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Anything You Can Do?: The Influence of Role Models on Architecture Students' Future Career Confidence

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ANYTHING YOU CAN DO?: THE INFLUENCE OF ROLE MODELS ON ARCHITECTURE STUDENTS' FUTURE CAREER CONFIDENCE

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Since its professionalization in 1857, the field of architecture has been male dominated. Traditionally, the efforts of female architects have been constrained to sectors considered "appropriate" to their gender such as historic preservation and residential and interior design (Adams and Tancred 2000, American Architectural Foundation 1988). Efforts to promote gender equality more broadly have improved academic participation and, in 2012, women accounted for 42% of architecture students nationally (The National Architectural Accrediting Board, Inc. 2012). However, during the same year, women made up only 24% of the architecture workforce (Bureau of Labor Statistics 2012). Scholars and professionals attribute this gender gap to a range of factors, including industry tradition (Pluviose 2007), sexism, wage discrimination, (De Graft-Johnson and Greed 2005; Jett 2012), a difficult work life balance (Greer 1982), and a lack of female role models (Ahrentzen and Anthony 1993; Frederickson 1993; Groat and Ahrentzen 1996; Pluviose 2007) among others; nevertheless, there has been little empirical exploration of the influence of role models on women in architecture. To address this gap, I draw upon analyses in Science, Technology, Engineering, and Math (STEM) fields, which show that role models promote women's success by mitigating the effects of stereotype threat (Marx and Roman 2002; McIntyre, Paulson and Lord 2003). Similarly, my study of an accredited architecture program at a Midwestern public university investigates the relationship

between role models, academic confidence, and future career confidence and considers the results within the context of women's historic and contemporary participation in architecture.

KEYWORDS: Architecture, Gender, Role Models

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CHAPTER 1

INTRODUCTION

The birth of professional architecture in the United States is marked by the establishment of The American Institute of Architects (AIA) in 1857 (Wren 2005a). Originally founded by 49 white men (Wren 2005a), the field has historically been dominated by male practitioners and today "remains all too homogeneous: too male, too pale" (Anthony 2002:266). Understanding and remedying this pattern of participation is important given the significant, though often overlooked impact of the built environment on our daily lives. Boyer and Mitgang (1996:3-4) explain that, "…architecture has always rested on the idea that it is a *social art*—whose purposes included, yet transcend, the building of buildings. Architects…can shape how productive, healthy and happy we are both individually and collectively." Anthony (2008:14, emphasis in original) adds, "*The built environment reflects our culture, and vice-versa.* If our buildings, spaces, and places continue to be designed by a relatively homogeneous group of people, what message does that send about our culture?" Unfortunately, with women accounting for only 24% of architects in 2012 (Bureau of Labor Statistics 2012), the message sent is that architecture is a field for men.

The gender gap in architecture is not unique however; similar patterns exist in science, technology, engineering, and math (STEM) occupations as well as many other historically male dominated professions. Yet, while women's participation in STEM fields has received widespread, public and scholarly attention in recent years, there has been far less critical investigation into women's lack of representation in architecture. Research conducted in STEM illustrates that role models are important for promoting women's academic and professional success. Because many aspects of STEM fields are incorporated into architecture, it follows that

role models may also promote women's successful participation in architecture and facilitate their entry into the professional realm. The analyses presented below utilizes original survey data collected from architecture students in an accredited architecture program at a Midwestern public university and focuses on the following research question: Do role models positively impact architecture students' feelings of confidence about their potential for success in their future professional careers in architecture? I hypothesize that: Architecture students with academic role models will be more confident about their future professional careers than those without.

The remainder of this paper is organized as follows: chapter two presents an overview of the history of professional architecture in the United States as well as the establishment of the architectural education system. This history highlights significant professional and academic developments beginning with the establishment of the AIA and carries through to contemporary practice while exploring gendered patterns of participation along the way. Within this section, I pay particular attention to women's involvement, illustrating the manner in which their participation has historically been constrained.

Chapter three includes a review of literature focusing on the impact of role models for women in traditionally male dominated professions. I begin with a discussion of the theoretical importance of having role models for women in these fields. Because there is a lack of empirical investigation assessing the influence of role models on women in architecture, I turn to studies conducted in STEM to illustrate the importance of role models for women's success in traditionally male dominated fields before exploring historical and anecdotal accounts of role models in architecture. Chapter four outlines the methodology and statistical procedures that I utilized in this study and also describes how each variable was measured. Chapter five discusses

the results of the data analyses. Finally, in chapter six I synthesize the results in the discussion and conclude with implications for promoting women's successful involvement in professional architecture.

CHAPTER 2

HISTORICAL OVERVIEW

After the AIA's formal establishment in the New York office of Richard Upjohn, the organization's first president (Wren 2005a), the founding membership grew from 49 to 90 over the next decade. By 1876, the number had swelled to 280 despite rigid standards for eligibility (Wren 2005b). Although the AIA's organizational philosophy incorporated inclusionary values and touted the importance of young designers for the future of professional architecture (Wren 2005b), women were not among its early members. In fact, female architects were completely absent from the AIA until 1888 when the first woman, Louise Bethune, was elected into membership 31 years after its creation (American Architectural Foundation 1988).

