

THE IMPOSTOR SYNDROME: AN OBSTACLE TO WOMEN'S PURSUIT OF  
POWER

by

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## ABSTRACT OF THE DISSERTATION

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Women are still paid less than men for identical work (England, 2006) and occupy significantly fewer leadership positions (e.g., Catalyst, 2013). Why do men continue to be over-represented at the top, occupying positions of power in the workplace? One reason may be that women need to solve the challenge of experiencing the impostor syndrome. The impostor syndrome refers to high-achieving people who have difficulty internalizing their accomplishments and who fear that they will be exposed as a fraud (Clance & Imes, 1978). Women report higher impostorism than men (Kumar & Jagacinski, 2006); therefore, the current study tested whether impostorism hinders women's ability to advance in their careers. Specifically, the present research addressed whether impostorism increases women's sensitivity to negative feedback because impostor feelings are associated with decreased self-efficacy, self-confidence, and an attributional style that emphasizes internal sources of failure (for a review, see Kumar & Jagacinski, 2006). Whether the gender difference in attrition for students in STEM and employees in other domains is due to higher levels of impostorism for women than men is unknown, despite evidence that women in medical school score higher than men on impostorism (Jöstl et al., 2015). The present thesis tested whether negative feedback resulted in less

interest in pursuing a graduate degree and less persistence for people high on impostorism, and whether that was particularly true for women. In addition, I examined whether impostorism had incremental validity as a predictor variable after adjusting for (1) self-esteem, which was negatively related to impostorism (Chrisman et al., 1995), and (2) beliefs about intelligence (Blackwell, Trzesniewski, & Dweck, 2007), because impostorism may be positively related to believing that intelligence is fixed rather than malleable. Results made the following novel contributions to the gender and impostorism literatures: (1) impostorism was especially detrimental to women's pursuit of a graduate degree, but only when they faced negative feedback about their potential; (2) the stronger people's impostorism, the more strongly they believed negative feedback about their potential; (3) impostorism was related to beliefs essential to career and academic advancement (e.g., fixed mindset beliefs). Finally, impostorism was not related to persistence rates on a graduate school aptitude task, but the task suffered from poor psychometric properties. Findings suggest that impostorism may hinder women's career advancement by amplifying their responses to negative feedback. Additionally, the results illuminate other beliefs that people with strong impostor feelings may hold that are detrimental to career and academic pursuits. Future research should further address whether impostorism can affect persistence (i.e., attrition).

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## Introduction

Since the advent of the Women's Movement 50 years ago, women have made tremendous strides toward gender equality. Today, women earn the majority of undergraduate degrees and master's degrees, and since 2011, the majority of doctoral degrees (Allum, 2013). However, women are paid less than men for identical work (England, 2006) and occupy significantly fewer leadership positions (e.g., Catalyst, 2013; Wickware, 1997). In fact, only 40 U.S. women hold congressional seats. Why do men continue to be over-represented at the top, occupying positions of power in the workplace? One reason may be that women need to solve the challenge of experiencing the impostor syndrome.

Women's relative absence in powerful leadership positions and in science, technology, engineering, and mathematics (STEM) fields is often explained by the leaky pipeline metaphor, whereby there is more attrition among women than men in the pipeline to high status positions. Although a similar number of women and men express interest in STEM careers in high school and college, women are less likely than their male counterparts to persist and exit the pipeline (Blickenstaff, 2005; Oakes, 1990; Sadler, Sonnert, Hazari, & Tai, 2011). Additionally, despite earning more than half of doctoral degrees (U.S. Census Bureau, 2008; National Science Foundation, 2009), women are less likely than men to earn tenure as faculty, partly due to attrition (Ceci, Williams, & Barnett, 2009; Goulden, Frasch, & Mason, 2009; Goulden, Mason, & Frasch, 2011; Nelson, 2007).

Why do women exit leadership pipelines at higher rates than men? Previous research has identified interpersonal goals, gender stereotypes, and gender discrimination as obstacles to women's advancement. Next, I expand on the role of these three factors in harming women's progress.

### **Factors Affecting Women's Attrition from High Status Positions**

Women still tend to occupy more jobs that complement communal roles (roles that emphasize caretaking and affiliation) and require interpersonal qualities than men. For example, women are more likely than men to become nurses and teachers, jobs that require communal traits (Cejka & Eagly, 1999; England, Budig & Folbre, 2002), and they report more interest in careers that emphasize interpersonal skills than careers that promote status (Morgan, Isaac, & Sansone, 2001). Interpersonal goals, including a valued family life, is a primary obstacle to women's acquisition of high power positions such as tenured faculty positions (Goulden et al., 2009). Women tend to rate family life as more important than men (Cinamon, 2010) and the extent to which people value family and work goals significantly contributes to their career plans (Niles & Goodnough, 1996). Although women have made tremendous strides in the workplace, if both parents work full time, women are still responsible for the majority of childcare and household chores (Biernat & Wortman, 1991; Dempsey, 2000; Moon & Hoffman, 2008; Wilkie, Ferree, & Ratcliff, 1998). In fact, women complete more household labor than their husbands, regardless of their income. That is, even women who earn more than their husbands complete more domestic labor (Fetterolf & Rudman, 2014). Ultimately, women's family responsibilities and interests may influence their choices to pursue or continue pursuing high-status positions.

Research has also identified gender stereotypes as an obstacle to women's obtainment of leadership positions (e.g., Cheryan et al., 2009). Gender stereotypes can be harmful to women by influencing interpersonal and intrapersonal sources of women's advancement. On an interpersonal level, women who are perceived as violating gender stereotypes may receive backlash, any social or economic penalty for acting in a counterstereotypical manner (Rudman, 1998). Backlash is administered because gender stereotypes are not only descriptive, they are also prescriptive. For female vanguards, women who disconfirm beliefs about their gender (i.e., women who excel in masculine domains; Rudman, Moss-Racusin, Glick, & Phelan, 2012a), career advancement can invite backlash because by defying gender stereotypes and gaining powerful workplace positions, by definition, they challenge the gender hierarchy (Rudman, Moss-Racusin, Phelan, & Nauts, 2012b). Further impeding women are gender stereotypes that associate women with lower competence than men, which makes it even more difficult for women to progress towards gender equality and succeed in domains requiring intelligence (Fiske, Cuddy, Glick, & Xu, 2002; Leslie, Cimpian, Meyer, & Freeland, 2015).

Gender stereotypes can influence women on an intrapersonal level. People are more likely to be successful if they stereotype their field as congruent with their gender because people persist in areas in which they think they can succeed (Eccles, 2010). Therefore, women may be less likely to expect success in a male-typed domain. Additionally, the stark gender disparity between the quantity of men and women in STEM fields (particularly the physical sciences) signals to girls that women are not supposed to participate in STEM careers (Walton & Cohen, 2007). Women's gender stereotypes towards different work domains influence whether they would like to pursue

certain fields (Diekman, Brown, Johnston, & Clark, 2010) and influences their expectations for their performance such that they underestimate their abilities (Correll, 2001; Meece, Parsons, Kaczala, & Goff, 1982).

Negative stereotypes about women's competence in masculine domains can lead to the experience of stereotype threat, impinging on women's ability to perform well in these domains. Stereotype threat is the psychological threat and stress that arises out of the awareness that others can perceive you through the lens of negative stereotypes (Steele, 1997; Steele & Aronson, 1995). Stereotype threat can be robust and be so debilitating to women's performance that women actually fulfill the negative stereotypes (e.g., Davies, Spencer, Quinn, & Gerhardstein, 2002; Inzlicht & Ben-Zeev, 2000; Shih, Pittinsky, & Ambady, 1999; Spencer, Steele, & Quinn, 1999). Unfortunately, adverse effects of stereotype threat are strongest when the domain of the performance is self-relevant, impacts self-worth, and is incorporated into people's self-construct (Aronson, Lustina, Keough, Steele, & Brown, 1999; Steele, 1997).

Additionally, gender discrimination can be an obstacle women's advancement (Moss-Racusin et al., 2012; Steinpreis, Anders, & Ritzke, 1999). Discrimination and harassment at work is detrimental to women's psychological, physical, and organizational well-being (Schneider, Swan, & Fitzgerald, 1997). Harassment is degrading and be both physically and psychologically threatening (Fitzgerald, 1993). These negative consequences from harassment are especially concerning since about 50% of women report harassment during their academic or work experiences (Fitzgerald, 1993).

Women's rise to power may be inhibited by a systemic preference for male leadership. Gender stereotypes, discrimination, and women's preferences for jobs that

highlight interpersonal goals contribute to women's obtainment of leadership positions. Of importance, women more than men self-select out of leadership positions, choosing not to pursue them of their own accord (Ceci & Williams, 2010; van Anders, 2004). The present study proposes a novel source of women's self-selection bias to illuminate gender differences in attrition to high status positions: the impostor syndrome.

