

Sex Differences in Creativity

Sex differences have not been found in assessments of the creative process or the creative person. Nevertheless, males have an advantage over females when measuring creative products with markers of eminence, such as prizes. That is, men win prizes and recognitions of eminence more frequently than women (Abraham, 2016).

In a literature review, Baer and Kaufman (2008) compiled 77 studies that measured creativity in males and females with tests of divergent thinking, remote associates, evaluative thinking and other tests of the creative process. Sixty-five of these studies revealed no sex differences in test scores, 9 studies revealed higher female test scores, and 3 studies revealed higher male test scores. Likewise, 3 of these studies revealed that females scored higher than males in Openness to Experience, the personality trait that has been correlated to creativity in previous research. Another

interesting finding reported in this literature review is that psychometric measures of creative thinking were more predictive of creative behaviors, such as playing an instrument, in males than females. This finding supports the idea that creative potential translates into creative achievements less frequently in females than in males. Studies of creativity in childhood, using the same measures, had similar results: boys and girls are equally creative (Baer & Kaufman, 2008). Thus, creative potential seems to be equally distributed in males and females across all ages. Sex differences are only found in the assessment of creative products, and under specific circumstances.

When creative products are measured with the Consensual Assessment Technique, sex differences are not found. Amabile (1982, 1983) conducted a series of experiments that used a collage-making task to assess creativity in children and adults. Collages were evaluated and rated by experts, using the Consensual Assessment Technique. No sex differences were found in her two studies. Likewise, Kaufman, Baer, and Gentile (2004) found no sex differences in a study that evaluated 308 creative writing pieces (poems, personal narratives and short stories) made by eighth graders. These writing pieces were rated by 8th grade creative writing teachers, psychologists studying creativity and published creative writers, using the Consensual Assessment Technique. Thus, sex differences are not found in creative products made by subjects in research scenarios.

Nevertheless, sex differences are found when creative products are evaluated by markers of creative eminence, such as earning prizes or producing publications. In general, males are more likely than females to pursue fields such as scientific invention, musical composition or professional painting – all considered examples of creative

invention. Sex differences are even more pronounced at higher levels of creative achievement, where females are less likely to attain eminence (Abraham, 2016; Baer & Kaufman, 2008). For example, Baron (1972) studied the personality traits of art-school graduates of the San Francisco Art Institute, and pointed out that none of the females in his study ever had a one-person art show during or after finishing the program. Likewise, (Ballesteros-Doncel, 2016) analyzed art pieces in 21 contemporary art museums and exhibition centers in Spain and found that fewer than 20% of art pieces exhibited were created by women.

Similarly, there are sex differences in high-level creative achievements in the realm of science. Studies that use prizes and publications as measures of creative performance find men to be more successful than women. Initially, it was suggested that these differences had to do with women dropping out or stopping out of these fields. Cole and Zuckerman (1991) evaluated scientific publications in the U.S and interviewed 120 scientists to study the effects of marriage and motherhood on number of publications of female vs male researchers. The study revealed that women generally publish fewer papers than men matched for age, doctoral institution and field. In addition, the disparity has increased since 1942. However, married women with children's publication rates are the same as the rates of their single colleagues. On average, eminent married women published slightly more than eminent single women, and the rate of publications of female scientists was unrelated to the number of children they had. Thus, factors such as excessive household workload burdening women do not explain the observed sex differences. Feist and Runco (1993) conducted a similar study, counting the male and female-authored publications in the *Journal of Creative Behavior* from 1967 until 1989.

Throughout these years, there were three times more male-authored than female-authored publications. In addition, significant sex differences are also found in the most important creativity achievement award of all times: the Nobel Prize. Only 53 out of the 919 individuals who have been awarded a Nobel Prize are women. The situation is even more unsettling in the fields of science, where women have been awarded only 22 prizes—about 3% of the total (Guterman, 2019). These examples are evidence of the imperative need for future research to focus on finding other explanations to why males publish and win more prizes than women.

Taken together, the findings of studies on sex differences in creativity indicate that males and females score equally in every measure of creativity, except for prizes and publications. The question remains: why is there a creative achievement gap between males and females, despite no differences in creative ability?

In order to answer this question, previous studies have explored sex differences in brain activation patterns when completing creative tasks. Abraham, Thybusch, Pieritz, and Hermann (2014) found sex differences in brain activation patterns while completing an alternate use task, a common measure of creative thinking. In a study of 28 men and women, no sex differences were observed on the task, which required participants to come up with different and original uses for everyday objects. Nevertheless, fMRI studies revealed significant differences in patterns of brain activity. Both sexes had predominantly left hemisphere activity while completing the task, but male and female areas of activation were clearly distinguishable. Areas of the left inferior frontal gyrus, orbitofrontal cortex and inferior parietal lobule were more active in men, while females displayed more activity in the anterior and posterior superior temporal gyrus and the

superior parietal lobule. Thus, male activation patterns reveal the use of brain regions related to declarative memory, semantic cognition, rule learning and decision making. Women, in contrast, displayed higher activity in regions related to speech processing, social perception, theory of mind and self-referential processing. Authors explain that the use of specific brain areas in the sexes suggests that different cognitive approaches may be employed to solve this creative task. For example, some participants may opt for imagining themselves with the object, while other participants may recur to metaphors and analogies in order to come up with ideas to complete the task. If males and females use different strategies to solve the task, this could explain disparities in brain activation areas. This study did not consider the sexual orientation or gender identity of its participants, nor did it analyze the specific strategies they used to complete the task. Hence, it can be concluded that males and females show distinct brain activation pathways to creativity, but the reason for this difference remains unclear.

Sex Differences in the Extrinsic Motivation Hypothesis

Motivation is yet another aspect of creativity that could differ in males and females. The extrinsic motivation hypothesis, which is well documented in creativity research, explains that creativity thrives with intrinsic motivation and is hindered by extrinsic constraints (Amabile, 1993). It is likely that these effects are more pronounced in women.

In a study that aimed to measure the impact of feedback (an extrinsic constraint) on intrinsic motivation, Deci (1971) gave subjects either positive feedback, negative feedback or no feedback while completing a puzzle task. Intrinsic motivation was measured as the amount of time that participants spent on the task after given time

specifically to solve the puzzle and then offered the option to either rest or continue. Females spent less time on the puzzle after receiving any feedback, whether or positive or negative, compared to no feedback at all. Thus, any kind of feedback was related to lower intrinsic motivation to continue the puzzle-solving task. Among males, positive feedback was related to persisting in solving the puzzle; they spent more time on it after positive feedback than after either negative feedback or no feedback at all. The author concluded that positive feedback increases intrinsic motivation in males but not in females.

Deci (1971) suggested that differences in the way that males and females are raised may explain the disparities found. Positive feedback may increase self-determination and confidence in men, but it may change the locus of causality in women. Because females are often encouraged to be more sensitive towards others, feedback can become an extrinsic motivator to do well in a task, shifting the locus of causality from inwards (finishing the puzzle because they want to) to outwards (finishing the puzzle in order to receive positive feedback). Feedback, as an extrinsic constraint, may not have the same effect on males, who are less sensitive to it. In their case, it could strengthen feelings of competence, increasing their intrinsic motivation and leaving their extrinsic motivation levels unchanged.

Inferring intrinsic motivation from behavior, such as free time spent on a task, has an advantage over self-report measures of motivation: self-report can provide information on a participant's perception of the task, but not on the tangible effect that motivation has on creative performance. Furthermore, this study indicates that there are differences in how extrinsic constraints affect motivation in males and females. These differences in

motivation could account for sex differences in creative performance and should be assessed by future studies.

Other research on extrinsic constraints on intrinsic motivation has also used puzzle solving as a measure of task performance. Koestner, Zuckerman, and Olsson (1990) measured intrinsic motivation in subjects completing a puzzle task in conditions of no verbal motivation (control group), ability praise ('you are more capable than most') and effort praise ('you are trying harder than most'). Intrinsic motivation was measured with time spent on the task. In line with previous research, women displayed more intrinsic motivation – persisted more on the puzzle – under the no praise condition compared to either of the two praise conditions, while men showed the opposite pattern. Like previous researchers, the authors concluded that women may be more sensitive to social reinforcement due to socialization practices, and therefore may perceive praise as controlling, shifting the motivation for the task from intrinsic to extrinsic. These findings are consistent with the previously described study (Deci et al., 1975), and taken together reveal a tendency of women to show higher levels of intrinsic motivation when they receive no feedback than when any kind of feedback, including praise, is offered. It is possible that women appraise feedback as evaluative and thus choose an avoidance coping mechanism by not engaging further in the task.