During the first decade of the organization's existence, AIA members focused on issues such as client and supplier relations, material testing, and the lack of an architecture library (Wren 2005a). In addition, establishing a system for educating new architects was also important. Prior to the AIA's founding, some architects learned the trade by attending design schools in Europe but most apprenticed with established practitioners in the United States (Cuff 1991; Smith 2007). In the absence of laws regulating the practice of architecture, draftsmen, contractors, and builders often worked as "architects" (Draper 1977). Although the Civil War stalled efforts to formalize architectural education (Wren 2005a), the unregulated building that occurred during Reconstruction highlighted both the lack of safety codes in the US and the limited training that many architects possessed (Draper 1977). This brought the issue of architectural education to the forefront once again where, for the AIA, establishing an academic tradition was in line with members' interest in developing "higher and more uniform standards

for themselves" as well as their desire to solidify architecture's status as a proper profession like law and medicine (Draper 1977:209).

Initially, members proposed developing a "grand central school of architecture" that would incorporate all the best features of mechanical and polytechnical institutes worldwide (Woods 1999). This system would have included instruction in drawing, modeling, construction, engineering, aesthetics, and history among others, and most importantly "prepared and conditioned mechanics, builders, and engineers to work under the architect's direction" (Woods 1999:67). While the "grand central school" would have "institutionalized the professional ideal of architect as head and authority" it was an endeavor that proved too costly for the AIA to implement (Woods 1999:68). Instead, the design competition oriented French Ecole des Beaux-Arts model was put into practice which, in many ways, was a natural selection given that many AIA members had been trained under the system in Europe (Draper 1977). As Draper (1977:211-212, emphasis in original) explains, the Ecole system:

> ...exerted strong control over the nature of a student's work, [yet] it left him or her quite free to choose how and when to do it...the center of the student's world was the *atelier* or studio where competition projects were worked out...All but three of the twenty or so ateliers [in France] were maintained independently by *patrons* (design professors) who were practicing architects. The patrons usually came around in the evening to give critiques, but otherwise the atelier was student-run...Students could come to the atelier whenever they wanted, since only a minimum number of projects was required each year. Advancement through the hierarchy set by the Ecole did, however, require discipline and hard work, and it encouraged individual initiative.

Advocates in the AIA heralded the Ecole des Beaux-Arts system because it approached architecture as an art as well as viewing architectural design as a set of "universal principles [that] could be rationally perceived, expressed and then taught systematically to any intelligent person" (Draper 1977:210). Using the Beaux-Arts model, the first architecture programs were established at MIT, Cornell University, and the University of Illinois in 1868, 1871, and 1873,

respectively (Woods 1999). By 1898, there were nine schools of architecture in the United States, each housed in colleges funded by the Morrill Land-Grant Act of 1862 (Wright 1977). Although land-grant schools were required by law to be co-educational, the newly established architecture departments in public universities openly discouraged women's attendance and programs in private schools refused women outright (Wright 1977). As a result of this gender discrimination, it was 1880 before the first woman, Margaret Hicks, earned a degree from the architecture program at Cornell University (American Architectural Foundation 1988).

While discriminatory admittance practices at universities denied women the opportunity to pursue architectural educations, receiving training through apprenticeships was also very rare (Woods 1999). In spite of these obstacles, at the end of the nineteenth century the number of female architects slowly grew (Woods 1999). Perhaps unsurprisingly, their pursuits were tightly constrained by their male counterparts during this time. Wright (1977:280) explains, "Those few women who were able to take part seldom...competed with the men who dominated architectural practice; instead they took up the slack where they could, performing the jobs and concentrating on the services which their male colleagues either put aside or treated only peripherally." This resulted in the evolution of "women's fields" including interior design and domestic and landscape architecture in which female architects' "natural" expertise, rooted in biological sex, could be appropriately focused on other women's needs in domestically oriented projects (Adams and Tacred 2000; Woods 1999; Wright 1977). "These aspects of architectural practice were and are considered less prestigious than the designs of public and commercial buildings, which tend to be larger, more high-profile, and more frequently published than housing projects" (Adams and Tancred 2000:38). By characterizing female practitioners as mere "domestic experts" a distinct gender hierarchy was established that limited women's professional

opportunities in architecture by ensuring that their efforts "remained wholly dependent on that of their male colleagues" (Adams and Tancred 2000:380).