### **The Impostor Syndrome**

The impostor syndrome refers to high-achieving people who have difficulty internalizing their accomplishments and fear that they will be exposed as a fraud regardless of evidence suggesting that they are qualified (Clance & Imes, 1978; Ferrari, 2005). People who experience the impostor syndrome tend to believe that others' views of themselves are too positive and that they are less talented than they appear (Clark & Imes, 1978; Cozzarelli & Major, 1990; Kolligan & Sternberg, 1991). Although impostors may achieve success in their fields, their negative self-views may increase the likelihood that they quit their jobs, disengage from work-related goals, and choose not to pursue promotions. Consequently, impostors may be less likely to advance in their field. Because impostor feelings are negatively related to self-efficacy (i.e., belief in one's ability to perform well enough to succeed; Bandura, 1977), impostorism is likely to decrease women's persistence and advancement to leadership roles. Next, I summarize evidence that supports this reasoning.

Regardless of academic success, women report less confidence than men in their academic potential (Kimball & Gray, 1982). Compared with male doctoral students, female doctoral students in Austria reported having stronger impostor feelings and less self-efficacy (Jöstl et al., 2015). Further, Fiorentine (1987) found higher rates of attrition

among female compared with male medical students in the U.S. (57% vs. 36%).

Additionally, female medical students reported lower confidence in their abilities as physicians than the male students, which could indicate that female medical students exhibited stronger impostorism (Fiorentine, 1988). Interestingly, the gender difference in attrition was driven by students with lower grades. Low grades increased the chance that women dropped out, but was much less influential to men's attrition. However, whether the gender difference in attrition for students with lower grades was due to higher levels of impostorism for women than men is unknown, despite evidence that women in medical school score higher than men on impostorism (Jöstl et al., 2015). Nonetheless, it may be the case that the impostor syndrome is a primary source of women's abandoning pursuit of high status positions. If so, it is important to identify the reason why the impostor syndrome depresses women's persistence on the road to personal power.

### **The Impostor Syndrome and Reactions to Criticism**

One way that the impostor syndrome may lead to high rates of attrition is by increasing people's sensitivity to negative feedback. Similar to other self-deprecating biases, impostorism is related to negative psychological outcomes. For instance, impostor feelings are associated with self-criticism and low self-esteem (Chrisman et al., 1995; Cozzarelli & Major, 1990; Kolligian & Sternberg, 1991; Leary, Patton, Orlando, & Funk, 2000; Peteet, Brown, & Lige, 2015). Although self-esteem and the impostor syndrome are related, impostor feelings, not self-esteem, accounted for negative affect following academic failure (Cozzarelli & Major, 1990). The pressure to meet high performance standards, the experience of feelings of phoniness, and an attributional style that emphasizes internal sources of failure, increases fear of failure and decreases self-

confidence and self-efficacy (for a review, see Kumar & Jagacinski, 2006). Therefore, impostors who are faced with negative feedback about their potential may strongly internalize the feedback and be more likely to disengage from their performance goals. Additionally, the impostor syndrome may increase women's sensitivity to negative feedback, and if so, may illuminate why women are far more likely than men to drop out of medical school and other STEM fields. Although some research suggests that men are just as susceptible to impostor feelings (Bernard, Dollinger, & Ramaniah, 2002; Chae, Piedmont, Estadst, & Wicks, 1995; Cokley, McClain, Enciso, & Martinez, 2013; Cowman & Ferrari, 2002; Ferrari, 2005), the majority of research has found evidence that impostor feelings are more intense in women than men (e.g., Clance & Imes, 1978; Jöstl et al., 2015; Kumar & Jagacinski, 2006; McGregor, Gee, & Posey, 2008).

The present thesis proposes that impostorism may contribute to women's attrition in the workplace and academia. The impostor syndrome was first studied in women professors in the 1970s (Clance & Imes, 1978). Impostorism may be particularly influential to women's attrition in academia because many fields, such as STEM fields, are stereotyped as more masculine than feminine (Carnes & Bland, 2007; Roos & Gatta, 2009). Women's gender stereotyping of various careers influences whether they would like to pursue them (Diekman et al., 2010) and informs their performance expectations such that they underestimate their abilities to the extent the field is stereotyped as masculine (Correll, 2001; Meece et al., 1982). Additionally, the stark disparity between the quantity of men and women in STEM fields signals to women that they do not belong in male-dominated careers (Walton & Cohen, 2007). If environments such as graduate school and high status jobs decrease women's confidence in their own abilities, then they

will also increase their risk of impostorism because there is a negative relationship between perceptions of ability and likelihood of success and the impostor syndrome (Cozzarelli & Major, 1990; Leary et al., 2000). Therefore, academia may ironically increase women's susceptibility to the impostor syndrome and negative feedback about graduate school potential may be especially influential to women's graduate school goals and pursuit.

Impostorism may also be particularly influential to women's attrition in academia because women are less confident than men in their academic potential (Jöstl et al., 2015; Kimball & Gray, 1982), women tend to be more self-critical of their abilities (Luscombe & Riley, 2001), and women respond more strongly to negative feedback than men (Roberts, 1991). In fact, men are more likely to deny failures and acknowledge successes and to adopt an attributional style that emphasizes external sources of failure (Dweck & Bush, 1976; Eagly & Whitehead, 1972). This finding is particularly concerning because teachers tend to give more negative feedback to girls than to boys (Dweck & Leggett, 1988; Eccles & Blumenfeld, 1985). Also, parents tend to give their daughters more negative feedback than their sons (Lundgren & Rudawsky, 1998), even when their sons perform at the same level as their daughters (Lewis, Allessandri, & Sullivan, 1992). Therefore, impostorism may disproportionately affect women's self-selection out of competitive career tracks.

Next, I describe an alternative deterrent to women's persistence on the road to high status career success.



### **Fixed Intelligence Beliefs**

Because many high status fields require exceptional intelligence, gender stereotypes that associate women with lower competence than men may impede women's progress toward gender equality (Fiske, Cuddy, Glick, & Xu, 2002). Leslie et al. (2015) recently identified expectations of brilliance as a primary reason for the dearth of women in academic fields believed to require innate talent. The authors surveyed faculty, postdoctoral fellows, and graduate students from 30 disciplines, including STEM, regarding their beliefs about their field. The percentage of women with doctoral degrees in each field served as the dependent variable. Their primary hypothesis was that fields in which practitioners believed their discipline required innate brilliance would attract, accept, and graduate fewer women due to gender stereotypes (Bennett, 1996; Kirkcaldy, Noack, Furnham, & Siefen, 2007; Tiedemann, 2000). The stereotype that men are more naturally gifted could deter women's success because faculty may assume that their female students and colleagues do not possess the "genius" required to succeed. Additionally, they posited that women might internalize the brilliance stereotype, which could contribute to their decision to pursue another field (Wigfield & Eccles, 2000) for example, by increasing stereotype threat (i.e., the psychological stress that results from fear of confirming negative gender stereotypes; Dar-Nimrod & Heine, 2006; Steele, 1997).

Leslie et al. (2015) also investigated three competing hypotheses to explain gender disparities in graduate programs: that they are the result of (1) women to work long hours (Ferriman, Lubinski, & Benbow, 2009), (2) potential sex differences in GRE scores (Hedges & Nowell, 1995), and (3) women's inability to succeed in fields that

demand skills in systematic and abstract thought over empathy (Billington, Baron-Cohen, & Wheelwright, 2007; Lippa, 1998). Results showed that gender disparities in each field were primarily due to beliefs that innate brilliance was necessary to succeed, which explained 28% of the variance for the percentage of female Ph.D. recipients across 30 fields. Because minimal variance was explained by the requisite number of work hours, Graduate Record Examinations (GRE) scores, and beliefs about whether the field required systematizing versus empathizing, brilliance stereotypes contributed more substantially to the scarcity of female Ph.D. recipients in many academic disciplines, including STEM, economics, and philosophy.

Leslie et al. (2015) showed that practitioners' belief that fixed and innate brilliance is required for success informs women's academic achievement, although whether that stems from fewer applications, fewer acceptances, or greater attrition is unknown. Nonetheless, it seems plausible that women's own beliefs about their intelligence may also play a role (i.e., whether it is fixed or malleable). In particular, they may help to explain women's attrition from high status positions. Beliefs about the malleability of intellect, that is, mindsets about cognitive ability, predict motivation and success in school (Blackwell et al., 2007; Burnette et al., 2013; Elliot, Da Fonseca, & Moller, 2006; Mangels et al., 2006; Good, Aronson, & Inzlicht, 2003; Paunesku et al., 2015). Beliefs that intelligence is set at birth and cannot be improved reflects a fixed mindset. People with a fixed mindset tend to question their potential when the work is difficult, quit trying sooner, and therefore, accomplish less (Blackwell et al., 2007; Cury, Elliot, Da Fonseca, & Moller, 2006; Haimovitz, Wormington, & Corpus, 2011). By contrast, having a growth mindset is related to viewing intelligence as something that can

be improved through effort. Unlike people with a fixed mindset, those with a growth mindset increase their hard work when the task is more difficult, which leads to more accomplishments (Blackwell et al., 2007; Dweck & Leggett, 1988). If women have a fixed mindset, they may be more likely to disengage from work-related goals after receiving negative feedback. Consequently, believing that intelligence is innate and fixed may influence women's achievement in higher education by increasing their attrition.