Like feedback, evaluation situations are another constraint for performance in creative endeavors that affect women more than they affect men. In a study designed to test the effects of evaluation on creative performance, Baer (1997) asked 8th grade boys and girls to write original poems and short stories. He examined differences in the effects of anticipated evaluation on creativity by having each participant write a poem and a

story under conditions favoring first intrinsic motivation (an ungraded assignment) and then extrinsic motivation. For the latter condition, the experimenter came into the classroom claiming to be an expert in language arts from the state department of education. He explained that the poems would be collected and assessed by experts in the department, emphasizing that student's skills would be judged on these two pieces. These writings were then evaluated by raters blind to the experiment. Results revealed that creativity was negatively affected in females in the evaluation condition. This pattern was absent in male participants. According to Baer (1997), it is possible that adolescent girls are more attentive to cues from their social environment than boys, which may increase the negative effect of extrinsic motivation on their creativity. Thus, their motivational set is more responsive and sensitive, augmenting the negative effects of extrinsic motivators on tasks. Lastly, he concludes that if there are gender differences in creative performance under evaluation, they would be more pronounced in this age group; early adolescence is a period of life marked by great gender-consciousness. Studying students in their natural environment and examining external constraints (evaluations) that are coherent with it, allows conclusions to be generalized to real-life scenarios of evaluation that are relevant to male and female creativity. Again, results point to a pattern of female creativity being more affected by extrinsic constraints than male creativity. Although this study did not specifically assess motivation, its results are in line with those of studies that have directly analyzed the relationship of motivation to extrinsic constraints and task performance. In females, motivation could be carrying the negative effect of extrinsic constraints on creativity.

Competition as an Extrinsic Constraint on Motivation

Competition has also been considered as a possible extrinsic constraint on motivation, shifting motivation from inward to the pursuit of an external reward. In a competitive scenario, there is direct social and relational impact because the person is compared to his or her peers. Thus, winning and losing are types of feedback that can affect motivation. An overview of the research conducted on creative performance in competitive scenarios in males and females will be provided below.

Amabile (1982) designed a study that aimed to assess the impact of competition on creativity. Participants of the study were 21 girls aged 7 to 11 who were divided into two groups. One of the groups made collages at a party where prizes were to be raffled. The second group went to a different party and was told that prizes would go to the three best collages. Experts rated all collages and found the ones from the raffle party more creative than the ones from the competition party. This led to the conclusion that competition has negative effects on creativity. Nevertheless, the fact that there were only female participants in this study must be taken into consideration when analyzing its results (Conti et al., 2001). The effects of competition on creativity cannot be generalized to males based on these findings, but subsequent studies have tried to replicate Amabile's findings on the effects of competition on creativity in both males and females.

Like Amabile, Conti et al. (2001) aimed to evaluate if competition influenced children's creativity and intrinsic motivation, specifically examining differences between girls and boys. An experimental design with 50 children aged 6 to 10 included two groups who were instructed to make collages. In the experimental condition, children with the three best collages were to receive prizes. No prizes were offered to the children

in the control group. Boys' creativity was found to be enhanced under the competition situation, while creativity in girls was affected negatively in this condition. Furthermore, findings revealed that this differential effect of competition on creativity was more pronounced when children self-segregated by gender (they could choose where and with whom to interact while making their collages). When compared to children who sat in mixed groups, the creativity of boys who sat with other boys was enhanced the most under the competition condition, and the creativity of girls who sat with other girls was diminished the most in this same condition.

The effect of gender segregation on creativity led the researchers to conduct a second experiment. This time, children completed collages in a setting with assigned seats: either gender integrated (boys and girls together) or gender segregated (boys on one side, girls on the other). A 2 x 2 factorial design was used, where gender segregation and competition were the two predictor variables, and creativity was the outcome variable. An inventory of masculinity and femininity traits in children's personalities (the children's sex role inventory, CSRI, 1991) was included as an additional measure. Results of this second phase of the study revealed no differences in the effects of competition on intrinsic motivation and creativity in boys and girls. Neither was girl's creativity diminished nor was boy's creativity enhanced by the competitive situation. Nevertheless, highly masculine children were found to be more intrinsically motivated in the competition scenario than children who scored lower in masculinity on the CSRI scale. Masculinity traits were also found to be associated with higher levels of global sense of self-worth, scholastic competence, social acceptance, athletic competence and physical attractiveness. What is more, children high in masculinity traits were more motivated in

the competition scenario when they were seated with other children of their same gender than when they were seated at mixed-gender tables.

These findings indicate that masculine traits, rather than being male or female, may play a role in the way children react to competition. Negative effects of competition in females were revealed by study 1, and although these were not replicated in study 2, enhanced creativity in competitive scenarios was positively related to masculinity traits. This suggests that the effect of competition on creativity is related to gender traits: competition enhances creativity when a person scores high in masculinity traits and tends to diminish creativity when a person scores high in femininity traits. A closer review of masculinity traits as described by the CSRI discloses that attributes such as dominance, willingness to take stand and eagerness to win games are classified as more masculine than feminine (Boldizar, 1991). Thus, it is not surprising that they were found to be related to an increase in creativity in competitions. Specific scenarios that change the motivational orientation of children may be influenced by characteristics that may be more common in boys than girls because of upbringing, such as the masculinity traits as described by the CSRI. Motivation has a decisive influence in creativity, and research has found differences in how the motivational system of the genders is impacted by extrinsic constraints, such as competition.

More recent studies have also assessed the effects of competition in the creativity of single-sex groups. In the first part of a study on intergroup competition, Baer, Vadera, Leenders, and Oldham (2014) recruited 360 college students who were randomly assigned to low, medium, and high intergroup competition levels. The groups were tasked with generating creative ideas on how the university could help new students

transition from high school to college. The competition levels were differentiated by the amount of cash the groups were to receive if their ideas were chosen among those of other groups (either \$1, \$10 or \$100 per person), and by levels of competitiveness, defined by the percentage of groups they had to outperform in order to win (single most creative group, top ten most creative groups, amongst the most creative half). Creativity was measured by external raters blind to the experiment. Results revealed that competition had the expected negative effects on the creativity of groups of women, while it enhanced the creativity of groups of men. Significantly, however, these findings emerged only at the high end of the competition spectrum (high intergroup competition) and were not found in sex-heterogeneous groups. A second part of the study repeated the experiment in a sample of 64 groups of scientists, engineers and technicians of a global gas and oil company. Again, the negative effects of intergroup competition on creativity were found in female groups on the higher end of the competition spectrum. These results follow the trend of previous studies on competition, revealing that competitive cues hinder female creativity. This relationship is dependent on the level of competitiveness and sex-homogeneity of groups.

Sports are a natural setting for research in competition. Hence, previous research has examined how male and female athletes' performances are affected by anxiety towards competitions. Witting, Duncan, and Schurr, (1987) studied perceived physical-self efficacy and sport competition anxiety in 270 male and female college students. Previous studies had revealed that males tend to have lower levels of competition anxiety than females. Measures of the study included sport competition anxiety, physical self-efficacy and gender- role endorsements. The latter term describes the extent to which an

individual identifies with traditionally masculine or feminine traits as measured and defined by the Bem Sex-Role Inventory (1974). Adjectives such as affectionate, cheerful, and compassionate are included in the feminine traits, while adjectives such as dominant, assertive and individualistic are included in the masculine traits (Bem, 1974). Results of the Wittting et al. study (1987) showed that males endorsing masculine roles had the highest levels of physical satisfaction on the scale of physical self-efficacy. Females endorsing masculine roles had lower levels of physical satisfaction than males endorsing masculine roles, but more physical satisfaction than either females or males who were low on masculinity traits. Likewise, both males and females with high masculine traits showed less competition anxiety than participants who scored low on masculine traits. In general, males had lower levels of sport competition anxiety than females. Males endorsing a masculine role had the least sport competition anxiety and females endorsing feminine roles had the most. There was also a middle group who evidenced androgynous traits, and their sport competition anxiety did not vary between males and females, suggesting that that differences in sport competition anxiety are present only in males and females who have distinct preferences for traditional gender-roles.

Importantly, the Bem sex-role inventory, used in this study to measure gender-role endorsements, includes competitiveness as one of the masculine traits, so it is not surprising that people who score high in masculinity traits would also have low competition anxiety. Nonetheless, this study reveals that competition negatively affects physical self-efficacy in females and people endorsing feminine traits to a greater extent than males and people endorsing masculine traits. It can be concluded that physical activities and competitions have been traditionally linked to males and masculinity.

Therefore, males and the masculine gender role are related to lower levels of sports competition anxiety, while females and female identity are related to higher levels of competition anxiety.

In sum, results of various studies of sex differences in competitions suggest that females are negatively affected by competitive scenarios more than males. There are several possible reasons why women tend to perform less well when they are placed in competitive situations. One reason is masculine vs. feminine traits. Masculine traits are associated with self-confidence and paying less attention to other people's feedback, which is thought to reduce the negative impact that extrinsic constraints – like competition – have on intrinsic motivation. On the other hand, feminine gender traits have been associated with being more attentive and influenced by other's feedback. Hence, the female motivation system is more sensitive to cues from the external world. Because competitive scenarios are necessarily ones where the person is confronted with others, being more sensitive to cues from the environment can become a strong extrinsic factor that overrides intrinsic motivation.

On that account, the sex differences observed in competitions could be explained by the fact that the motivation systems of males and females react differently in competitive scenarios. In other words, motivational orientations could be the link between competition and diminished performance in females. As mentioned in the previous section, motivation has been studied as an element that can help or hinder performance in creativity, and results of these studies have pointed to a pattern of female motivation being more sensitive to cues from the environment – like competition.