Given their subjugated status, women were often unable to secure employment in established offices managed by men. As a result, some women worked alone as owner-architects or as partners with other women (Woods 1999). In any case, female architects' professional activities were influenced by the social norms and expectations for feminine behavior of the era. Wright (1977:284, emphasis in original) explains that during this time the majority of women architects embodied one of the following roles in order to cope with the professional discrimination they faced:

1. "*exceptional women*--just like successful men and more so: more dedicated, more determined, more prolific, giving themselves over totally to their work and professional role"
2. "*anonymous designers* who tolerated discrimination and less than their share of recognition in offices and in the press in order to be able to design"
3. "*adjuncts* to the profession: planners, programmers, critics, writers, journalists"
4. "*reformers* dedicated to creating alternatives, either by advocating legislative reform or by building new kinds of domestic institutions"

Included among the ranks of "exceptional" early female architects are women such as Louise Bethune who, as I mentioned earlier, was the first female member of the AIA. Bethune started the architecture firm Bethune and Bethune with her husband in Buffalo, New York, and during her career designed a wide range of facilities including schools, police stations, a prison, an armory, and a baseball grandstand among many others (American Architectural Foundation 1988). Julia Morgan is also notable as the first woman to graduate from the Ecole des Beaux-Arts in Paris, an accomplishment that was highly unusual at the time. Furthermore, after receiving her degree, she went on to become one of the first licensed architects in California and designed over 800 buildings during her career (American Architectural Foundation 1988).

In the early twentieth century, advocate efforts improved women's opportunities in architecture somewhat. For example, in response to the continued academic discrimination that women faced in architecture, Harvard Professor Henry Atherton Frost established the Cambridge School of Architecture and Landscape Architecture in 1916 “to offer formal training in architecture and landscape architecture exclusively to women” (American Architectural Foundation 1988:13). The first of its kind, the Cambridge School's opening corresponded with a period in which aspiring female architects had begun to demand equal educational opportunities and sufficient training in order to be able to practice architecture upon graduation (Stevens 1977). The school operated for 26 years, graduating more than 400 women, many who went on to become active professionals in the field of architecture (American Architectural Foundation 1988; Stevens 1977).

During this time, women also established architectural organizations that provided important support systems for female practitioners. Stevens (1977:88) explains, "women architects had finally realized that until they drew together into a sisterhood, they could hardly expect the brotherhood that held all the strings of power to admit them as equals into the profession." Groups such as the Chicago Women's Drafting Club and Alpha Alpha Gamma were created in the 1920s and exhibited architectural design work at a series of Women's World Fairs (Stevens 1977). Although the latter went on to become the Association of Women in Architecture (AWA) which continues to support the pursuits of female designers today, the former "was eventually absorbed within the AIA and became known as the club of architects' wives" (Stevens 1977:88).

The efforts of female architects and their advocates had some impact during the first quarter of the twentieth century; however, women's professional opportunities in architecture

remained limited. This changed somewhat in 1933 with the development of the Historic American Buildings Survey (HABS). Initiated by the National Park Service, the Library of Congress, and the AIA, “The establishment of the HABS program provided work to a steadily growing number of women architects. Through site visits, photographs, and measured drawings, architects recorded America’s built environment, documenting the country’s architectural heritage” (American Architectural Foundation 198:18). Although the program was an important source of employment for female practitioners, it did little to subvert the gender hierarchy that existed in professional architecture. In fact, it ultimately solidified the distinction between the efforts of "real" (male) architects who were actively sought for public and commercial commissions and their “helpmates” (women) who continued to be channeled into architecture’s less prestigious and complimentary areas (Wright 1977). Even today, historic preservation, like domestic and landscape architecture and interior design, remains secondary to the more highly esteemed activities of architectural design, illustrating that the historic legacy of gender inequality in architecture persists.

During World War II many men joined the armed services and, as a result, women were given the opportunity to fill positions in that had been previously held by men. “In architecture, engineering, and other male-dominated occupations, shortages of men during World War II meant that women were actively sought for jobs or programs they would ordinarily have been denied or discouraged from seeking" (American Architectural Foundation 1988:13). Although wartime necessity facilitated equal employment opportunities for women, these gains were short lived. While some women voluntarily returned to the domestic sphere after the war, as Ockman (1996:201) explains, "Women...were induced or seduced to return to home and child-rearing

through intensive propaganda by government, businessmen, psychologists, religious leaders, and others on behalf of 'family values.'"

A similar pattern emerged in architectural education. Although the Cambridge School had been highly successful on its own, changes in the accreditation requirements for architecture schools forced the faculty at Cambridge to seek association with another university (Stevens 1977). This "coincid[ed] with the wartime shortage of male students" at the Harvard Graduate School of Design and, as a result, Harvard changed their admissions policy allowing female students from the Cambridge school to enter the architecture program at Harvard beginning in 1942 (American Architectural Foundation 1988:13). Unfortunately, these small shifts did not have a lasting impact in architectural education either. At the conclusion of the war, "In the same [patriotic] spirit, architectural schools reduced the number of places allotted for women" (American Architectural Foundation 1988:13).

During the post-war period the day-to-day practice of professional architecture underwent a structural transformation. Prior to this time, architectural design was often carried out in the offices of small or medium sized firms. However, this began to change in the 1930s with commissions for large, complicated projects such as the Empire State Building and Rockefeller Center, which required extensive design staffs to complete (Boyle 1977). After WWII, individual elements of the architectural design process were divided among employees who became specialists, a development in the profession that mirrored similar evolutions in industrial mass-manufacturing processes (Bolye 1977). Furthermore, as firms grew larger, they also became more specialized, focusing on the design of specific building types (Boyle 1977).