### **Overview of the Research and Hypotheses**

The present research examined whether impostorism heightens sensitivity to negative feedback, resulting in less persistence (i.e., higher rates of attrition) and lower graduate school aspirations when striving for higher education, and whether that is particularly true for women. Male and female undergraduate students were presented with a bogus graduate school aptitude test. To assess persistence (i.e., attrition), the test was offered in eight stages and participants received either positive, negative, or no feedback (controls) after performing each stage. Afterwards, participants rated the extent to which they were motivated to pursue a graduate school degree. I also examined whether impostorism has incremental validity as a predictor variable after adjusting for (1) self-esteem, which is negatively related to impostorism (e.g., Cozzarelli & Major, 1990), and (2) beliefs about intelligence, because impostorism may be positively related to believing that intelligence is fixed rather than malleable. My hypotheses were as follows:

**Hypothesis 1.** Replicating prior research, female participants will report stronger impostor feelings than male participants (e.g., Clance & Imes, 1978; Jöstl et al., 2015; Kumar & Jagacinski, 2006).

**Hypothesis 2a.** The stronger people's impostorism, the less motivation they will report in pursuing a graduate degree, but only after receiving negative feedback about potential, and especially for women.

**Hypothesis 2b.** The stronger people's impostorism, the more strongly they will believe the negative feedback is accurate because impostors tend to make internal attributions after failure and the impostor syndrome is negatively associated with self-efficacy and self-confidence (for a review, see Kumar & Jagacinski, 2006).

**Hypothesis 3a.** Negative feedback about graduate school potential will decrease persistence in the graduate school potential task (i.e., a main effect for feedback is expected; Fiorentine, 1988).

**Hypothesis 3b.** The stronger people's impostorism, the sooner they will quit the graduate school aptitude test, but only after receiving negative feedback, and especially for women (i.e., impostor feelings will interact with feedback and participant gender). To my knowledge, this hypothesis is unique.

**Hypothesis 4a.** Fixed mindset beliefs will predict persistence during the graduate school aptitude test such that the stronger people's fixed intelligence beliefs, the sooner they will quit the task when receiving negative feedback, uniquely positing that fixed mindset beliefs influence persistence (i.e., an interaction effect of fixed intelligence beliefs and feedback condition is expected).

**Hypothesis 4b.** The impostor syndrome will contribute unique variance in persistence even after adjusting for self-esteem or fixed intelligence beliefs for at least female participants in the negative feedback condition.

### **Pre-test: The Graduate Aptitude Task**

In order to ensure the credibility of the graduate aptitude task, ostensibly a measure of cognitive style, I first pre-tested the items.

#### **Participants**

One-hundred and twelve Amazon.com Mechanical Turk workers completed the pre-test online in exchange for 25 cents. Participants who were over 22 and who failed the attention check were eliminated from the analyses so the final sample included 79 participants (41 women, 38 men), ages 18-22 ( $M = 20.94$ ,  $SD = 1.09$ ). The majority of participants were White ( $n = 56$ ), nine were Black, six were East Asian, three were Hispanic/Latino, three were biracial, one was South Asian, and one identified as other.

#### **Procedure and Methods**

Participants read the cover story for the Graduate School Aptitude Task before completing nine items from the following randomized measures: personality items (Appendix A), easy Remote Associates Test items (Appendix B; RAT; McFarlin & Blascovich, 1984), and hard RAT items (Appendix C). The personality items were selected from the NEO Personality Inventory (Costa & McCrae, 1992). After completing each measure, participants were asked to complete two items measuring credibility as an estimate of cognitive style (Appendix D). Scores on these two items were averaged together such that higher scores indicated stronger belief that the measure could be used to estimate cognitive style.

## Pre-Test Results

### Credibility of the Graduate School Aptitude Task

In order to determine whether items from each measure was a credible estimate of cognitive style, scores for each measure on the credibility scale were compared to the midpoint of the credibility scale which indicated neither belief nor disbelief that the measure could be used to estimate cognitive style. The credibility of personality items ( $M = 3.36$ ,  $SD = 1.13$ ) significantly differed from the midpoint of the scale ( $X = 3$ ), such that they were rated as more believable as a measure of cognitive style compared to the midpoint,  $t(78) = 2.83$ ,  $p = .006$ . The credibility of the easy RAT items ( $M = 3.39$ ,  $SD = 1.10$ ) were also rated as significantly greater than the midpoint of the scale;  $t(78) = 3.16$ ,  $p = .002$ ; as well as the credibility of the difficult RAT items ( $M = 3.36$ ,  $SD = 1.07$ ),  $t(78) = 2.99$ ,  $p = .004$ . In other words, the personality items, easy RAT items, and difficult RAT items were rated as credible measures of cognitive style.

In order to determine whether there was a difference in credibility between the easy and difficult RAT items, a paired samples  $t$ -test was conducted. The credibility ratings for the easy and difficult RAT items did not differ,  $t(78) = .31$ ,  $p = .76$ . Additionally, credibility ratings between the easy and difficult RAT items were strongly positively correlated,  $r(77) = .66$ ,  $p < .001$ . Therefore, both easy and difficult RAT items were included in Graduate School Aptitude Task. Additionally, paired samples  $t$ -tests revealed that there was no difference in credibility ratings between the personality items and both the easy and difficult RAT items,  $ps > .05$ .

### Conclusion

The personality items ( $n = 33$ ), easy RAT items ( $n = 28$ ), and difficult RAT items ( $n = 26$ ) were included in the Graduate School Aptitude Task because they were rated as believable measures of cognitive style.

## Main Study Method

### Participants

Six-hundred and ninety-seven Rutgers University undergraduate students who were at least 18 years old participated in exchange for research credit ( $M$  age = 20.00,  $SD$  = 2.00). The study was released in two parts online. Twenty-eight students were eliminated from data analysis for not completing both parts of the study. Therefore, the final sample contained 669 students. Of these, 437 participants (62.7%) were women, 227 (32.6%) identified as men, one participant reported that their gender was non-specified, and four students chose not to answer the question. Therefore, analyses that included participant gender were based on  $N = 664$ .

I did not expect race or sexual orientation to influence my hypothesized results, but I report these demographics for the sake of completion. The racial composition was 40.0% White, 17.6% South Asian, 12.9% East Asian, 9.8% Hispanic/Latino, 7.0% Black/African American, 2.7% Biracial, 5.3% Other, and 4.6% did not respond. The sexual orientation composition was as follows: 85.2% heterosexual, 4.2% gay or lesbian, 3.9% bisexual, 1.3% unsure, 0.9% other, and 4.6% chose not to respond.

**Design.** In order to prevent biased responses on individual difference measures, participants completed the study in two phases online. The design of the second, online phase was a 2 (participant gender) x 3 (feedback: positive, negative, none) between subjects factorial.

### Part 1 Measures

**Clance Impostor Phenomenon Scale.** Participants completed the 20-item Clance Impostor Phenomenon Scale (CIPS; Clance, 1985; see Appendix E) which measures



impostorism on a scale from 1 (*not at all true*) to 5 (*very true*). Sample items include, “I can give the impression that I’m more competent than I really am;” “I avoid evaluations if possible and have a dread of others evaluating me;” and “I’m afraid people important to me may find out that I’m not as capable as they think I am.” Items that exclusively referred to impostorism at work were modified to also include school experiences because the sample consisted of undergraduate students who may have limited work experiences ( $\alpha = .90$ ).

Prior research has used the CIPS to identify impostors from non-impostors (Holmes et al., 1993). Responses to this scale have been shown to be negatively related to self-efficacy, self-confidence, and an attributional style that emphasizes internal sources of failure (for a review, see Kumar & Jagacinski, 2006). Additionally, the CIPS is the most widely used measure of impostorism (Holmes et al., 1993).

**Rosenberg Self-esteem Scale.** Participants completed the Rosenberg Self-esteem Scale (Appendix F; Rosenberg, 1965), because it has been shown to negatively correlate with impostorism (Cozzarelli & Major, 1990; Leary et al., 2000). The Rosenberg Self-esteem Scale is a highly validated measure of global self-esteem that instructs participants to rate the extent to which they agree with 10 items on a scale from 1 (*strongly disagree*) to 4 (*strongly agree*). Items include, “On the whole, I am satisfied with myself;” “At times I think I am no good at all” (reverse coded); and “I feel that I have a number of good qualities.” Scores were averaged such that higher scores indicated greater self-esteem ( $\alpha = .89$ ).

**The Mindset Scale.** The Mindset Scale (Appendix G; Dweck, 2006) includes 10 items that ask participants to rate the extent to which they agree with the items on a scale

from 1 (*strongly agree*) to 4 (*strongly disagree*). Items include, “Your intelligence is something about you that you can't change very much” and “No matter how much intelligence you have, you can always change it quite a bit” (reverse coded). The Mindset Scale has been used to predict persistence in difficult tasks (Blackwell et al., 2007; Cury et al., 2006; Haimovitz, Wormington, & Corpus, 2011). Scores were averaged such that higher scores indicated stronger fixed mindsets ( $\alpha = .70$ ). Self-esteem and the extent to which participants believe that intelligence is stable or malleable was used to test the incremental validity of impostorism when predicting persistence following negative feedback.