The Effects of Approach and Avoidance Motivation on Creativity

In the past, studies on approach and avoidance motivation have tried to explain the relationship between creativity and motivation. An approach motivation is evoked by the presence of potential positive outcomes and related to safe environments. It induces explorative behaviors and a broader focus, when compared to avoidance motivation. The latter is associated with potentially threatening environments and the expectation of negative outcomes, and induces focused and vigilant behavior (Roskes, 2014). The way in which approach and avoidance motivation influence creativity can be explained by the specific cognitive processing styles that people adopt under each of these. On the one hand, avoidance motivation evokes a systematic, effortful and focused way of processing information, a cautious mode of thinking that has been linked to reduced creativity (Roskes, De Dreu, & Nijstad, 2012). Furthermore, avoiding negative outcomes is paired with anxiety, stress, and fear of failure, which have all been identified as constraints to creativity. Approach motivation, on the other hand, is related to a flexible style of information processing, higher risk tolerance, holistic thinking and the ability to flexibly recombine and switch ideas, all of which foster creativity. As an example, avoidance temperament was found to increase social-evaluative threats towards standardized math tests in college students, leading to a worse performance in comparison to that of low avoidance-temperament students (Liew et al., 2014). Likewise, psychopathologies that are linked to the approach system (hypomania, positive schizotypy) were positively correlated to increases in creative production, while avoidance-related psychopathologies (anxiety, depressive mood, negative schizotypy), were not (Baas, Nijstad, Koen, Boot, & De Dreu, 2019). However, previous studies of approach vs. avoidance motivation and

creativity have not considered gender differences. If women are more likely to take an avoidance motivational approach to competition, then this tendency might explain why they become less creative when confronted with competition.

Although the goals that people adopt are determined in part by personality and other individual factors, they can also be driven by specific fluctuating situations (Roskes, 2015). Accordingly, situations where people expect negative outcomes would elicit an avoidance approach, while situations where positive outcomes are expected would elicit an approach motivation. Competition may be such a scenario. As previous authors have mentioned, females may want to avoid the negative stereotype associated with women and feminine traits in competition (Baer et al., 2014; Witting et al., 1987). Masculinity traits, on the other hand, are positively related to a desire for winning, physical self-efficacy and enhancement of creativity in competitions (Conti et al., 2001; Witting et al., 1987). This would explain why intrinsic motivation diminishes in females in competitions. Hence, different motivational approaches could account for disparities across gender creative performances in competition, despite creative thinking test scores, under no special circumstances, being equal, if not favorable to women.

Significance of Study

The existing literature provides evidence that females have the same creative potential as males, but this potential does not lead to creative achievements to the same extent. Past studies have attempted to assess external elements that could impact creativity in order to decipher this enigma. Ultimately, the results of these studies reveal the tendency of competitive scenarios to have a negative impact on both female creativity

and motivation. On the other hand, avoidance motivation negatively affects creativity in both males and females.

Previous studies have made significant advances in uncovering these patterns. Yet, these researchers have failed to make a critical connection that provides the logical link between these relationships: the impact of motivation on the reduction of female creativity under competition. Is motivation a mediator in the relationship between competition and creativity? And, if it is, does this explain the persistent sex differences in creative achievement that are observed in competitive settings?

It was hypothesized that females would show higher levels of avoidance motivation in competitive scenarios than males, and this avoidance motivation would be associated with reduced creativity. On the other hand, it was predicted that males would show more approach motivation in the competitive scenario than females. Thus, their creativity scores would be unchanged by competition.

A careful study of the motivational orientations that females adopt in the face of competition will allow a deeper comprehension of female creativity. Furthermore, it will elucidate the mechanisms behind its impairment in the world of creative achievements in competitions, where it has been overshadowed by male creativity.

Study Aims & Hypotheses

The purpose of this study was to investigate the influence of avoidance motivation in creativity competitions. Additionally, it examined the different effects of this type of motivation on male and female creativity. To do so, the study focused on three main aims:

Aim 1

This study aims to answer the question: is avoidance motivation carrying the negative effects of competition in creativity? Previous research has established the link between creativity and competitive scenarios, concluding that people are less creative in competitions (Amabile, 1982; Baer, 1997). Likewise, it has established a link between creativity and avoidance motivation, concluding that avoidance motivation hinders creativity (Roskes, 2015). This study examined whether the relationship between competition and diminished creativity could be explained by avoidance motivation. I predicted that people's creativity would be reduced in competitions when they score high on avoidance motivation but remain unaffected when they score low on avoidance motivation.

Aim 2

This study aims to understand if the relationship between avoidance motivation and diminished creativity is stronger in females than in males. Given that existing literature reveals that competitions negatively affect female creativity (Baer et al., 2014; Conti et al., 2001), I predicted that females would be more avoidant than males, and thus less creative in competitions. I divided this aim into several smaller questions that provided answers necessary to draw conclusions.

1. Does avoidance motivation mediate the relationship between competitions and creativity in females?

I hypothesized that avoidance motivation would mediate the relationship between competition and creativity in females: when females scored high on avoidance

motivation, their creativity in competitions would be diminished. When they scored lower on avoidance motivation, their creativity in competitions would be unaffected.

2. In a competitive situation, are females more avoidant than males?

I hypothesized that, in competitions, females would have higher scores on avoidance motivation than males.

3. In a competitive scenario, are males more creative than females?

I hypothesized that, in competitions, males would have higher creativity scores than females.

4. Does avoidance motivation mediate the relationship between sex and creativity in competitions?

I hypothesized that mediation would be confirmed: females would score higher on avoidance motivation than males, thus having lower creativity scores.

Aim 3

This study aims to examine if gender -role endorsements of masculinity and femininity are significant predictors of avoidance motivation. Gender role endorsements refer to a person's identification with traditionally masculine and feminine gender-roles (i.e., societal expectations of the behaviors and attitudes that are considered appropriate for males and females (Bem, 1947). This study collected information of participants' sex, defined as 'male', 'female' or 'non-binary'; and their gender-role orientations, measured with the Bem Sex Role inventory (1947). In the two previous aims, sex differences were assessed based on participants' self-identification of their sex. In this aim, however, participants' responses on the gender-role measure were used as predictors of avoidance motivation.

I divided this aim into several smaller questions that provided answers necessary to draw conclusions.

1. Are people who score high on femininity more likely to be avoidant?

I hypothesized that people who scored high on femininity would be more likely to have higher avoidance motivation scores.

2. In a competitive scenario, are people who score high on femininity more likely to be avoidant?

I hypothesized that people in the competition group who scored high on femininity would be more likely to have higher avoidance motivation scores.

3. Are people who score high on masculinity less likely to be avoidance motivated?

I hypothesized that people who scored high on masculinity would be more likely to score low on avoidance motivation.

Chapter II

Method

This study consisted of an experiment measuring creative performance in competitive and noncompetitive scenarios in both males and females. It was conducted using an online survey administered via Qualtrics with open-ended and multiple-choice questions. The software program G Power 3.1 determined that the target sample needed to be a minimum of 56 participants, half of whom were male and half of whom were female. An MANOVA F test was assumed, with an effect size of 0.2, an alpha of 0.05 and a power of 0.95.

Participants

Participants were recruited through the Harvard Psychology Department's Study Pool, which gives course credit to Harvard students in exchange for participation in their registered studies. The only inclusion criteria were related to English fluency and sex identification. Participants were excluded if they were not fluent in English. In addition, participants were excluded if they did not define themselves as male or female, given the main hypothesis (about sex differences) of the study. Participants were screened for their English fluency and gender identity with two questions in the survey that appeared after the informed consent and before the tasks and measures. The sex-identification question allowed participants to identify themselves as: male, female, non-binary or 'would rather

not answer'. After the data was collected, Participants were excluded from the analysis if they did not meet inclusion criteria.

A total of 107 participants completed the study. From this sample, a total of 18 participants were excluded for any of the following reasons: 1) they did not define themselves as male or female, and/or 2) they did not complete the survey. The final sample consisted of 89 participants, (68.6% female, 31.4% male).

Measures

Participants were asked to complete one of two versions of a survey with a competitive cue manipulation embedded into the experimental group's version. This study included measures designed to capture personality traits, avoidance motivation, creative ability, and gender-role endorsements.

Primary Outcomes

The primary outcomes of this study included all creativity and avoidance motivation measures.

The Remote Associations Test was used as a measure of creative thinking. This 10-item measure requires participants to complete sentence stems by filling in the blank with one word. Participants were given 30 seconds to respond to each item before the next one appeared. For each item, participants were given three cue words that were linked by a hidden fourth word. Participants were tasked with providing the correct fourth word in the blank. An example question was provided for participants: 1) paint, doll, cat (answer: house).

Each item of the RAT was scored with either 1 for a correct answer or 0 for an incorrect answer. The sum of all items was used as a creativity measure, with higher scores indicating greater creative ability. Mednick (1968) provided evidence of internal consistency of the RAT with Spearman-Brown reliability coefficients of $r = .92$ and $r = .91$ in tests from two separate samples. Furthermore, as evidence of criterion validity, Mednick demonstrated that the test has positive correlations with measures of originality in divergent thinking tests and is not related to grades or IQ, suggesting that the RAT measures creativity instead of intelligence. Studies comparing eminent and non-eminent artists found higher RAT scores in eminent artists (Plucker & Makel, 2010), strengthening the claims of criterion validity of the measure. The RAT has been widely used in literature as a measure of creative thinking (example: Gómez-Ariza et al. (2017).