These changes in the industry neither promoted equality for female architects, nor improved women's rates of participation. Yet, in 1948 the editors of *Architectural Record* were

asked to provide a figure that accurately reflected women's representation in the profession. With the help of the AWA and the deans of several architecture schools, a list of 1,119 female architects was compiled and each was mailed a questionnaire that explored the status of women in architecture. Of the 231 women who responded, 108 were practicing architects at the time of the survey. Of these, a meager 17 were profiled in the *Record'*s two part series, "A Thousand Women in Architecture," published in the March and June issues of 1948. While "not a single one [of the respondents] indicated any disappointment whatsoever in her chosen career," several described being mistaken as secretaries in their own offices, explained that residential commissions were the easiest to acquire as well as "the most satisfying and natural for women to engage in," and also lamented the considerable wage gap that persisted between male and female architects (*Architectural Record* 1948:105). These findings illustrate that during this time, women's experiences continued to be influenced by architecture's gender hierarchy, constraining their opportunities and subjecting them to professional discrimination.

While the gendered nature of architecture persisted in 1950s, the structure of practice continued to evolve with the rise of large, all-inclusive firms like Skidmore, Owings, and Merill (SOM) of Chicago. SOM was unique in that it "set out to provide every kind of professional service within a single frame, including not only the usual design, structural, and production services, but also interior design, graphics, all types of presentation, technical research, and mechanical and other engineering specialties...a total in-house package of design and related services..." (Boyle 1977:326). By the late 1950s, SOM was a national operation with four regional offices, each staffing the requisite "specialists" to facilitate the complete self-sufficiency of the individual branch (Boyle 1977). Incorporating capitalistic ideals of efficiency,

productivity, reliability, and predictability, firms like SOM are precursors to the contemporary structure of architectural practice.

Perhaps unsurprisingly, the few female architects that were employed in large firms like SOM were often overlooked by male partners, even when they were "exceptional." Paine (1977) outlines Natalie de Blois' 30 year career at SOM where she was a senior architect for more than twenty years before being promoted to an associate. During this time, de Blois "was responsible for much of [the] creative design for which the firm is noted," working on important and recognizable projects both in the US and abroad (Paine 1977:112). Although de Blois was undoubtedly an asset, none of the firm's male partners selected her as their protégé, a move that would have benefited her career (Paine 1977). Furthermore, she was never promoted to partner and worked in virtual anonymity before leaving SOM in 1974 (Paine 1977). Given the extensive experience that de Blois' and other female architects' possessed, it is somewhat surprising that women continued to be so grossly underrepresented in the profession, particularly in light of the growth that many firms underwent during this time. However, in 1958, there were only 320 registered female architects in the US, making up a mere one percent of practitioners nationwide (Stevens 1977).

The 1970's Women's Rights Movement helped facilitate the passage of Title IX of the Education Amendments of 1972 which states that, "No person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance" (U.S. Department of Education n.d.). In addition to improving women's academic opportunities more broadly, this measure also had an impact on female enrollment rates in architecture

programs and by 1975 14% of all architecture students were women (American Architectural Foundation 1988).

This period of activism influenced the profession as well and advocates began discussing women's status in architecture at conferences and symposiums across the nation (American Architectural Foundation 1988). In 1973, three separate AIA chapters submitted resolutions focused on promoting the status and rights of women in architecture for consideration at the national convention (Edelman 1989). These drafts were consolidated into a single resolution which was passed by the AIA board in spite of stiff opposition and resulted in the establishment of the "Subcommittee on Women and Other Minorities" (Edelman 1989). Despite significant roadblocks and a short timeframe, the committee managed to conduct a study assessing the status of women in architecture and, due to their findings, were authorized to become an independent task force in 1975 (Edelman 1989). Drawing upon the study's conclusions, the task force developed the 1975 *Affirmative Action Plan for the Integration of Women in the Architectural Profession* "...with specific goals of increasing the number of women in the profession, increasing the public's awareness of the contribution of female architects and to promoting equal access to employment for women" (Greer 1982:41).

Although the AIA board of directors approved the Affirmative Action Plan in 1975, it unfortunately had little impact on the profession. As Anna Halpin (quoted in Greer 1982:41), AIA board member from 1977-1979 and later Vice President noted, "'In my years on the board there was never any reference made to the affirmative action plan.'" While members of the task force such as Natalie de Blois and Judith Edelman were committed to promoting women's advancement in architecture, the larger membership did not share their dedication. Edelman (1989:122, emphasis in original) explains, "The A[ffirmative] A[ction] P[lan] was not distributed

within the AIA. Requests for the *Task Force* Report and AAP...were not filled. It is hard to say whether this was an attempt to ignore the whole effort or was typical bureaucratic failure." Another former task force member (quoted in Greer 1982:41) adds, "Basically I think that AIA at the national level breathed a sigh of relief and said, 'Well, we've dismissed that. We don't have to think about it for a while.'"