## **Part 2 Measures**

**Feedback Manipulation.** Before completing the items in the Graduate School Aptitude Task in the second part of the study, participants read a cover story designed to enhance the credibility of the task. To convince participants that the Graduate School Aptitude Task was credible, the cover story included statements such as the following, “Over the past few years, the Social Cognition Lab has developed a credible measure of graduate school potential that uses your personality traits and an implicit measure of your cognitive ability to predict graduate school success in students” (see Appendix H for the cover story). The cover story appeared on 6 different pages that contained 1-3 sentences. Participants were required to spend at least 10 seconds on each page before continuing to the next page. After reading the cover story, participants were quizzed about their comprehension before completing the Graduate School Aptitude Task. If participants responded incorrectly to the items measuring their comprehension, they were forwarded to previous content designed to convince participants of the task’s credibility.

After completing the cover story for the Graduate School Aptitude Task, Rutgers students completed items from the Remote Associates Test (RAT; McFarlin & Blascovich, 1984) and personality items selected from the NEO Personality Inventory (Costa & McCrae, 1992) that ostensibly measured their graduate school potential (see the pre-test). Participants completed 11 items from both the RAT and NEO Personality Inventory before receiving feedback about their graduate school potential. Both easy and difficult RAT items were included because they were rated as similarly indicative of cognitive ability in the pre-test. The first RAT item was accompanied by an example in order to reduce confusion about the instructions which stated, “Think of the word that ties all three words together. There is only one right answer for each series.” RAT items included the following, “cream/skate/water” (for which the answer is “ice”) and “loser/throat/spot” (for which the answer is “sore”). The personality items were accompanied by the following instructions, “Rate the extent to which you agree/disagree with the following” and items included, “Even if most people have good intentions, it’s better not to trust someone quickly;” and “I am the life of the party.” Responses were scored on a scale from 1 (*disagree*) to 5 (*agree*).

After responding to the first 11-12 items, participants were presented with negative, positive, or no feedback regarding their graduate school potential. In the positive feedback condition, participants were told that they had excellent potential to be a very successful graduate student and were given the option to persist in the same task and receive updated results about their potential or complete a different task. Participants in the negative feedback condition received the same options but were told that they have poor potential to be a successful graduate student. Participants in the control condition

did not receive any feedback about their potential and were only presented with the option to persist in the task or complete a different task (see Appendix I for the feedback messages included in the Graduate School Aptitude Task). This procedure relied on the Barnum effect (i.e., people's willingness to believe the results of psychological tests that are, in fact, arbitrary; Snyder, Shenkel, & Lowery, 1977), but I also expected people high on impostorism to be especially likely to believe the negative feedback (Hypothesis 2b).

**Persistence.** In order to measure whether gender, impostorism, and negative feedback influence persistence, after receiving feedback about their graduate school potential, participants were given the option to complete an unrelated task or persist in the Graduate School Aptitude Task. The unrelated task was a state capital knowledge test which required the same amount of time to complete as the aptitude task (students were forwarded to later stages of the capital quiz if they had already completed much of the aptitude task). Students who chose to persist in the aptitude task were presented with a new set of 11-12 RAT and personality items before receiving the same feedback (positive, negative, or none for controls) regarding their potential. This procedure was repeated up to eight times thus providing a measure of persistence following negative, positive, or no feedback (possible range: 1 – 8; 1 represented participants who chose to complete an alternative task after the first round of feedback). Higher scores indicated greater persistence and thus, lower attrition.

**Graduate School Aspirations Scale.** Participants reported their aspirations for graduate school by responding to seven items, using a scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Items included, “Right now, I am feeling capable of pursuing graduate school;” “At this moment, I am feeling confident in my future as a

graduate school student;” “Right now, I am questioning my ability to succeed in graduate school” (reverse coded); and “At this moment, I am doubting whether if I have the ability to earn a doctoral degree or its equivalent (reverse coded)” (see Appendix J). Scores on this measure were averaged such that higher scores indicated stronger graduate school aspirations ( $\alpha = .88$ ).

**Credibility Scale.** Participants completed two items measuring whether or not they believed the feedback they received reflects their potential (Appendix D) using a scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Items included, “I believe that the graduate school potential task could be used to estimate my cognitive style,” and, “I do not believe that the graduate school potential task could be used to estimate my cognitive style” (reverse coded). All of the items were averaged together such that high scores indicated a stronger belief in the graduate school potential feedback ( $\alpha = .90$ ).

### **Procedure**

The study was completed in two parts so that responses to the Clance Impostor Phenomenon Scale (CIPS; Clance, 1985), the Rosenberg Self-esteem Scale (Rosenberg, 1965), and the Mindset Scale (Dweck, 2006; these scales were completed at time 1) would not be influenced by the Graduate School Aptitude Task (completed at time 2). Students completed both part 1 and party 2 online. Participants were emailed the link to the second part of the study 5 days after completing first part. During part 1, participants completed the aforementioned scales (excluding the Graduate School Aptitude Task) in a random order to counteract order effects.

In part 2, participants first completed the Graduate School Aptitude Task before receiving either positive, negative or no feedback that ostensibly indicated their graduate

school potential (see Appendix I for the feedback manipulation and see Appendix H for the cover story). After performing the aptitude task, participants completed a scale measuring their current graduate school aspirations and a scale measuring whether they believed the feedback was accurate and credible in a random order. Afterwards, participants completed a demographics form before being fully debriefed. The design of this study was a 2 (participants gender) x 3 (feedback condition: positive, negative, control) between-subjects factorial.

During debriefing, participants received full disclosure regarding the fake Graduate School Aptitude Task and were probed for whether or not their confidence in their own ability to succeed was restored. Students were also provided with my contact information in case they needed more clarification regarding the nature of the deception, and why it was necessary for the study. No participants contacted me in order to learn more about the use of deception.

## Results

### Initial Data Analysis

To summarize the data, Table 1 shows the means and standard deviations for all variables, for the whole sample and by participant gender. Effect sizes (Cohen's *d*) were computed so that high scores reflect men outscoring women.

Table 2 shows the correlations among all variables. Consistent with previous findings, impostorism was negatively related to self-esteem,  $r(686) = -.64, p < .001$  (e.g., Cozzarelli & Major, 1990; Leary et al., 2000). New to this research, impostorism was negatively related to graduate school aspirations,  $r(658) = -.30, p < .001$ , and positively related to beliefs that intelligence is fixed,  $r(686) = .26, p < .001$ . In other words, people with stronger impostor feelings more strongly endorsed the belief that intelligence is fixed rather than malleable and reported weaker graduate school aspirations. These findings support the construct validity of impostorism.

A factor analysis was conducted in order to test whether any subscales emerged within the CIPS. The Kaiser-Meyer-Olkin measure of sampling adequacy was .94, above the recommended value of .6, and Bartlett's test of sphericity was significant ( $\chi^2(190) = 6269.59, p < .001$ ). Principle components analysis was used and the initial eigen values showed that the first factor explained 37% of the variance, the second factor 8% of the variance, and a third factor 6% of the variance. The third variable was excluded because only two items had a factor loading of .4 and above. The first factor included 11 items with factor loadings .4 and above and the second factor included 7 items. Because no pattern emerged in the items in these factors and the two factors were strongly correlated,  $r(188) = .62, p < .001$ , the subscales were not further examined.

### **Hypothesis 1**

Hypothesis 1 stated that female participants would report stronger impostor feelings than male participants. Consistent with prior research, women ( $M = 61.52$ ,  $SD = 12.47$ ) reported stronger impostorism than men ( $M = 58.63$ ,  $SD = 12.55$ ),  $t(655) = 2.81$ ,  $p = .005$ ,  $d = .23$ . Therefore, Hypothesis 1 was fully supported. Additionally, this finding supports the known groups validity of impostorism (e.g., Clance & Imes, 1978; Jöstl et al., 2015; Kumar & Jagacinski, 2006).

### **Hypothesis 2a**

Hypothesis 2a stated that the stronger people's impostorism, the less motivation they would report in pursuing a graduate degree, but only after receiving negative feedback about potential, and especially for women. To test this hypothesis, graduate school aspirations were regressed on impostorism, credibility, condition, participant sex, and all interactions. The model was significant,  $F(8, 422) = 7.98$ ,  $p < .001$ ,  $R^2 = .13$ .

A main effect for feedback credibility (the covariate) was significant,  $b = -.11$ ,  $t = -2.34$ ,  $p = .02$ . Including the covariate when testing Hypothesis 2a and all remaining hypotheses (except Hypothesis 2b) allowed me to adjust for the fact that positive feedback ( $M = 5.92$ ,  $SD = 1.92$ ) was viewed as more credible than negative feedback ( $M = 4.81$ ,  $SD = 2.07$ ),  $t(435) = 5.82$ ,  $p < .001$ . In other words, participants were more likely to rate the feedback indicating that they have strong graduate school potential as accurate than feedback indicating that they have poor graduate school potential.

Of more interest, there was a main effect for impostorism,  $b = -.41$ ,  $t = -5.94$ ,  $p < .001$ , such that those with stronger impostorism reported weaker graduate school aspirations. The interaction between impostorism and condition was also significant,  $b =$



$-0.15, t = 2.14, p = .03$ . These effects were qualified by a significant three-way interaction between gender, condition, and impostorism,  $b = -0.18, t = -2.62, p = .009$ . To test my hypothesis, I decomposed this interaction by participant gender.