Two Alternate Use Tasks were used to measure Divergent Thinking (DT): a cognitive process involved in creativity. These are two validated tasks created by Torrance (1968). Participants were asked to come up with alternate uses for an empty soup can and a brick. They were given 2 minutes to answer each question and were instructed to come up with as many answers as possible. I assessed fluency (the number of responses produced) and originality (the statistical infrequency of each response relative to responses of other subjects in the study). Next, I calculated the standard scores for both fluency and originality and summed them to obtain each subject's total DT score. Alternate Uses tasks are widely used in creativity research and are reliably correlated with other measures of creativity, such as The Creative Achievements Questionnaire (Carson, Peterson, & Higgins, 2005).

The Behavioral Inhibition and Behavioral Activation Scales were used to measure motivation (Carver & White, 1994). These two separate scales measure approach and avoidance motivation. In the dimension of approach, people seek to attain favorable outcomes from a task. Contrarily, in the avoidance approach, people avoid an expected unfavorable judgment or result. The avoidance motivation scale consists of 7 questions and the approach motivation scale consists of 13 questions. Questions relate to how participants usually approach a task, for example: ‘When I go after something I use a "no holds barred" approach.’

In this study, the scales of approach and avoidance motivation were treated as two separate variables. Participants were instructed to respond to items on a Likert scale, providing ratings ranging from 1 (“very true for me”) to 5 (“very false for me”) for each item. Higher scores on the items reflect a greater level of the specific type of motivation. The sum of all items in the avoidance scale was treated as the avoidance motivation score for each participant.

The Behavioral Inhibition and Behavioral Activation Scales were validated in a study of 732 college students (Carver & White, 1994). Psychometrics were reported separately for each scale. Thus, the scales have been validated to be used and treated as two different variables representing two separate constructs (avoidance motivation vs approach motivation). Authors provided evidence of internal consistency with a Cronbach’s alpha of $\alpha = .73$ on approach orientation, and $\alpha = .74$ on avoidance orientation. Test-retest reliability coefficients at Time 1 and Time 2 (8 weeks later) were ($r = .59$) on approach orientation and ($r = .66$) on avoidance orientation. Furthermore, convergent and discriminant validity was assessed by comparing participant scores on the two scales with

other, well established scales that measure similar constructs, including: Positive and Negative Affect Schedule, Manifest Anxiety Scale, General Temperament Survey, Behavioral Inhibition System, Minnesota Multiphasic Personality Inventory, Tridimensional Personality Questionnaire and California Psychological Inventory. Results suggested that the scales are related to, but also distinguishable from, well-established measures of similar constructs.

Secondary Outcomes

Secondary outcomes of this study included measures of personality traits, gender-role orientations and a manipulation check.

The Bem Sex Role Inventory was used to measure each participants' identification with traditionally masculine and feminine gender-roles (i.e., societal expectations of the behaviors and attitudes that are considered appropriate for each sex (Bem, 1947). For example, adjectives such as "self-reliant," "competitive," and "independent" are culturally perceived to be masculine, while adjectives such as "compassionate," "tender," and "warm" are culturally perceived to be feminine. Participants were instructed to rate on a Likert scale ranging from 1 ("almost never true") to 7 ("almost always true") how much each adjective describes them. In total, there are 60 items (adjectives) on the measure.

In this study, the scales of masculinity and femininity were treated as two separate variables. The sum of all the 'masculine' items was calculated and then divided by twenty, as indicated by Bem (1974). Feminine traits are calculated using the same procedure. Higher scores reflect greater endorsement of each gender-role.

The Bem Sex Role Inventory has been used for years in studies of behavioral sciences (Donnelly & Twenge, 2016). In her initial study, with a sample of 917 college students and paid volunteers, Bem found evidence of strong internal consistency with a Cronbach's alpha of $\alpha = .86$ on masculinity and $\alpha = .80$ on femininity. The two scales were found to be logically and empirically independent, with a correlation coefficient of $r = .11$ for masculinity and $r = -.14$ for femininity. Test-retest reliability was assessed with a sample of 56 males and females: coefficients at Time 1 and Time 2 (4 weeks later) were $r = .90$ for both masculinity and femininity. Furthermore, convergent and discriminant validity was assessed by comparing participant scores on the two scales with other well-established scales that measure masculinity and femininity, including the California Psychological Inventory and Guilford – Zimmerman Temperament Survey. The most recent study assessing the validity of the scales was carried out in 1998, when Holt & Ellis (1998) found even stronger evidence of internal consistency with a Cronbach's alpha of $\alpha = .95$ on masculinity and $\alpha = .92$ on femininity.

The NEO-FFI was used as a measure of the Big Five personality traits (openness to experience, conscientiousness, agreeableness, extraversion, and neuroticism). Previous studies have found evidence that scores of openness to experience positively correlate with scores of creativity tests (McCrae, 1987). Neuroticism, agreeableness, conscientiousness, and extraversion did not correlate with creativity. Thus, it is concluded that openness to experience is a personality trait highly endorsed by creative people. This personality trait involves the dimensions of active imagination, aesthetic sensitivity, attentiveness to inner feelings, preference for variety, and intellectual curiosity.

Participants in this study were presented with statements such as ‘I am not a worrier’ and instructed to rate on a Likert scale ranging from 0 (“strongly disagree”) to 4 (“strongly agree”) how much each statement described them. In total, there were 60 items (statements) on the measure. Individuals received a separate score for each trait, which was calculated by adding up the scores of all items that corresponded to each of the five factors.

A recent assessment of psychometrics of the NEO -FFI in a sample of 359 college students found evidence of strong internal consistency of the scales with a Cronbach’s alpha of $\alpha = .88$ on neuroticism, $\alpha = .80$ on extraversion, $\alpha = .79$ on openness to experience, $\alpha = .76$ on agreeableness and $\alpha = .83$ on conscientiousness (Maples-Keller et al. 2019).

Construct validity was assessed by comparing participants NEO-FFI scores with their scores on the pathological personality inventory included within DSM–5 Section III. The five domains of personality in the NEO-FFI correspond theoretically with the five domains of maladaptive personality included in this model. The personality profiles included within the DSM -5 are each a maladaptive expression of one of the personality domains in The Big 5 (Maples-Keller et al. 2019).

A manipulation check of the competition variable was included at the end of the survey.

It consisted of two questions: 1) ‘How competitive with the other participants did you feel as you began the creativity tasks?’. Participants answered on a scale of 1 (“not at all competitive”) to 5 (“very competitive”); 2) ‘In general, which of the following best describes your feelings about the competition?’. Options were: ‘I prefer activities where I cooperate with people rather than compete against them’; ‘I don’t necessarily enjoy

competition, but I do well when I have to compete’; ‘I enjoy competition and feel it brings out the best in my abilities’.

Sex was coded based on the answers participants provided in the first part of the survey.

Options were: male, female, non-binary and ‘would rather not answer’. Because the main study hypotheses were related to sex differences, those who answered ‘non-binary’ or ‘would rather not answer’ were excluded from the analysis.

Procedure

There were three protocols used to conduct this study: 1) data collection protocol, 2) study protocol and 3) data cleaning protocol.

Data Collection Protocol

Data was collected with the help of the Harvard Psychology Department’s Study Pool: a digital platform that offers graduate and undergraduate students, postdoctoral researchers and faculty from Harvard University the opportunity to find participants for their research. Most participants are members of the Harvard community (students and affiliates), but participation is also open for unaffiliated volunteers. In exchange for their participation in this study, students were offered course credit (which is a requirement of the curriculum of many Psychology classes). All research linked to the Study Pool is reviewed by the Committee of the Use of Human Subjects (CUHS).

This study was approved by Harvard University’s Institutional Review Board (IRB) on 10/5/2020. It was uploaded to the Study Pool’s website (which directed participants to the appropriate Qualtrics survey) on 13/5/2020, and data collection began.

The survey was on the Study Pool's website for approximately three months, and data collection finished on 22/1/2021.

Study Protocol

Upon entering Qualtrics and before clicking on the survey, participants were screened for their English proficiency. If they met criterion, they were directed to the consent form, which informed them of the general purpose of the study (to investigate creativity and things that hinder it, as part of an ALM thesis in the Harvard Extension School), its duration (40 minutes) and the confidentiality and data security terms. Participants provided consent by clicking an 'I Agree' button. Next, participants completed a demographic question assessing sex. Afterwards, Qualtrics randomly assigned participants to one of two conditions: the control (non-competitive) or experimental (competitive) condition. These conditions differed in the instructions presented to participants. In the competition group, participants were told that they were about to enter a competition for a \$100 Amazon gift card, which would be raffled amongst the top creativity scores. In the control group, participants were told simply that they were about to complete a series of creativity tasks and personality measures. The first measure presented was the RAT, followed by the two Alternate Use tasks and the rest of the measures: Bem Sex Inventory, The Behavioral Inhibition and Behavioral Activation Scales, NEO-FFI, and the manipulation check. All tasks and measures were presented in the same order in both the control group and the experimental group. After participants had completed all the measures, they were finally directed to a debrief page that explained the study's true purpose (to study people's creativity in competitive and non-competitive scenarios) and that all participants were eligible for the \$100 Amazon

gift card raffle. Those who were interested in participating in the raffle were instructed to provide their email addresses in the Qualtrics form.