A follow-up study conducted by the AIA in 1981 confirms that once passed, the Affirmative Action Plan was little more than an afterthought. Comparisons of the results from the 1974 and 1981 studies illustrate that while there were more women working in professional architecture, they continued to face substantial interpersonal and institutional challenges. For instance, many respondents reported having been affected by discriminatory practices in hiring, salaries, advancement opportunities, and work assignments, among others (Greer 1982). Cynthia Rock (quoted in Dean 1982:50) explains, "The people who are advancing the fastest have been handpicked by various partners, and the protégés still tend to be very WASPy males." In addition, several women described the difficulty they had balancing their family and work lives and of the psychological damage they experienced due to the discrimination they faced in their careers (Greer 1982). As one respondent (quoted in Greer 1982:41) elaborated, "'It seems to me that most discrimination is psychological, causing one to doubt oneself as a professional.'"

By 1985, women's enrollment in architecture programs had grown to approximately 30% with women earning 24% of bachelor's degrees, 30% of master's degrees, and 36% of doctor of architecture degrees (American Architectural Foundation 1988). These numbers continued to rise in the 1990s; however, women's participation in the professional realm remained low. As a result, researchers began searching for solutions in the academic environment, focusing on the challenges that female students experienced during their programs of study. For example,

Anthony (1991) explores the nature of the architectural design studio, an updated version of the French atelier described above. While the contemporary design studio is more structured, many of the remnants of the original model persist, in particular spending extra time working on projects outside of class time. Anthony (1991:39) explains, "...many design students actually spend more time at their design studio on campus than they do in their real home…Working around the clock especially when a jury date draws near, design students may only venture out of the studio to attend other classes, or to eat or sleep." During these periods, students have little if any formal supervision and it is not uncommon for harassment to occur. As Ahrentzen and Anthony (1993) find, female students are subjected to sexually explicit conversations, music with sexist lyrics, and in some cases male classmates exposing themselves. In addition, of the women included in their study, a few had been physically accosted and one was sexually assaulted (Ahrentzen and Anthony 1993).

Female students also encounter obstacles during structured class time. In particular, Groat and Ahrentzen (1996) find that female students often feel they have to outperform their male counterparts in order to be taken seriously by faculty members (who are also often male). Unfortunately, even after working hard to be standouts, female students report being ignored or dismissed by their often male instructors (Groat and Ahrentzen 1996). While I will analyze the design studio environment in greater depth in the following pages, it is clear that the sum of these experiences does little to encourage women to seek careers as architects.

Because women remain underrepresented in architecture, in recent years the professionalization process has been subject to scrutiny. The AIA describes the typical trajectory for professional development with the "Three Es" of architecture: Education, Experience, and Examination (AIAS and AIA n.d.). Following this model, aspiring architects must: 1) earn a

degree from an academic program accredited by the National Architecture Accrediting Board (NAAB); 2) gain professional experience by working in architecture firms or offices in related professions such as engineering while completing the requirements for the Intern Development Program (IDP); and finally, 3) successfully complete the Architectural Registration Examination (ARE) (American Institute of Architecture Students 2009). For the most part, this is a linear path which, as Bowden (quoted in Pluviose 2007:10) explains, may pose particular challenges for women:

> The registration path limits women, in a certain way, because it is designed to take a person straight out of college and then have them work as a professional for three years and then be able to take the exam--those are [women's] most productive and likely childbearing years. And so many women exit that process to raise children and never catch up again.

Women's enrollment figures in architecture programs, which have remained steady at slightly over 40% for the last decade, are somewhat encouraging (National Center for Education Statistics 2012). Specifically, women comprised 43% of students in accredited architecture programs and earned 42% of all degrees awarded in 2012 (The National Architectural Accrediting Board, Inc. 2012). Unfortunately, despite women's improved enrollment and graduation rates, only around 24% of architects were women in 2012 (Bureau of Labor Statistics 2012). Other sources argue that the total number of *registered* female architects, women who have completed the full professionalization process and have acquired an architectural license, is an even lower 18% (*The Missing 32% Project* n.d.). Regardless of the figure used to quantify women's rates of participation in architecture, it is clear that they continue to be underrepresented.

The low numbers of women in many traditionally male dominated fields has been a topic of conversation in contemporary discourse among academics and professionals. While at one

time job selection may have been attributed to perceived natural differences that derived from biological sex, this explanation has since been problematized. Eliot's (2009) analysis in *Pink Brain, Blue Brain* illustrates that commonly perceived differences in boys' and girls' skill sets arise from social and cultural influences rather than biological dissimilarities. As such, "parents and teachers can be effective in encouraging more girls to pursue these important, satisfying careers" (Eliot 2009:211). Female architects also emphasize the importance of supporting women's pursuits in architecture "say[ing] that the best way to encourage women to enter the profession is for them to see women on the faculty of architecture schools...[and] having women deans helps" (Stephens 2006:68). Moreover, many scholars argue that women's success in architecture would be improved with greater access to female role models (see for example Anthony 2002; Frederickson 1993; Groat and Ahrentzen 1996; Stephens 2006).