For women, there was a main effect for impostorism,  $b = -0.50, t = 5.95, p < .001$ , qualified by the predicted Condition x Impostorism interaction,  $b = -0.27, t = 3.27, p = .001$ . For women in the negative feedback condition, the correlation between impostorism and graduate school aspirations was significantly negative,  $r(137) = -0.43, p < .001$ , suggesting that negative feedback reduces graduate school aspirations for female impostors, as expected. By contrast, the relationship between impostorism and aspirations for women in the positive feedback condition was nonsignificant,  $r(137) = -0.15, p = .07$ , emphasizing the stronger role that negative feedback plays in persistence and attrition rates for women high on impostorism.

Finally, for men, the Condition x Impostorism interaction was nonsignificant,  $b = 0.11, p = .31$ . Instead, regardless of feedback, there was a tendency for men high on impostorism to be somewhat less likely to aspire to graduate school,  $b = -0.22, t = 1.89, p = .06$ . However, even this impostorism main effect did not reach significance for men. Therefore, Hypothesis 2a was fully supported.

Because Hypothesis 2a was supported, I tested whether the inclusion of the control condition impacted the relationship between impostorism and aspirations. The PROCESS macro add-on to SPSS was used (Hayes, 2013) to test whether impostorism moderated the relationship between condition and aspirations. In order to include the condition variable, dummy coding was applied. The first dummy code compared the negative feedback condition to the positive feedback condition and coded the negative

feedback condition as 0, the positive as 1, and the control as 0. The second dummy code compared the negative feedback condition to the control and included the negative feedback condition as 0, the positive as 0, and the control as 1. The model included impostorism as the moderator, the dummy variables, and two interaction terms as predictors of aspirations. The first interaction term included the interaction between the first dummy variable and impostorism, and the second interaction term included the interaction between the second dummy variable and impostorism. The model was significant,  $F(5, 646) = 13.64, p < .001, R^2 = .10$ .

As expected, the impostor syndrome contributed to graduate school aspirations,  $b = .32, t = 66.27, p < .001$ . Although the dummy variables and the second interaction term were not significant, the first interaction term, examining the interaction between the first dummy variable (negative vs. positive feedback, controlling for the control condition) and impostorism, contributed to aspirations,  $b = -.15, t = -2.14, p = .03$ . Examining the impact of the interaction at levels of the moderator (impostorism) revealed that the interaction contributed to aspirations at one standard deviation above the impostorism mean ( $SD = 12.58$ ). In other words, at high levels of impostorism, there was a significant difference between the negative and positive feedback condition on aspirations,  $b = -2.72, t = -2.16, p = .03$ . Specifically, participants in the negative feedback condition who reported strong impostorism reported significantly lower graduate school aspirations ( $M = 28.16$ ) compared to participants in the positive feedback condition who also reported strong impostorism ( $M = 30.88$ ). Although the control condition was included, no differences between the control and the positive and negative feedback conditions

emerged when impostorism was included as the moderator. Therefore, negative feedback only exacerbated the effect of impostorism on aspirations compared to positive feedback.

### **Hypothesis 2b**

Because impostors tend to make internal attributions after failure (for a review, see Kumar & Jagacinski, 2006) and the impostor syndrome is negatively associated with self-efficacy and self-confidence (Jöstl et al., 2015; Kumar & Jagacinski, 2006), Hypothesis 2b predicted that the stronger people's impostorism, the more strongly they would believe the negative feedback, but not the positive feedback. To test this hypothesis, feedback credibility was regressed on impostorism, condition, participant sex, and all interactions. The model was significant,  $F(7, 423) = 7.58, p < .001, R^2 = .10$ . As already noted, there was a main effect for condition,  $b = -.26, t = 5.56, p < .001$ , such that people reported stronger belief in the feedback in the positive feedback condition ( $M = 6.82, SD = 1.82$ ) than the negative feedback condition ( $M = 4.81, SD = 2.07$ ). In addition, there was a significant main effect for impostorism,  $b = .18, t = 2.58, p = .01$ . These effects were qualified by the expected interaction between impostorism and feedback condition,  $b = .17, t = 2.45, p = .02$ . No other effects were significant, including the three-way interaction,  $p = .08$ . Simple effects showed there was no relationship between impostorism and feedback credibility for those in the positive feedback condition,  $r(218) = -.03, p = .69$ . However, there was a significant positive relationship between impostorism and belief in the feedback in the negative potential condition,  $r(212) = .18, p = .009$ . As expected, belief in negative feedback about graduate school potential increased for participants high on impostorism, regardless of their gender. Thus, H2b was fully supported.

To examine whether impostorism contributed unique variance to belief in negative feedback after adjusting for mindset beliefs and self-esteem, I hierarchically regressed feedback credibility on mindset beliefs and self-esteem (Step 1) and impostorism (Step 2), while adjusting for participant gender. In Step 1, the model was not significant,  $F(3, 207) = 1.87, p = .14, R^2 = .01$ . In Step 2, the model was significant,  $F(4, 206) = 2.44, p = .048, R^2 = .05$ . Thus, only impostorism contributed significant variance to belief in the feedback,  $b = .18, t = 2.02, p = .045$ . Mindset beliefs and self-esteem did not, both  $ps > .56$ , and neither did gender,  $p = .10$ .

### **Hypothesis 3a**

Hypothesis 3a stated that negative feedback about graduate school potential would decrease persistence (increase attrition) in the Graduate School Aptitude Task (i.e., a main effect for feedback was expected). Descriptive statistics revealed a floor effect for persistence; on average, participants exited the Graduate School Aptitude Task after less than two trials ( $M = 1.87, SD = .04, \text{range: } 1.00 - 7.00$ ). Analyses showed that persistence was severely skewed ( $M = 1.94, t = 18.33, p < .001$ ) and kurtotic ( $M = 3.81, t = 20.05, p < .001$ ).

To attempt to correct for normality violations, a norm trials transformation was conducted (Templeton, 2011). The norm trials transformation is done in two steps. First, the variable is transformed into a percentile rank of the probability that scores are uniformly distributed. Second, the inverse-normal transformation is applied to the rank probability which results in  $z$ -scores that are normally distributed. The norm trials transformation corrected kurtosis ( $M = -.13, t < 1.00$ ) and reduced skew ( $M = .71, t = 7.89, p < .001$ ). This transformation was selected because other techniques (logarithmic

and reciprocal root transformations) did not normalize kurtosis (both  $t_s > 3.83$ ,  $ps < .001$ ).

To test Hypothesis 3a, the transformed persistence variable was regressed on impostorism, feedback condition (negative, positive, or control), and their interaction, using standardized predictors. A macro appropriate for three-level predictor variables was used (Modprobe; Hayes & Matthes, 2009). Results are reported using unstandardized coefficients. The regression model was significant,  $F(3, 657) = 3.19$ ,  $p = .02$ , albeit with low explanatory power ( $R^2 = .02$ ). There was a significant main effect for condition,  $b = -.02$ ,  $t = 2.23$ ,  $p = .02$ , qualified by a marginally significant interaction between impostorism and condition,  $b = -.02$ ,  $t = -1.93$ ,  $p = .05$ .

Decomposing the interaction effect for each feedback condition, there was no relationship between impostorism and persistence for those in the negative and positive feedback conditions,  $ps > .28$ . However, for those in the control condition, there was a significant negative relationship between impostorism and persistence,  $b = -.03$ ,  $t = 2.08$ ,  $p = .04$ . Because high scores indicated more persistence (i.e., less attrition), this finding suggests that participants high on impostorism were less likely to persist, but only when no feedback was given. Because I predicted this effect would only occur in the negative feedback condition, there was no support for hypothesis 3a.

### **Hypothesis 3b**

Hypothesis 3b predicted that the stronger people's impostorism, the sooner they would quit the Graduate School Potential Task, but only after receiving negative feedback, and especially for women (i.e., impostor feelings would interact with feedback and participant gender). To test this hypothesis, participants in the control condition were

excluded in order to include feedback credibility (i.e., belief in the graduate potential feedback) as a covariate (a missing variable for controls).

After standardizing predictor variables, persistence was regressed on gender, impostorism, and condition (coded 1 = positive, 2 = negative), and all their interactions. The model was significant,  $F(8, 422) = 1.98, p = .048, R^2 = .04$ . However, there was only a significant main effect for condition,  $b = .14, t = 2.76, p = .006$ . Regardless of impostorism or gender, those in the negative condition persisted longer ( $M = .53, SD = .22$ ) than those in the positive feedback condition ( $M = .48, SD = .20$ ). There were no significant interactions, including the predicted three-way interaction,  $p = .88$ . Thus, hypothesis 3b was not supported. Instead, even after adjusting for the credibility gap, people receiving negative feedback persisted longer, perhaps in an effort to improve their feedback on subsequent trials.