Data Cleaning Protocol

After the data collection was complete, I used the software SPSS to download and clean the data. All participants who answered ‘non-binary’ or ‘would rather not answer’ on the demographic question about their sex were excluded from analysis, as being male or female was the main inclusion criteria for participation in this study. Likewise, I excluded all participants who did not complete (i.e., left blank) the two creativity tasks or the measures, as some participants completed only the RAT. I also excluded a single participant who did not understand the instructions of the RAT (wrote in the blank space a full sentence that included the three words), as this invalidates the measure and would constitute an outlier. Lastly, I excluded a single participant whose score in the Divergent Thinking test was three standard deviations above the norm, as he skewed the mean creativity score of his group and constituted an outlier. The data cleaning procedures carried out in this study followed the usual methods suggested for cleaning data in studies of the behavioral sciences (Field, 2013).

Data Analysis

All data analyses in this study were conducted using the software SPSS. Two preliminary analyses were conducted to gain a general understanding of the study’s results: 1) a correlation matrix including all outcome variables and 2) an assessment of sex differences in creativity outcomes using t- tests for comparing means. Afterwards, analyses were conducted separately for each study aim.

Aim 1

To assess if avoidance motivation is carrying the negative effects of competition in creativity, a mediation analysis was conducted. More specifically, the Baron and Kenny (1986) method, which consists of three simple linear regressions:

- Competition predicted by avoidance motivation: are the people in the competition group more likely to be avoidant?
- Creativity predicted by avoidance motivation: does avoidance motivation diminish creativity?
- Creativity predicted by competition: are people in the competition group less creative?

In the Baron and Kenny (1986) method, if these three assumptions are met, mediation is confirmed.

Aim 2

Four analyses were conducted to assess the questions in this aim:

1. Does avoidance motivation mediate the relationship between competitions and creativity in females?

The Baron and Kenny (1986) method of mediation analysis was used to test for mediation. This analysis consisted of three simple linear regressions:

- Competition predicted by avoidance motivation: are the females in the competition group more likely to be avoidant than the females in the control group?

- Creativity predicted by avoidance motivation: does avoidance motivation diminish creativity in females in the competition group?
- Creativity predicted by competition: are females in the competition group less creative than females in the control group?

If these three assumptions are met, mediation is confirmed.

2. In a competitive situation, are females more avoidant than males?

A t-test for comparing means was used to compare female avoidance scores and male avoidance scores. The data analyzed corresponded to participants in the competition (experimental) group.

3. In a competitive scenario, are males more creative than females?

A series of t-tests for comparing means were used to compare female creativity scores and male creativity scores. T tests were conducted separately for each one of the creativity outcome variables: RAT, DT Fluency, DT Originality, and DT Total. The data analyzed corresponded to participants in the competition group.

4. Does avoidance motivation mediate the relationship between sex and creativity in competitions?

The Baron and Kenny (1986) method was used to test for mediation. The three simple linear regressions necessary to answer this question were conducted with data from the males and females in the competition group:

- Creativity predicted by sex: are males more creative than females?
- Avoidance motivation predicted by sex: do females score higher than males on avoidance motivation?

- Creativity predicted by avoidance: are females in the competition group less creative than males in the competition group?

If these three assumptions are met, mediation is confirmed.

Aim 3

Three analyses were conducted to assess the questions in this aim:

1. Are people who score high on femininity more likely to be avoidant?

A simple regression was calculated to predict avoidance motivation based on femininity, including the data from the entire sample.

2. In a competitive scenario, are people who score high on femininity more likely to be avoidant?

A simple regression was calculated to predict avoidance motivation based on femininity, using data from the experimental group (including both sexes).

3. Are people who score high on masculinity less likely to be avoidant?

A simple regression was calculated to predict avoidance motivation based on masculinity, using data from the entire sample.

Chapter III

Results

The final sample in this study included 89 participants: 28 males and 61 females. 43 people (18 males, 25 females) were assigned to the experimental (competitive) condition, and 46 people (10 males, 36 females) were assigned to the control (non-competitive) condition.

In the general sample, higher scores in Divergent Thinking Originality were positively correlated with RAT scores, $r = .213$, $p = .043$. However, Divergent thinking Fluency and Divergent Thinking Total scores were not significantly correlated to RAT scores. Femininity, as measured by the BEM Sex Inventory, was significantly related to lower RAT scores, $r = -.287$, $p < .05$. Masculinity was significantly related to lower scores of Avoidance motivation, $r = -.404$, $p < .05$. The correlation matrix details are shown in Table 2. Overall, males scored higher than females on Divergent Thinking, $t(87) = 2.315$, $p = .025$. However, there was no significant difference in RAT or Avoidance motivation scores between the sexes. Table 3 displays sex differences across the three creativity measures and avoidance motivation.

Aim 1

The first assumption needed to determine if avoidance motivation mediates the relationship between creativity and competition was not met: in the general sample, people in the competition group did not score higher on avoidance motivation than

Table 1

Participant Allocation

Sex	Control group n	Experimental group n	Full sample n
Male (%)	10 (21.7%)	18 (41.9%)	28 (31.4%)
Female (%)	36 (78.3%)	25 (58.1%)	61 (68.6%)
Total	46	43	89

Note: This table displays the total number of participants and number of males and females in the control and experimental group.

Table 2

Outcome Variables, Correlation Matrix

Variable	M	SD	1	2	3	4	5	6	7
1. DT Total ^a	-	1.7	-						
	0.59								
2. DT Fluency	7.97	4.02	.940**	-					
3. DT Originality	6.84	5.67	.937**	.761**	-				
4. RAT	3.27	2.3	.201	.135	.243*	-			
5. Avoidance	21.4	3.73	-.037	-.056	-.014	-.082	-		
6. BEM Femininity	4.76	.67	-.021	-.010	-.030	-.269*	.048	-	
7. BEM Masculinity	4.96	.69	-.117	-.044	-.177	-.072	-.396**		-

Note: N = 89. This table displays Pearson's correlation coefficients (ρ) for all correlation analyses. It includes all outcome variables of the study. Mean parameter values and standard deviations for each of the variables are shown.

**correlation is significant at the $p < .05$ level.*

***correlation is significant at the $p < .01$ level.*

a Divergent Thinking total scores were calculated by standardizing Originality and Fluency into z scores, and then adding them for a total score for each participant (Carson et al., 2005).

people in the non-competition (control) group. A simple regression was calculated to predict avoidance motivation based on competition (coded as 0 for the control group and 1 for the experimental group) where a non-significant equation was found ($F(1, 87) = .011, p = .916$). I ran a t-test to confirm these findings: the difference in avoidance motivation scores between the experimental ($M = 21.36, SE = .57$) and control group ($M = 21.39, SE = .53$) was non-significant, -0.32 BCa 95% CI $[-1.64, 1.47]$, $t(87) = .106, p = .916$.

The second assumption needed to determine if avoidance motivation mediates the relationship between creativity and competition was not met: in the general sample, avoidance motivation did not predict creativity outcomes when measured with Divergent Thinking Total scores ($F(1, 87) = .121, p = .729$) or RAT scores ($F(1, 87) = .59, p = .445$).

The third assumption in the mediation analysis was partly met: in the general sample, competition negatively affected Divergent Thinking Total scores, but did not diminish participants' RAT scores. Two regressions were calculated to predict creativity based on competition (coded as 0 for the control group and 1 for the experimental group). A non-significant equation was found when creativity outcomes were measured with RAT scores ($F(1, 87) = .001, p = .970$) and a significant equation was found when creativity outcomes were measured with Divergent Thinking Total scores ($F(1, 87) = 4.495, p = .037$). These findings were confirmed by t-tests: the difference in Divergent Thinking Total scores between the experimental ($M = -.446, SE = .25$) and control ($M = .302, SE = .25$) group was significant $t(87) = 2.12, p = .037$; and the difference in RAT scores between the experimental ($M = 3.26, SE = .41$) and control ($M = 3.28, SE = .28$)

Table 3

Sex Differences in Outcome Variables

Outcome Variable	Control Group			Experimental Group			Full Sample		
	M	F	<i>t</i>	M	F	<i>t</i>	M	F	<i>t</i>
RAT	4	3.05	1.41	3.89	2.84	1.22	3.93	2.97	1.72
DT Total	1.62	-	3.8**	1.98	1.28	1.46	.582	-.353	2.315*
Avoidance	21.5	21.4	.065	20.05	22.32	-1.96	20.57	21.8	-1.46

*Note: This table displays Mean parameter values for the primary outcome measures of the females and males in the control group, experimental group, and full sample, as well as the results of *t* tests (assuming equal variance) comparing the parameter estimates between the two sexes.*

Table 4

Experimental vs Control Group Differences in Outcome Variables

Outcome Variable	Control Group	Experimental Group	<i>t</i>
RAT	3.26	3.28	-.037
DT Total	.302	-.446	2.12*
Avoidance	21.45	21.37	.106