CHAPTER 3

REVIEW OF LITERATURE

3.1 Theoretical Importance of Role Models

The importance of female role models for women in architecture is particularly compelling in light of the literature examining the impact that stereotype threat has on minority groups' academic success (e.g: women in architecture). Research indicates that stereotype threats can be overcome with the introduction of a counter-stereotypical model (Marx and Roman 2002, McIntyre, Paulson, and Lord 2003). Steele (1997:614) defines stereotype threat as:

> a situational threat—a threat in the air—that, in general form, can affect the members of any group about whom a negative stereotype exists...Where bad stereotypes about these groups apply, members of these groups can fear being reduced to that stereotype. And for those who identify with the domain to which the stereotype is relevant, this predicament can be self-threatening.

Given women's historic subjugation in architectural education, it is likely that their academic pursuits are negatively affected by the stereotypical model architect who is "powerful, passionate, obsessive, arrogant—and ultimately [a] successful—white male" (Toy 2001:9).

Stereotype threat can have a significant impact on women's classroom performance. As Steel (1997:614) explains, "if the threat is experienced in the midst of a domain performance...the emotional reaction it causes could directly interfere with performance." In other words, when female architecture students encounter threatening situations in the architecture educational environment, their work may be negatively affected. In addition, the continued presence of a stereotype threat may lead women to disassociate with architecture altogether. Steele (1997:614, emphasis in original) continues, "when this threat becomes chronic in a situation...it can pressure *disidentification*, a reconceptualization of the self and of one's

values so as to remove the domain as a self-identity, as a basis of self-evaluation." As long as stereotypical male models of architectural success continue to dominate the field, women will be subject to the effects of stereotype threat and may become alienated from the profession. However, female role models may make a difference by mitigating these negative effects and promoting women's entry into, and success in, professional architecture.

The impact of stereotype threat in architectural education may also contribute to women leaking out of the architecture pipeline. Berryman's (1983) model provides a metaphor for understanding individuals' academic and career trajectories. Generally speaking, the path flows in a linear fashion, but at important junctures people face decisions that affect their paths. For example, deciding whether or not to pursue a college degree and if so, what major to study. Once enrolled, students may decide to change majors and, upon graduating, decide to enter a different field altogether. While the pipeline is influenced by both individual and structural factors, in traditionally male dominated fields, more women than men are lost along the way (Blickenstaff 2005). This is evident in architecture where, as I have discussed above, there are high rates of attrition between graduation and professional registration.

3.2 Role Models in Science, Technology, Engineering, and Math (STEM)

Because of the lack of empirical analyses exploring the influence of role models in architecture, I draw upon studies conducted in STEM fields. This research is particularly relevant given that many elements of STEM disciplines are also incorporated into architecture. Role model research in STEM is a multifaceted body of work that explores the many structural, cultural, and social barriers women face in STEM fields. Scholars from a wide range of disciplines including education, psychology, and sociology among others have examined women's involvement in STEM fields at several stages, addressing issues such as negative

cultural stereotypes, recruitment challenges, and retention problems in both academic and professional settings. Sonnert, Fox and Adkins (2007:1334) highlight that understanding "gender divisions in science and engineering are important to understanding processes of social inequality, as well as to devising potential means toward greater equity in education, professional employment, and rewards, not only within science and engineering, but also in society broadly." There is evidence that negative cultural stereotypes deter women from pursuing careers in STEM but that women's exposure to successful, female STEM experts may help counterbalance these effects (Stout, Dasgupta, Hunsinger and McManus 2011). In particular, early exposure to female role models may positively influence women's pursuits in these fields (Weber 2011), especially when young women see that it is possible to balance professional and personal interests by learning more about the friends, families, and hobbies of STEM role models (Kekelis, Larking and Gomes 2014). The following role model literature in STEM, which is focused on college-aged women, outlines the important influence that educators, peers, and professionals have on women in STEM fields.

Several studies focus on how role models alleviate stereotype threat, illustrating that women's achievement is benefited from knowledge of other successful women. For example, McIntyre, Paulson, and Lord (2003) find that performance on a difficult math test improved when the female participants were told of other women's achievements prior to taking the test. The relationship is particularly strong when the models of success presented to respondents are perceived as having earned their success through personal ability or effort rather than situational advantage (McIntyre, Paulson, Taylor, Morin, and Lord 2011). Similarly, Marx and Roman (2002) find that having more female role models in mathematics may eliminate the gender gap that exists on standardized math tests.

Stout et al. (2011:256) highlight the importance of academic context, arguing that "the skewed gender ratio of STEM experts in academic environments undermines female students' identification with, positive attitudes about, and self-efficacy in STEM and saps their motivation to pursue careers in science, engineering, or technology." As a result, promoting a hospitable academic environment is critical for female students' success in STEM. One way to accomplish this is by making sure that female students have ready access to female faculty. In a study conducted in an introductory calculus course, female students' self-concept and self-efficacy in math improved when they were taught by women instructors and teaching assistants (Stout et al. 2011). Cotner, Ballen, Brooks, and Moore's (2011) research mirrors these findings, showing that women enrolled in an introductory biology course reported greater gains in confidence over the course of a semester when taught by female instructors (see also Gilbert, Gallessich and Evans 1983 for similar results in psychology). Importantly, Cotner et al.'s results also indicate that female students with male instructors report a loss of confidence in their comprehension abilities.