#### **Hypothesis 4a**

Hypothesis 4a posited that fixed mindset beliefs would predict persistence during the Graduate School Aptitude Task such that the stronger people's fixed intelligence beliefs, the sooner they would quit the task when receiving negative feedback (i.e., a main effect of fixed intelligence beliefs is expected). To test this hypothesis, the transformed persistence variable was regressed on gender, feedback condition (positive and negative), Mindset beliefs, and all interactions, after adjusting for feedback credibility. Echoing the analyses for Hypothesis 2b using impostorism, there was only a main effect for feedback condition,  $b = .14, t = 2.80, p = .005$ , such that those in the positive feedback condition persisted less, or had a higher attrition rate ( $M = .48, SD = .20$ ) than those in the negative feedback condition ( $M = .53, SD = .22$ ). No other effects

emerged, all  $ps > .12$ , including the main effect for mindset,  $p = .76$ , and the model was not significant,  $F(8, 424) = 1.39$ ,  $p = .20$ ,  $R^2 = .01$ . Thus, Hypothesis 4a was not supported. Additionally, the identical analysis substituting self-esteem for mindset beliefs produced the same results. There was only a main effect for condition, and the model was not significant,  $p = .06$ .

#### **Hypothesis 4b**

Hypothesis 4b predicted that the impostor syndrome would contribute unique variance to persistence even after adjusting for self-esteem or fixed intelligence beliefs for at least female participants in the negative feedback condition. However, given that impostorism did not influence persistence (attrition), and neither did mindset beliefs or self-esteem (see above), this hypothesis was no longer viable.

Instead, I examined whether impostorism would contribute unique variance to graduate school aspirations after adjusting for self-esteem and fixed intelligence beliefs. To that end, I hierarchically regressed graduate school aspirations on mindset beliefs and self-esteem (Step 1) and impostorism (Step 2). In Step 1, the model was significant,  $F(2, 429) = 33.43$ ,  $p < .001$ ,  $R^2 = .14$ . In Step 2, the model was also significant; impostorism contributed unique variance to graduate school aspirations,  $b = -.13$ ,  $t = -2.16$ ,  $p = .03$ ,  $R^2 = .05$ . Self-esteem also contributed to graduate school aspirations,  $b = .29$ ,  $t = 5.03$ ,  $p < .001$ . Mindset beliefs did not,  $b = .01$ ,  $t = .31$ ,  $p = .76$ . Therefore, impostorism was a unique incremental predictor of graduate school aspirations.

## **Discussion**

The present study supports prior findings that women tend to report stronger impostorism than men (Kumar & Jagacinski, 2006; Hypothesis 1) and indicates the following novel contributions to the gender and impostor syndrome literatures. First, impostorism may be especially detrimental to women's pursuit of a graduate degree, but only when they face negative feedback about their potential (Hypothesis 2a). Second, the stronger people's impostorism, the more strongly they may believe negative feedback about their graduate school potential (Hypothesis 2b). Third, findings suggest that impostorism is related to beliefs that are key to people's career and academic success. Specifically, impostorism was negatively related to graduate school aspirations and positively related to fixed mindset beliefs. Finally, there was no support for my predictions that negative feedback would decrease persistence (Hypothesis 3a), but especially for women high on impostorism (Hypothesis 3b). There was also no support for the hypothesis that fixed mindset beliefs would decrease persistence in the negative feedback condition (Hypothesis 4a). Next, I will discuss each of these findings in more detail.

### **Impostorism and Women's Pursuit of Power**

The present findings suggest that impostorism is detrimental to women's pursuit of a graduate degree when they receive negative feedback about their potential (Hypothesis 2a). Not only did women report stronger impostorism than men, impostorism had a stronger effect on women's graduate school aspirations than on men's aspirations when participants received negative feedback. This may be the case for the following four related reasons. First, graduate school is a masculine domain and women report



lower performance expectations in masculine fields (Correll, 2001; Meece et al, 1982). Second, women are less confident than men in their academic potential (Jöstl et al., 2015; Kimball & Gray, 1982). Because there is a negative relationship between confidence and impostorism (Kumar & Jagacinski, 2006), low performance expectations and confidence may both reflect and reinforce impostor feelings, causing women to shy away from challenging academic pursuits. Third, relative to men, women tend to be more self-critical of their abilities (Luscombe & Riley, 2001) which could also magnify the effect of impostorism on goal pursuit. Fourth, women respond more strongly to negative feedback than men (Roberts, 1991). In fact, men are more likely to deny failures and acknowledge successes and to adopt an attributional style that emphasizes external sources of failure (Dweck & Bush, 1976; Eagly & Whitehead, 1972). Women's sensitivity so negative feedback is especially concerning because teachers tend to give more negative feedback to girls than to boys (Dweck & Leggett, 1988; Eccles & Blumenfeld, 1985). Also, parents tend to give their daughters more negative feedback than their sons (Lundgren & Rudawsky, 1998), even when their sons perform at the same level as their daughters (Lewis, Alessandri, & Sullivan, 1992). Thus, girls may be developmentally more at risk for impostor feelings than boys. As a result, impostorism may be one more reason why women self-select out of competitive career tracks.

Although impostorism was especially detrimental to women's pursuit of a graduate degree, women receive more graduate degrees than men (U.S. Census Bureau, 2008; National Science Foundation, 2009). Therefore, the generalizability of the present findings to women's ability to enter graduate school programs may be limited. Nonetheless, the impact of negative feedback on the aspirations of women who report

impostorism may be extremely influential to women's career trajectories, helping to explain why women do not strive for high status positions following their graduate school education. Additionally, women's experience with negative feedback may be more limited during their undergraduate studies because students tend to receive less personalized attention as undergraduates. Once women are exposed to more frequent and personalized evaluations during graduate school and beyond, the impact of impostorism on their subsequent career success may be stronger due to greater exposure to negative feedback.

### **Impostorism and Belief in Negative Feedback**

This research also indicates that the stronger people's impostorism, the more strongly they believe negative feedback about their potential (Hypothesis 2b). This finding is related to previous work suggesting that impostorism is associated with emphasizing internal sources of failure (for a review, see Kumar & Jagacinski, 2006). If people high on impostorism tend to attribute failure to internal sources (i.e., to an innate inability such as lack of intelligence) then they may be more likely to judge the feedback as credible because the feedback would be perceived as reflecting an inherent inability instead of an external, contextual, or fleeting flaw. Therefore, this research has revealed another detrimental consequence of impostorism, the tendency to believe negative feedback. This consequence may be particularly detrimental because viewing negative feedback as credible could exacerbate impostorism and contribute to a cyclical relationship between impostorism and feedback. Rather than learning from their mistakes to improve their performance, impostors may instead avoid feedback (to prevent hearing bad news) or develop feelings of learned helplessness when feedback is unavoidable.

### **Correlates of Impostorism**

The current findings suggest that impostorism is related to beliefs that are essential to people's ability to excel in graduate school and beyond. Specifically, impostorism was negatively related to graduate school aspirations and positively related to fixed mindset beliefs (see Table 2). Also, replicating prior effects, impostorism was related to less self-esteem (for a review, see Kumar & Jagacinski, 2006). Previous research has not only found impostorism to be related to lower self-esteem, but also to other negative self-views such as lower self-efficacy and self-confidence (for a review, see Kumar & Jagacinski, 2006). Because self-efficacy is related to academic achievement (e.g., Bandura, 1993; Pajares & Schunk, 2001), it follows that people high on impostorism reported lower graduate school aspirations.

Additionally, fixed mindset beliefs that promote the idea that intelligence is set at birth and cannot be improved (Blackwell et al., 2007; Cury et al., 2006; Haimovitz, Wormington, & Corpus, 2011) were related to higher impostorism. Attributing failure to lack of inherent ability may color beliefs about abilities and the likelihood for success in the future (Anderson & Jennings, 1980). Believing that failure is a likely outcome is debilitating when faced with obstacles (Elliott & Dweck, 1988; Frankel & Snyder, 1978; Nicholls, 1984). Perhaps one reason that impostors tend to feel fraudulent is because they attribute their lack of ability to permanent and fixed inadequacies in intelligence. In other words, if impostors believe that their abilities are fixed and unable to be improved, then they may feel especially inadequate compared to their peers whom they perceive as more deserving of their positions.

### **The Influence of Impostorism on Women's Persistence**

Hypothesis 3a predicted that negative feedback about graduate school potential would decrease persistence (i.e., increase attrition) and Hypothesis 3b predicted that the stronger people's impostorism, the weaker their persistence, but only after receiving negative feedback, and especially for women. Both hypotheses were not supported. However, results were compromised by the psychometric limitations of the persistence measure. The measure produced a floor effect such that most participants quit the Graduate School Aptitude Test after only one or two rounds of feedback. In the future, an improved measure of persistence should be constructed in order to properly address whether impostorism contributes to women's attrition from high status careers and positions.

Unexpectedly, participants were more likely to persist in the aptitude task when they received negative feedback about their potential. This finding suggests that participants may have aimed to challenge the negative feedback they received by answering more questions measuring their aptitude. Although I expected the opposite result (Hypothesis 2a), this finding sheds an optimistic light on people's responses to negative feedback because persisting through and challenging failure is key to people's ability to ultimately succeed (Ames, 1984; Diener & Dweck, 1980; Dweck, 1986; Dweck & Reppucci, 1973; Nicholls, 1975).