*Note: This table displays Mean parameter values for the primary outcome measures of the experimental and control groups, as well as the results of *t* tests (assuming unequal variance) comparing the parameter estimates between the two groups (regardless of sex). *correlation is significant at the $p < .05$ level.*

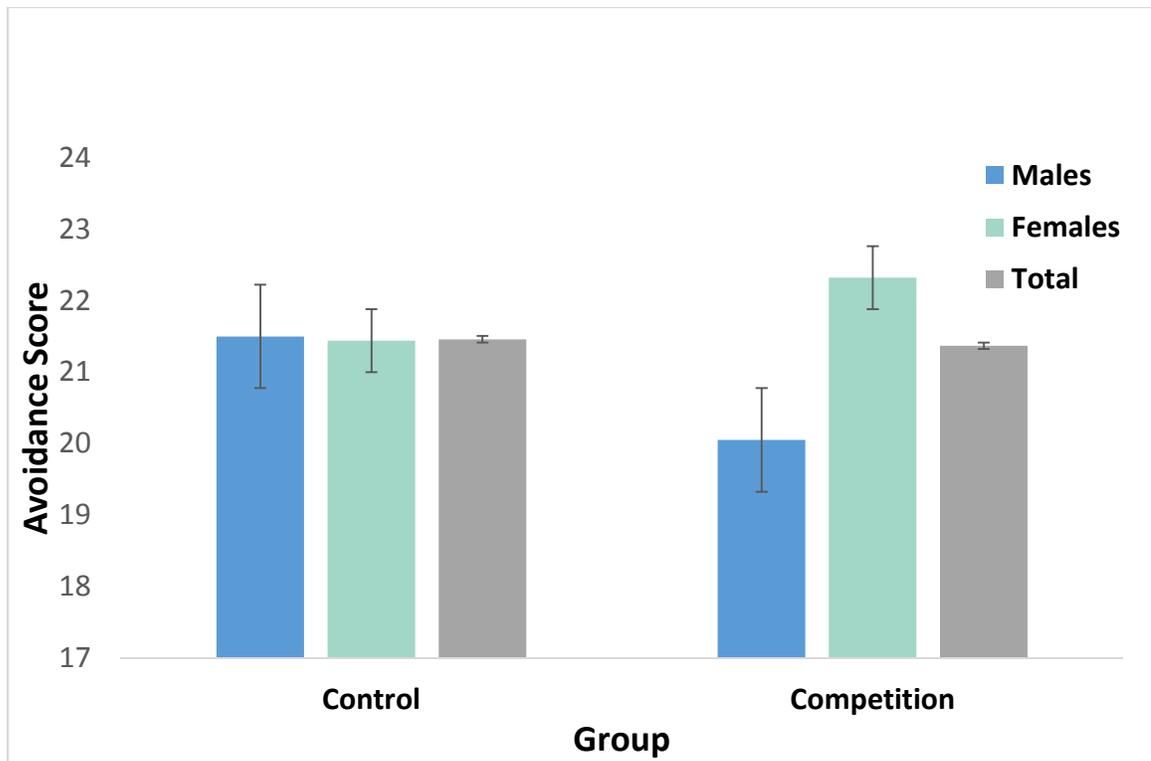


Figure 1: Avoidance Motivation by Group and Sex

This figure displays the difference in mean avoidance motivation scores across groups (control vs experimental) and provides a comparison between mean avoidance scores of males and females in each group. Although females in the competition group scored higher in avoidance than males in the competition group, this difference was non-significant ($p > .5$).

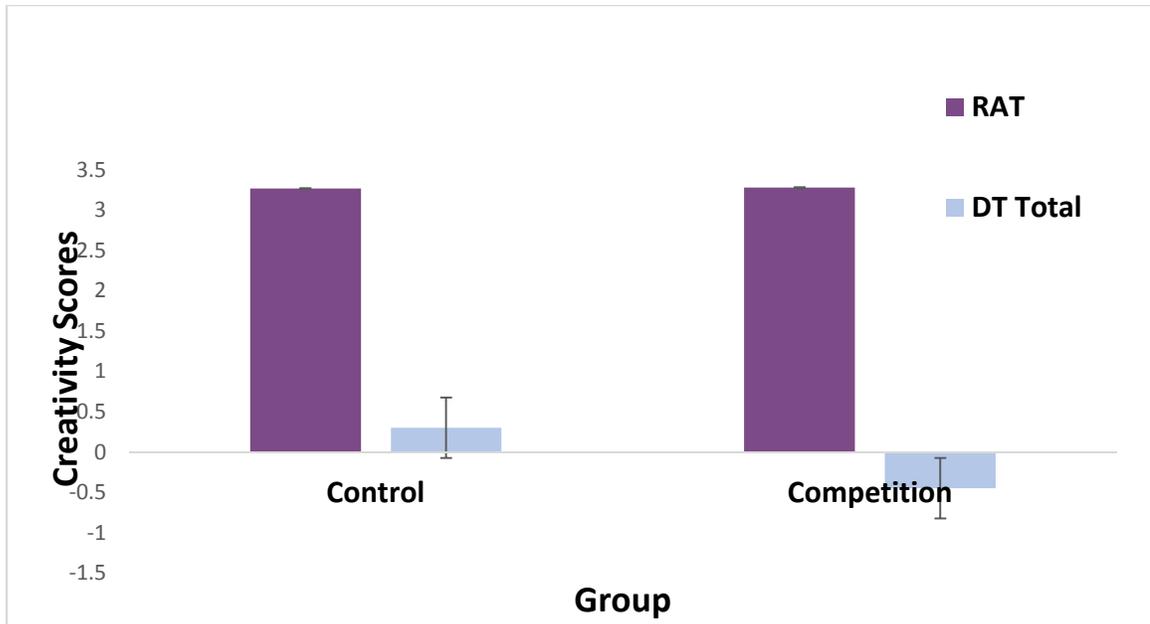


Figure 2: Creativity Scores Across Groups

This figure illustrates the comparison between the mean creativity scores of participants in the competition and control group. RAT measures were similar in both groups, while Divergent Thinking Total scores (converted to z scores) diminished in the competition group.

group was non-significant $t(87) = -.37, p = .967$. Details of the differences in creativity scores between the competition and control group are provided in Table 4.

Results of these analyses do not support the hypothesis that people's creativity is reduced in competitions when they score high on avoidance motivation, but unaffected when they score low on avoidance motivation.

Aim 2

Results are reported separately for each question in this aim.

1. Does avoidance motivation mediate the relationship between competitions and creativity in females?

The first assumption needed to determine if avoidance motivation mediates the relationship between creativity and competition in the female group was not met: females in the competition group were not more avoidance motivated than females in the non-competition (control) group. A simple regression was calculated to predict avoidance motivation based on competition (coded as 0 for the control group and 1 for the experimental group). A non-significant equation was found ($F(1, 59) = 0.817, p = .370$). I ran a t-test to confirm these findings: the difference in avoidance motivation scores between the experimental ($M = 22.32, SE = .72$) and control group ($M = 21.44, SE = .633$) was non-significant, $.875$ BCa 95% CI $[-1.07, 2.74], t(59) = .913, p = .37$.

The second assumption needed to determine if avoidance motivation mediates the relationship between creativity and competition in females was not met: avoidance motivation did not predict creativity outcomes when measured with Divergent Thinking Total scores ($F(1, 59) = .607, p = .439$), Divergent Thinking Originality scores ($F(1, 59) = .206, p = .652$) or RAT scores ($F(1, 59) = .335, p = .565$).

However, competition successfully predicted creativity measured with Divergent Thinking Fluency Scores $F(1, 59) = 5.55, p = .022$, with an R^2 of .086. Female participants' fluency scores decreased, in average, 2.213 points in the competitive group. This detrimental effect of competition in creativity was not found in RAT or Divergent Thinking Originality scores.

Taken together, these findings do not support the hypothesis that avoidance motivation mediates the relationship between competition and creativity in females.

2. In a competitive situation, are females more avoidance motivated than males?

A t-test to compare means revealed that there was a significant difference in avoidance motivation between males and females in the competition group: the mean female avoidance motivation score ($M = 22.32, SE = .72$) was higher than the mean male avoidance motivation score ($M = 20.1, SE = .85$). This difference, -2.21 , BCa 95% CI $[-4.39, -.13]$, was statistically significant $t(42) = -1.98, p = .048$.

These findings support the hypothesis that in a competitive situation, females score higher than males in avoidance motion.

3. In a competitive scenario, are males more creative than females?

A t-test to compare means revealed that there was no significant difference in creativity outcomes between males and females in the competition group when measured with RAT scores. The mean male RAT score ($M = 3.79, SE = .66$) was higher than the mean female RAT score ($M = 2.84, SE = .51$). However, this difference, $.95$, BCa 95% CI $[-.79, 2.69]$, was not statistically significant $t(42) = -1.137, p = .263$.