Other analyses also show the importance of having a "critical mass" of female professors. Sonnert et al.s' (2007) study, which includes students from biology, physical sciences, and engineering at 499 institutions, illustrate a positive relationship between percentages of female students and the proportion of female faculty in these disciplines (see also Rask and Bailey 2002). Furthermore, female faculty have also been shown to positively influence female students' major selection (Rask and Bailey 2002), retention rates in science, mathematics, and computer science (Robst, Keil, and Russo 1998), graduation rates (Sonnert et al. 2007), and career selection and development (Basow and Howe 1979; Gilbert et al. 1983; Gilbert 1985; and Quimby and DeSantis 2006). While the vast majority of research supports the positive influence

of female faculty on female students, one study finds that female instructors negatively impact retention of female students in STEM (Price 2010).

Though women faculty are important for female student success in STEM, female peers can also be role models and may be particularly important in the absence of female faculty (Robst et al 1998). Evaluations of institutional demographics over time illustrate that colleges with higher proportions of female graduate students in STEM also have greater numbers of female undergraduates which suggests a modeling relationship between graduate and undergraduate students (Griffith 2010). Stout et al.'s (2011) study shows that even brief interactions with successful advanced female peers majoring in mathematics improve female respondent's self concept, effort, and performance on a difficult math test. While successful female students have been shown to positively influence the academic success of other female students, Cheryan, Siy, Vichaapai, Drury, and Kim (2012) find that these effects may be mitigated when role models embody discipline specific stereotypes such as "computer nerd" rather than traditional gender stereotypes such as "typical college student." In this study, stereotypical role models wore "Glasses, a t-shirt that read 'I code therefore I am,' unfashionable pants, [and] socks and sandals" (Cheryan et al. 2012:658). Furthermore, in a "get to know you" exercise with respondents, the stereotypical role models shared that their favorite movie was *Star Wars*, their favorite television show was *Mystery Science Theater 2000,* and their favorite magazine was *Electronic Gaming Monthly* (Cheryan et al. 2012). In this case, the analysis reveals that for women in computer science, having no role model may be better than having one which embodies computer stereotypes such as the ones outlined above (Cheryan et al. 2012).

Finally, it is also important to consider the importance that female professionals have as role models for women in traditionally male dominated fields. Lockwood (2006:40) explains:

> In occupations in which women perceive themselves to be minority group members, it may be especially important and inspiring for them to learn that an individual who shares their minority group status has attained such success. In addition, women may derive particular benefits from gender-matched role models because such models provide evidence that women like them can overcome gender barriers such as discrimination to achieve a high level of success in their fields.

Meeting or learning about successful women who are able to effectively manage both career and family responsibilities may be encouraging for women pursuing nontraditional occupations and positively affect their attitudes and commitment (Quimby and DeSantis 2006; Stout et al. 2011). Having exposure to same-sex experts in male dominated fields helps dispel existing stereotypes about women in these areas and reduces the potentially damaging effect of stereotype threats (Lockwood 2006). With that said, Lockwood and Kunda (1996) caution that some students may become discouraged when their available role models have achieved what seem to be unattainable or extraordinary successes.

3.3 Role Models in Architecture

In lieu of empirical analysis, I draw on historical and anecdotal accounts to illustrate the importance of female role models for aspiring women architects. For example, a female employee of early practitioner Julia Morgan describes the inspiration and encouragement that Morgan offered younger women. She explains, “Morgan was always trying to develop a woman. She’d give you as much work and advice as you could handle... her devotion was total, and she demanded the same thing from us. I don’t know of any men who worked that hard” (quoted in Wright 1977:288). Given Morgan's extensive portfolio, including over 800 projects, and her commitment to grooming young female architects, Morgan was not only an “exceptional” architect, but also an important early role model.

The impacts of female role models is also evident in architecture's academic realm. In chronicling women's historic contributions to Canadian architecture, Adams and Tancred (2000) find that during the first half of the twentieth century, one third of registered female practitioners were graduates from the University of Manitoba. The authors' work reveals that,

> ...a list of all [University of Manitoba] instructors in architecture through the 1940s and 1950s shows that no fewer than four women were on the faculty at that time...Given that few *current* schools of architecture could boast such a female presence, it is worth hypothesizing that these women instructors were important influences on the presence of registered women architects (Adams and Tancred 2000:18-19, emphasis in original).

The positive influence that female faculty have on female architecture students is also illustrated in Stephens' (2006) interviews with female owner-architects. While the interviewees are all successful architects, many also hold professorial and administrative positions in architecture and believe that in doing so they serve as role models, which may help encourage other women to enter the field.