### **The Incremental Validity of Impostorism**

Before testing the incremental validity of impostorism compared to mindset beliefs, Hypotheses 4a tested whether fixed mindset beliefs predict persistence during the Graduate School Aptitude Task because endorsing the belief that intelligence is fixed is

related to less persistence through difficult work (Blackwell et al., 2007; Dweck & Leggett, 1988). Additionally, gender stereotypes that associate women with lower competence (Fiske et al., 2002) and field-specific expectations of brilliance hinder women's success (Leslie et al., 2015); therefore, fixed intelligence beliefs could contribute to women's attrition. However, fixed mindset beliefs did not predict attrition during the Graduate School Aptitude Task. Similar to Hypotheses 3a and 3b the results were compromised by the psychometric limitations of the attrition measure. Therefore, future research should further address the impact of fixed intelligence beliefs on women's persistence.

Hypothesis 4b predicted that the impostor syndrome would contribute unique variance to persistence even after adjusting for self-esteem or fixed intelligence beliefs for at least women in the negative feedback condition. However, given that impostorism, mindset beliefs, and self-esteem did not influence persistence, I examined whether impostorism contributed unique variance to graduate school aspirations. Impostorism was a unique incremental predictor of graduate school aspirations. Although self-esteem also contributed to graduate school aspirations, mindset beliefs did not. These results suggest that impostorism contributes to graduate school aspirations above and beyond self-esteem and mindset beliefs. Therefore, impostorism warrants further examination in research investigating why women more often than men self-select out of challenging academic fields.

### **Future Directions**

**Exploring Gender Differences.** Mirroring previous findings, women reported stronger impostorism than men (e.g., Clance & Imes, 1978; Jöstl et al., 2015; Kumar &

Jagacinski, 2006). Future research should identify the factors that contribute to this gender disparity in order to illuminate strategies for the reduction of impostorism. For instance, investigating whether teachers and parents, who tend to give more negative feedback to girls than to boys (Dweck & Leggett, 1988; Eccles & Blumenfeld, 1985; Lundgren & Rudawsky, 1998), play a causal role is suggested. If so, then uncovering the reasons why adults display this gender difference would be important. It could be that adult's endorsement of the gender hierarchy contributes to behaviors that invoke higher rates of impostorism in women than men. Specifically, people may fail to support girls and women in order to defend men's greater access to power and resources (Rudman et al., 2012a). Alternatively, adults may socialize girls to be more submissive than boys in order to protect them from backlash, which women receive for enacting high-status traits that violate the gender hierarchy (Rudman et al., 2012a).

Another factor that may contribute to the gender disparity in impostorism is gender stereotypes, such as the stereotypes that women are less competent than men (e.g., Broverman et al., 1972; Rosenkrantz et al., 1968). If women endorse this belief, then they may feel unqualified and fraudulent in academic settings. Therefore, strategies aimed at reducing impostorism could challenge gender stereotypes that portray women as impostors in academic or work settings. Finally, women are less likely than men to attribute their successes to internal and stable sources (Deaux, 1976). Simply practicing attributing success to internal factors, such as intelligence, may be one way for women to overcome impostorism.

**Interventions Aimed at Reducing Impostorism.** Future research should identify effective interventions aimed at improving impostorism. Clance and Imes (1978) have

suggested that a multi-modal approach, that employs multiple therapeutic approaches, may be best at reducing impostorism based on interviews they conducted with female undergraduate and graduate students. Specifically, they proposed that a group setting may be beneficial by challenging women to share their impostor feelings which they have typically hidden (because impostorism is rooted in a fear of being exposed as a fraud) and may thus increase feelings of relief once women learn that others share similar feelings. Clance and Imes (1978) also suggested that encouraging the client to believe that feelings of fraudulence do not reflect reality, increases the likelihood that successes are attributed to internal sources. Finally, Clance and Imes (1978) proposed that asking a client to imagine confronting people who have given praise with the belief that they were given praise due to reasons unrelated to their aptitude (e.g., the client received praise because she was likeable) can help the client realize that others reject the idea that they were tricked into believing that the client was capable and deserving of praise. Other work has also discussed the possible benefits of reflecting on family and early experiences that may have caused people to develop a need to prove their competence because awareness of developmental sources that drive impostorism can help people frame their fraudulent feelings as a natural consequence of environmental factors (Castro, Jones, & Mirsalimi, 2004).

Based on the present study, I suggest that reducing fear of failure is essential to reducing impostorism. The present study found that failure reduced academic aspirations for people high on impostorism. Therefore, an intervention could introduce exercises that instruct participants to reframe and reappraise failure as a challenge that could contribute to positive outcomes, such as knowledge about what to do differently in the future.

Additionally, emphasizing people's ability to overcome failure in the future could help people avoid feelings of helplessness which are detrimental to success (Bandura, 1977). This technique would help to reduce impostorism because impostors report higher levels of fear of failure (Clance, 1985) and fear of failure is negatively related to performance (grade point average; Caraway, Tucker, Reinke, & Hall, 2003). Some research has even suggested that fear of failure is more predictive of school achievement than cognitive ability (Spinath, Spinath, Harlaar, & Plomin, 2006; Steinmayr & Spinath, 2009). This method may also be valuable because failure is an inherent part of people's academic and work experiences so being able to respond in an effective and resilient manner is necessary for achieving goals.

Research on self-affirmation provides another unexplored and potential intervention for people high on impostorism. Self-affirmation theory posits that people are motivated to protect evaluations of the self such as their moral adequacy and self-integrity (Aronson, Blanton, & Cooper, 1995; Steele, 1988). When people experience a setback that threatens their self-integrity, people can restore their self-views by affirming other sources of self-integrity. Koole et al. (1999) found that participants who completed a self-affirmation task in which they thought about their most important value were less likely to ruminate about receiving negative feedback on an ostensible IQ test compared to participants who did not complete the self-affirmation task and were instead instructed to think about values that were not important to them. Because self-affirmation reduced rumination after negative feedback, it may one way to buffer the impact of negative feedback in those who report impostorism.



Interventions may also benefit from identifying subscales within the CIPS.

Although the present thesis did not reveal any clear subscales, Chrisman et al. (1995) found evidence for the existence of three factors within the CIPS termed Fake, Discount and Luck. The Fake subscale included items measuring perceived fraudulence, the Discount subscale included items measuring appraisal of abilities and accomplishments, and the Luck subscale included items measuring the extent to which success was attributed to luck or ability. Future research could further investigate whether any subscales emerge in the CIPS in order to better tailor interventions based on subscale endorsement. Additionally, there may be unidentified subscales that contribute to people's ability to excel at work or school. For example, it may be the case that negative feedback sensitivity is a subscale of the CIPS. If this is the case, this subscale could be highly impactful to impostors' ability to face negative feedback on their path to success.

### **Conclusion**

Impostorism may be especially detrimental to women's pursuit of a graduate degree, but only when they face negative feedback about their potential. Impostorism may be one more reason why women self-select out of competitive career tracks (Ceci & Williams, 2010; van Anders, 2004). Hopefully, illuminating impostorism as a mechanism for women's self-selection out of competitive career tracks could be used in future research to encourage women's pursuit of high status positions. Additionally, impostorism was related to beliefs that are detrimental to academic and career pursuits, such as the proclivity to believe negative feedback about potential and support of fixed mindset beliefs. The present research highlights the need to address impostorism with

effective interventions in order to improve the experience of both women and men in their academic and career pursuits.

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Appendix A  
Personality Items

**Instructions:** Rate the extent to which you agree/disagree with the following  
Even if most people have good intentions, it's better not to trust someone quickly.

Response scale: 1 (Disagree)      2      3 (Neutral)      4      5 (Agree)

I am the life of the party.

I am not really interested in others

I feel little concern for others.

I get stressed out easily because I take myself and my work very seriously.

When I'm with strangers, I tend to stay silent and watchful.

I like order.

I am primarily interested in people, rather than abstract topics.

I frequently can't remember where I've put something.

I start conversations.

I change my mood a lot

I am the life of the party

I feel little concern for others

I don't talk a lot

I don't like to draw attention to myself

I get stressed out easily

I am interested in people

I leave my belongings around

I am relaxed most of the time

I take time out for others

I feel comfortable around people

I insult people

I keep in the background

I have frequent mood swings

I sympathize with others' feelings

I have little to say

I don't mind being the center of attention

I am not interested in other people's problems

I am easily disturbed

I have a soft heart.

I get upset easily

I sympathize with others' feelings

I talk to a lot of different people at parties

## Appendix B

## Easy RAT Items

**Instructions:** Think of the word that ties all three words together. There is only one right answer for each series.

Example: What word is related to these three words?

paint doll cat

The answer is "house": house paint, dollhouse, and house cat.