Likewise, t test to compare means revealed that there was no significant difference between males and females in the competition group in creativity when

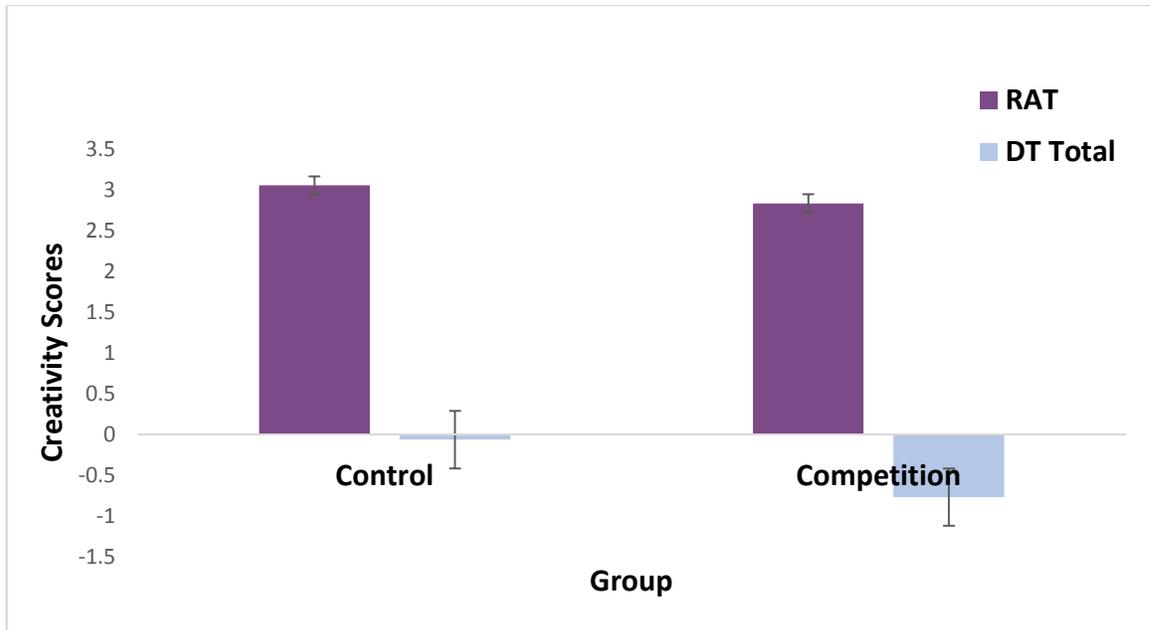


Figure 3: Females: Creativity Outcomes by Group

N = 61. This figure compares mean creativity scores between females in the competition and control group. RAT scores were similar across groups, but tests of difference of means revealed a significant reduction in Divergent Thinking Total scores in the competition (experimental) group.

measured with Divergent Thinking Fluency and Divergent Thinking Originality scores. The mean male DT Fluency score ($M = 8.84$, $SE = 1.41$) was higher than the mean female DT Fluency score ($M = 6.12$, $SE = .598$). However, this difference, 2.72 , BCa 95% CI $[-.097, 5.86]$, was not statistically significant $t(42) = 1.93$, $p = .081$. The mean male DT Originality score ($M = 8.73$, $SE = 1.99$) was higher than the mean female DT Fluency score ($M = 5$, $SE = .9$). Nonetheless, this difference, 3.73 , BCa 95% CI $[-.34, 8.23]$, was not statistically significant $t(42) = 1.71$, $p = .114$. Similarly, when Divergent Thinking Fluency and Originality are standardized and combined into a single Divergent Thinking Total score, a regression reveals that sex is not a significant predictor of Divergent Thinking. A non-significant equation predicting total Divergent Thinking scores from sex was found at $F(1, 41) = 2.43$, $p = .126$.

Although males scored higher than females on divergent thinking tests in the competitive condition, the results were not significant. Therefore, taken together, these findings do not support the hypothesis that males are more creative than females in competitive scenarios.

4. Does avoidance motivation mediate the relationship between sex and creativity in competitions?

The first assumption needed for a mediation analysis was not met, as findings described in the previous section revealed that there are no significant differences in male and female creativity scores in the competitive scenario. However, as noted earlier, females in the competition group scored higher in avoidance motivation than males in the competition group. Nonetheless, taken together these findings do not support the



Figure 4: Competition Group: Avoidance Scores

This figure illustrates differences in means of avoidance motivation scores between males and females in the competition (experimental) group.

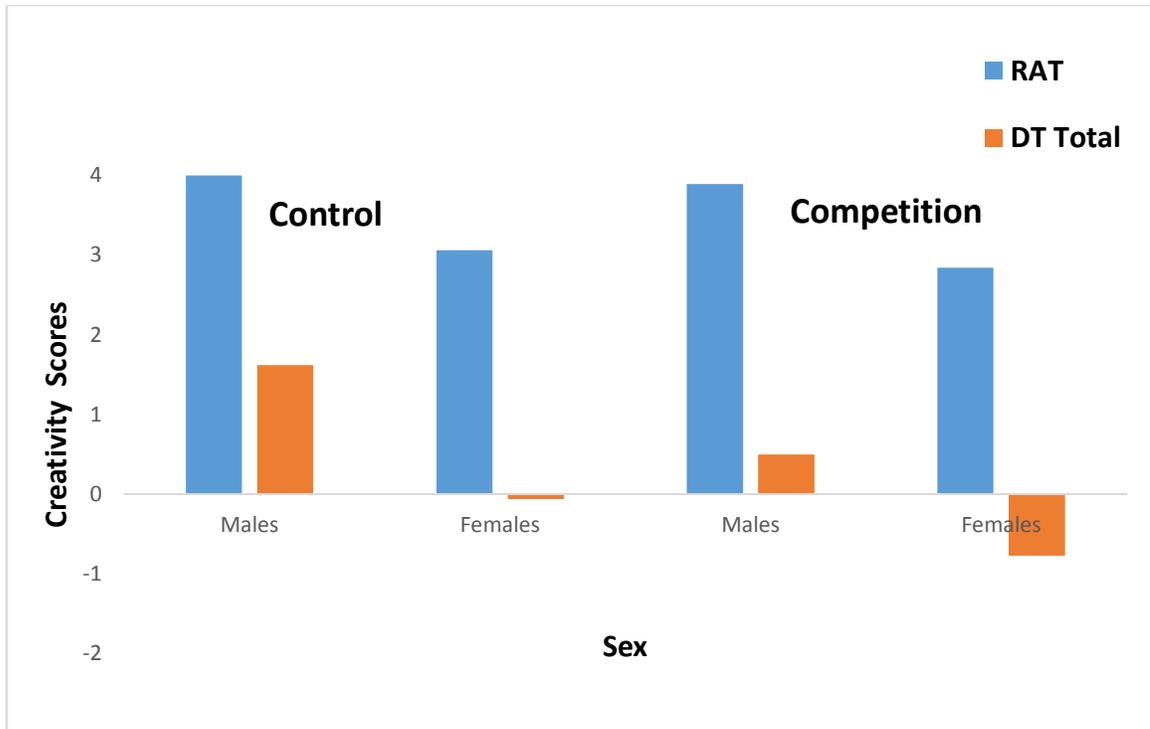


Figure 5: Creativity Outcomes by Group and Sex

This figure compares creativity scores across the experimental and control groups, broken up by sex. Males scored higher than females on divergent thinking tests in the competitive condition, but the results were not significant ($p > .5$).

hypothesis that avoidance motivation mediates the relationship between sex and creativity in competitions.

Aim 3

Results are reported separately for each specific question in this aim.

1. Are people who score high on femininity more likely to be avoidant?

A simple regression was calculated to predict avoidance motivation based on femininity, measured by the BEM sex role inventory. A non-significant equation was found ($F(1, 87) = .47, p = .515$). Therefore, the hypothesis that people who score high on femininity were more likely to be avoidance motivated was not supported.

2. In a competitive scenario, are people who score high on femininity more likely to be avoidant?

A simple regression was calculated to predict avoidance motivation based on femininity in the competition group. A non-significant equation was found ($F(1, 42) = .037, p = .848$). Therefore, the hypothesis that people who score high on femininity were more likely to be avoidance motivated was not supported.

3. Are people who score high on masculinity less likely to be avoidant?

A simple linear regression was calculated to predict avoidance motivation based on masculinity, measured by the BEM sex role inventory. A significant equation was found ($F(1, 87) = 16.22, p < .001$). Therefore, the hypothesis that people who score high on masculinity were less likely to be avoidant was supported.

Chapter IV

Discussion

The purpose of this study was to examine if avoidance motivation mediated the relationship between competition and diminished creativity, and if this mediation effect was more pronounced in females than in males. The study consisted of an experiment in which, via online survey, participants were instructed to conduct two creativity tasks either in a competitive or non-competitive scenario. This study also considered how personality traits and gender role endorsements influenced participants' performances on the creativity tasks.

The overall findings of this study yielded results that were surprising; some of which did not correspond either to my initial hypotheses or to findings of previous studies on creativity competitions. To recap, this study found no evidence of avoidance motivation having any effect on creativity scores either in the control or experimental group. However, competition increased avoidance motivation in females, but not in males, and had a greater negative effect not on female, but on male creativity. Lastly, this study provides evidence that the gender-role endorsement of masculinity traits is associated with diminished levels of avoidance motivation. Nonetheless, being male was not a significant predictor of the gender-role endorsement of masculinity, and most participants in this study were classified as Androgynous according to BEM Sex role Inventory. These main findings will be discussed in detail below.

The Effects of Avoidance Motivation on Creativity

Preliminary analyses of this study revealed that avoidance motivation scores were not related to (or did not predict) creativity scores in either sex. This result is contrary to previous studies that demonstrate that avoidance motivation diminishes creativity. For example, Friedeman & Foster (2001) asked people to perform motor actions associated with approach and avoidance motivation (e.g., bringing an object closer or pushing it away) and found that approach motivated people came up with more creative ways for using a brick (a divergent thinking task). Likewise, Lichtenfeld et al., (2012) found that a brief glimpse of a green light prior to a creativity task improved a subject's performance, and a brief glimpse of a red light diminished it. Findings like these have led researchers to conclude that avoidance motivation induces focused and vigilant behavior, inflexible cognitive styles, and a systematic way of thinking—all; cognitive and behavioral traits that are detrimental to creativity (Roskes, 2015). Notably, there is an important difference in method between these studies and the present study: while avoidance and approach motivation in previous studies were independent variables induced by the experimenters, this study, instead, relied on participants' self-report measures and used their scores as dependent variables. It is possible that people's scores in the BIS/Bas Scales used in this study reflected character traits instead of a specific type of motivation towards the task at hand, which would account for the difference in results.

Regardless, the findings of this study do not replicate those of previous studies. In the case of females, the increase of avoidance motivation in the competition condition did not reach statistical significance, but competition decreased their Divergent Thinking Total scores. In the male group, competition decreased creativity, but this effect was

unrelated to avoidance motivation, as the levels of avoidance in the control and experimental group remained equal. In the past, researchers have suggested that avoidance motivated people compensate for their inflexible processing style with effortful and controlled cognitive processes (Roskes, 2015). Seemingly, females in the competition group used this type of focused cognitive style that allowed them to perform equally well in the RAT (but not the Divergent Thinking tasks).

The Effects of Competition on Creativity

Like findings of previous studies, the creativity of both males and females in this study was somewhat negatively affected by competition. However, the differential effects that competition had on males and females in this study contradicts findings of previous studies, where competition has negatively affected the creativity of females, but not males (Amabile, 1982; Baer et al., 2014; Conti et al., 2001; Witting et al., 1987). These studies were carried out using creativity tasks such as divergent thinking tests, like the one used in this study, along with poems, collages and other creative pieces that were rated by experts. Contrary to their results, the creative performance of females in this study was largely unaffected by competition, except for the Fluency subscale of the Divergent Thinking task. On the other hand, the reduction in men's creative performance was present across all creativity measures: RAT, Divergent Thinking Fluency and Divergent Thinking Originality. This finding, paired with the higher avoidance motivation scores from the female group (compared to the male group), confirms that avoidance motivation was unrelated to creativity outcomes.

Furthermore, results of the manipulation check questions revealed that males rated the task as more competitive than females. The fact that females appeared to ignore

or downplay the competitive aspect of the task may be a sign of avoidance: a strategy to manage the constraints of competition by avoiding thinking about it. Regardless of compensation strategies, their comparatively higher avoidance scores did not lead to significant diminishment in creativity.

In the men, their diminished creativity in the competition group may be yet another result that supports the extrinsic motivation hypothesis, which has found that constraints from the outer world tend to diminish creativity. This hypothesis has been supported by multiple studies in the past (Amabile, 1993; Baer, 1997; Deci, 1971; Koestner et al., 1990). Lastly, the sample size of the present study could account for the greater negative effect that competition had in males: there were more than double the number of female participants ($N = 61$) than male participants ($N = 28$). Given that larger effect sizes tend to be found in smaller samples, the fact that the male sample was half the size of the female sample could explain why the negative effect of competition was seen only in the male group.

Gender -Role Endorsements and Creativity

Results of this study provide interesting insights on gender-role endorsements and their relationship to avoidance motivation. Masculinity traits were negatively associated to with avoidance motivation. Femininity traits, on the other hand, had no relationship to avoidance motivation. Therefore, it can be concluded that avoidance motivation is unaffected by femininity traits, but masculinity traits are a protective factor against it. Some of the adjectives classified as ‘masculine’ by the Bem Sex Role Inventory include competitiveness, willingness to take risks and aggressiveness; personality traits such as these could potentially protect individuals from expecting negative outcomes out of

competitive situations. What is more, being male was not a good predictor of masculinity traits. Being female, however, was a better predictor of endorsing femininity traits, and almost reached statistical significance at $F(1, 88) = 3.63, p = .06$. This result could indicate that females are, nowadays, more comfortable endorsing masculine traits than males are comfortable endorsing feminine traits., the Bem Sex Role Inventory classified adjectives as ‘masculine or ‘feminine’ based on research carried out in the 70’s. Despite the positive results of recent validation studies of the measure, cultural ideas of masculinity and femininity may be shifting. In fact, the general sample of this study showed a significant tendency towards androgyny and a pull/distancing from the traditional gender-role endorsements. Out of the sample of 89 students 71 were classified as androgynous, 9 as predominantly masculine (including 4 females), and 9 as predominantly feminine (including 1 male). These findings suggest that both sexes are, at present, more comfortable endorsing both masculine and feminine traits.

Lastly, femininity traits were found to be good predictors of openness to experience, the personality trait most associated with creativity. Sex, however, was not related to this trait, unlike in previous studies in which women showed higher levels of openness. This divergence suggests that endorsing feminine traits, rather than being female, is what predicts openness to experience, and that both males and females feel increasingly comfortable in doing so.

General Discussion

Given that previous research had failed to draw a link between the impact of motivation on the reduction of female creativity under competition, this study provides novel data necessary to clarify the connection. Yet the results of this study ultimately

reveal that avoidance motivation cannot explain why females show a reduced creativity in competitive scenarios. Moreover, they differ from what has previously been established in the creativity literature: that female creativity is diminished in competitive scenarios and male creativity is unaffected by competition (in our case, male creativity clearly diminished in the competition group, while female creativity was mostly unaffected). Of note, the methods used in this study may have been the cause for the discrepancy between its results and those of previous studies, where avoidance motivation was induced and manipulated as an independent variable. Future studies are needed to make the distinction between the effects of avoidance on creativity when it comes as a personal, spontaneous response to competition versus when it is induced by external cues.

Furthermore, results of this study also differ from existing literature concerning sex differences in creativity: males and females scored similarly in creative competitions, and the endorsement of masculinity traits, which was a significant predictor of low avoidance scores, was displayed equally by males and females. These findings may suggest that females are increasingly comfortable in competitions. In fact, the male and female responses to the manipulation check question in this study assessing participants' feelings about competition were remarkably similar: 40% of females and 36.8% of males enjoy competition and feel it brings out the best in their abilities.

Future research and interventions to close the gap between male and female creative achievement should investigate factors other than motivation, such as obstacles to performance in females. Lastly, results of this study indicate that females are now frequently endorsing personal characteristics associated to high functioning in stressful

situations, which were previously considered masculine traits. Thus, it is possible that future research will reveal that differences in creative achievement in males and females are diminishing.

Study Limitations

While this study provides novel data on the connection between avoidance motivation and competitions, its limitations are various and varied. To begin with, the experimental manipulation of competition in this study may not have been enough to make participants feel competitive. The manipulation check question assessing perception of competitiveness revealed that participants in the experimental group mostly found the tasks ‘somewhat competitive’, which may not be enough to spark avoidance motivation or a special effort.

Second, the Harvard population used in this study is not an accurate representation of the general population. Harvard students are highly educated and possibly accustomed to competitive situations. This may explain why avoidance in the general population was low, and mostly the same across the experimental and competitive groups (the difference between avoidance scores in the male and female experimental group was approximately 2 points on a scale from 0 to 28). A population which may generally score low in avoidance is not ideal for a mediation analysis where avoidance motivation is the mediator.

Lastly, sample size was an important limitation in this study, as the female group was twice as large as the male group. Smaller sample sizes produce bigger effect sizes, which could explain why male creativity was affected by competition to a greater degree than female creativity. To conduct an experiment that reduces biases to the minimum, it

would be necessary for the male and female groups to be equally large. Another issue with this study's sample is that it ignores non-binary gender identities. Because of resource and time constraints, it was not possible to extend the data collection to yet a third group. To gain an exhaustive comprehension of gender-role endorsements and their relation to avoidance motivation and creativity, future studies need to include population that self-identifies as non-binary.

Conclusions

This study yielded results that provide novel insights to the field of creativity. Firstly, it brought to light that females may be increasing their enjoyment of competitions and their eagerness to participate in them. Therefore, as was evident in this study, female creativity is not affected by competitions as much as previous studies revealed. Secondly, it found that avoidance motivation is not always conducive to diminished creativity. Further studies are needed to clarify the specific conditions under which avoidance diminishes creativity and explore the coping mechanisms that allow people's creativity to remain unaffected by avoidance motivation. Lastly, it concluded that males and females may be increasingly more comfortable endorsing both feminine and masculine gender-roles. Masculinity gender-roles are associated to lower levels of avoidance motivation, but being male is not a good predictor of masculinity.

General interest and scientific research in the field of creativity is on the rise. As more emphasis is placed on creativity across diverse sectors of life in the 21st century, uncovering the reasons behind the male and female achievement gap is imperative.

Understanding how males and females respond creatively in competitive situations brings us one step closer to this goal. This and future research will help address the enigma of male and female creativity.

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