Example2: What word is related to these three words?

stool powder ball

The answer is "foot": footstool, foot powder, and football.

cream / skate / water

dust / cereal / fish

loser / throat / spot

show / life / row

night / wrist / stop

dew / comb / bee

duck / fold / dollar

rocking / wheel / high

fountain / baking / pop

preserve / ranger / tropical

aid / rubber / wagon

flake / mobile / cone

soap / shoe / tissue

cracker / fly / fighter

safety / cushion / point

cane / daddy / plum

dream / break / light

fish / mine / rush

political / surprise / line

gap / door / sign

high / district / house

worm / shelf / end

river / note / account

date / alley / fold

computer / cable / broadcast

fur / rack / tail

hound / pressure / shot

sleeping / bean / trash

## Appendix C

## Difficult RAT Items

**Instructions:** Think of the word that ties all three words together. There is only one right answer for each series.

Example: What word is related to these three words?

paint doll cat

The answer is "house": house paint, dollhouse, and house cat.

Example2: What word is related to these three words?

stool powder ball

The answer is "foot": footstool, foot powder, and football.

piece / mind / dating

stick / maker / point

right / cat / carbon

home / sea / bed

cross / rain / tie

chamber / mask / natural

office / mail / hat

hot / butterflies / pump

room / Saturday / salts

base / show / dance

desert / ice / spell

rag / milk / out

property / moral / price

chest / care / store

measure / worm / video

dash / happy / stick

grand / door / bang

release / french / secretary

tomato / cement / tooth

print / berry / bird

due / life / tense

jury / door / side

cadet / capsule / ship

sake / pet / nick

mouth / bike / oil

bedroom / plan / brew

## Appendix D

## Credibility Scale

**Instructions:** Now we would like to hear about what you thought of this word completion task. Please rate the extent to which you agree/disagree with the following statements.

Response scale:

1 (strongly disagree) 2 (disagree) 3 (neither) 4 (agree) 5 (strongly agree)

1. I believe that this word completion task could be used to estimate my cognitive style.
2. I do not believe that this word completion task could be used to estimate my cognitive style.



## Appendix E

## Clance Impostor Phenomenon Scale

Response Scale:

1	2	3	4	5
(not at all true)	(rarely)	(sometimes)	(often)	(very true)

1. I have often succeeded on a test or task even though I was afraid that I would not do well before I undertook the task.
2. I can give the impression that I'm more competent than I really am.
3. I avoid evaluations if possible and have a dread of others evaluating me.
4. When people praise me for something I've accomplished, I'm afraid I won't be able to live up to their expectations of me in the future.
5. I sometimes think I obtained my present position or gained my present success because I happened to be in the right place at the right time or knew the right people.
6. I'm afraid people important to me may find out that I'm not as capable as they think I am.
7. I tend to remember the incidents in which I have not done my best more than those times I have done my best.
8. I rarely do a project or task as well as I'd like to do it.
9. Sometimes I feel or believe that my success in my life, school, or job has been the result of some kind of error.

10. It's hard for me to accept compliments or praise about my intelligence or accomplishments.
11. At times, I feel my success has been due to some kind of luck.
12. I'm disappointed at times in my present accomplishments and think I should have accomplished much more.
13. Sometimes I'm afraid others will discover how much knowledge or ability I really lack.
14. I'm often afraid that I may fail at a new assignment or undertaking even though I generally do well at what I attempt.
15. When I've succeeded at something and received recognition for my accomplishments, I have doubts that I can keep repeating that success.
16. If I receive a great deal of praise and recognition for something I've accomplished, I tend to discount the importance of what I've done.
17. I often compare my ability to those around me and think they may be more intelligent than I am.
18. I often worry about not succeeding with a project or examination, even though others around me have considerable confidence that I will do well.
19. If I'm going to receive a promotion or gain recognition of some kind, I hesitate to tell others until it is an accomplished fact.
20. I feel bad and discouraged if I'm not "the best" or at least "very special" in situations that involve achievement.

## Appendix F

## Rosenberg Self-esteem Scale

**Instructions:** Please rate the extent to which you agree/disagree with the following statements.

Response scale: 1 (strongly agree) 2 (agree) 3 (disagree) 4 (strongly disagree)

1. On the whole, I am satisfied with myself.
2. At times I think I am no good at all (reverse coded).
3. I feel that I have a number of good qualities.
4. I am able to do things as well as most other people.
5. I feel I do not have much to be proud of (reverse coded).
6. I certainly feel useless at times (reverse coded).
7. I feel that I'm a person of worth, at least on an equal plane with others.
8. I wish I could have more respect for myself (reverse coded).
9. All in all, I am inclined to feel that I am a failure (reverse coded).
10. I take a positive attitude toward myself.

## Appendix G

## Mindset Questionnaire

**Instructions:** Please rate the extent to which you agree/disagree with the following statements.

Response scale: 1 (strongly agree) 2 (agree) 3 (disagree) 4 (strongly disagree)

1. Your intelligence is something very basic about you that you can't change very much.
2. No matter how much intelligence you have, you can always change it quite a bit (reverse coded).
3. Only a few people will be truly good at sports, you have to be born with the ability.
4. The harder you work at something, the better you will be (reverse coded).
5. I often get angry when I get feedback about my performance.
6. I appreciate when people, parents, coaches or teachers give me feedback about my performance (reverse coded).
7. Truly smart people do not need to try hard.
8. You can always change how intelligent you are (reverse coded).
9. You are a certain kind of person and there is not much that can be done to really change that.
10. An important reason why I do my school work is that I enjoy learning new things (reverse coded).

## Appendix H

### Graduate School Aptitude Task Cover Story

#### The Graduate School Potential Task

Over the past few years, the Social Cognition Lab has developed a credible measure of graduate school potential that uses your personality traits and an implicit measure of your cognitive style to predict graduate school success in students. *(Next page)*

Your ability to creatively associate words reflects your cognitive potential and problem solving skills.

We will ask you to generate a word that is related to lists of words. Prior research has found that cognitive potential is strongly related to people's ability to creatively generate terms. *(Next page)*

Based on the type of words you generate, we can measure your cognitive approach and problem solving mindset. Some cognitive styles are more suited for graduate school than others, and this test tells us if your style is suited for graduate school. *(Next page)*

Based on the graduate school performance of past participants, we have also identified personality traits that make you more or less suited for graduate school.

Therefore, you will also complete items measuring your personality traits that will tell us if you have the unique combination of personality traits that best prepare you for graduate school. *(Next page)*

Your responses to the personality questions and word completion task will be combined to provide us with an idea of your graduate school potential. *(Next page)*

Overall, this task has been highly predictive of the graduate school performance of the past participants. Additionally, this task has been peer-reviewed (McLean et al., in press 2017; The psychological predictors of graduate school success. *Science*).

## Appendix I

### Graduate School Aptitude Task Feedback Messages

#### **Positive Feedback Condition:**

Based on your preferences, **you may have excellent potential to be a very successful graduate student**. Choose whether you would like to continue in this task and receive updated results about your potential or complete a different task before completing the next measures.

*If you continue in this task, your responses will update your results.*

[Click here to continue in this task/Click here to complete a different task](#)

#### **Negative Feedback Condition:**

Based on your preferences, **you may have poor potential to be a successful graduate student**. Choose whether you would like to continue in this task and receive updated results about your potential or complete a different task before completing the next measures.

*If you continue in this task, your responses will update your results.*

[Click here to continue in this task/Click here to complete a different task](#)

#### **Control Condition:**

Choose whether you would like to continue in this task or complete a different task before completing the next measures.

[Click here to continue in this task/Click here to complete a different task](#)

## Appendix J

## Graduate School Aspirations Scale

**Instructions:** Please rate the extent to which you agree/disagree with the following statements.

Response scale:

(strongly disagree) 1 2 (disagree) 3 (somewhat disagree) 4 (neither) 5 (somewhat agree) 6 (agree) 7 (strongly agree)

1. Right now, I am feeling capable of pursuing graduate school
2. At this moment, I am feeling confident in my future as a graduate school student
3. Right now, I am questioning my ability to succeed in graduate school (reverse coded)
4. At this moment, I am doubting whether if I have the ability to earn a doctoral degree or its equivalent (reverse coded)
5. Right now, I am excited about graduate school.
6. At this moment, I am dedicated to pursuing graduate school.
7. Right now, I am invested in pursuing a graduate school degree.



Table 1

*Means and Gender Differences in all Variables*

	<u>Whole Sample</u>		<u>Women</u>		<u>Men</u>		<u>Gender Differences</u>		
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>p</i>	<i>d</i>
CIPS	60.60	12.59	61.52	12.47	58.63	12.55	2.81	.005	-.22
Aspirations	32.39	8.66	32.37	8.42	32.56	9.03	.27	.78	.02
Persistence	.51	.23	.50	.22	.53	.24	1.46	.15	.11
Credibility	5.56	2.07	5.71	2.00	5.27	2.15	2.65	.008	-.21
Self-esteem	28.67	5.17	28.29	4.97	29.50	5.41	2.87	.004	.22
Mindset Beliefs	21.15	3.42	21.18	3.43	21.10	3.47	.28	.78	<.001

Table 2

*Correlations Among Variables*

	Aspirations	CIPS	Persistence	Credibility	SE
Impostorism (CIPS)	-.30***	-----			
Persistence	.07	-.04	-----		
Feedback Credibility	-.07	.06	.10*	-----	
Self-esteem (SE)	.35***	-.64***	.01	-.07	-----
Mindset Beliefs	-.08*	.26***	.01	.08*	-.25***

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