As role models, successful female architects also redefine traditional conceptions of what it means to be an architect. This was certainly the case for graduates of the Cambridge School. Stevens (1977:91) explains that by the time the school was folded into the Harvard Graduate School of Design in 1942,

> it's women graduates seem to have developed a consciousness of themselves as architects--and as women--that is quite contemporary. For example, they can be credited as a group with breaking the long-established precedent that a woman must choose between marriage and a career. Their successful life histories dispelled that notion, showing that far from being natural to women, it was just another of society's taboos that kept women in the home. Once that barrier had been overturned, husband and wife partnerships began to spring up in many areas of the country.

If the contemporary female owner-architects interviewed in Stephens' (2006) "Not Only Zaha" are any indication, the legacy of the Cambridge women persists. Women

architects are successfully balancing their professional and personal lives making them models of the change that is possible in architecture and potentially inspiring future generations in the process.

3.4 The Architectural Design Studio as Academic Context

In light of the empirical evidence supporting the positive impact female role models have on women's success in traditionally male dominated fields, the relationship is worth examining further in architecture. The following discussion will explore the influence that role models have on architecture students; however, in doing so it is important to understand how architecture's gender stereotypes are produced and maintained in the academic context. Dasgupta (2011:231-232) explains the relationship between "achievement domains" and stereotype threat:

> People tend to gravitate toward achievement domains that feel like a comfortable fit in the sense that they conform to ingroup stereotypes and away from other domains that feel like an uncomfortable fit in that they deviate too far from ingroup stereotypes. The demographic composition of achievement settings is often a critical situational cue that activates these stereotypes—who is visible and who is scarce? It is important to note that individuals may be unaware or only semiaware that their own interests, self-concept, and academic and professional choices are shaped by stereotypic cues in achievement settings. Yet, not withstanding the absence of awareness, stereotypes leave an implicit imprint on their self concept.

In architecture, the relevant "achievement domain" is the architectural design studio which has a significant influence on architecture students' academic experiences. As noted above, the design studio is an updated version of the French atlier and is considered the most significant and important component of an architectural education. Corroto (2005:274, emphasis in original) elaborates:

> Studio is considered the core of the program, where all knowledge garnered in *support* courses (such as architectural history, theory, engineering structures, and those outside the major in the humanities, natural sciences, and social sciences is synthesized and integrated. Significantly, it is both a place where students are expected to work and a pedagogical type.

Anthony (1991) continues: "…studios form the very core of design education. They function not only as a classroom, but also as office and, as many students can attest, often even as 'home'" (p. 38-39). In short, the architectural design studio is the place where students learn how to be architects and as such constitute a significant component of the academic experience in the field.

While students learn critical thinking, problem solving, mechanical, and technical skills among others in the design studio, they are also taught important social and cultural information. In addition to its intended function, architecture studio is also a conduit for communicating specific values, particularly about gender. Ahrentzen and Anthony (1993:11) describe the process of "genderization" that takes place in studios where "...our cultural constructs of masculinity [are attached] to our concept of what constitutes a well-educated person or suitable educational methods." The process of genderization privileges traits that are stereotypically considered masculine and structures the system of architectural education in a way that benefits male students. The resulting "hidden curriculum" that develops has a significant impact on design studio pedagogy, social dynamics, and ideas and expectations in architecture more broadly (Groat and Ahrentzen 1996).

Argyris (1981) explains that the patterns of behavior and interaction that take place in the studio are governed by the "mastery-mystery syndrome." Within this framework, instructors (the masters) provide students with little assistance recognizing or explaining design ideas, theories, and solutions (the mystery). Because the source of instructor comments and critique are not clear, "…the student assumes the mystery is an indication of the mastery of the teacher [and]…Over time, mystery begins to be taken as a symptom of mastery." (Argyris 1981:575). This makes learning to be a "good" designer difficult because there are often no clearly stated

standards. Although students realize that there are "right" and "wrong" design decisions, the process of selection is based largely on intuition meaning that students either have "it" or they don't. Ahrentzen and Anthony (1993) add that the "mastery-mystery syndrome" reinforces the patriarchy that is common in design studios and presents specific challenges for female students who have difficulty developing master-apprentice relationships with instructors who are often male (see also Groat and Ahrentzen 1996). In addition, women are probably not inclined to pursue mentor relationships with male instructors who use sexual innuendo and sexist language when speaking to them and commenting on design projects (Ahrentzen and Anthony 1993).

The design jury which functions as the evaluative extension of the design studio gives architecture students the opportunity to present their projects to "expert" panels of peers, professors, architects, professionals, and sometimes clients. Unfortunately this process often reproduces the same problematic, gendered social dynamics. Although conceived of as a constructive process in which students have the chance to "practice" being architects and enhance their academic experience by exchanging ideas with experts, "[t]oo often, the proceedings seem almost Kafkaesque—a sleep deprived student facing a panel of inquisitors, with the 'right' answers so subjective as to be unknowable" (Boyer and Mitgang 1996:94). Furthermore, the "us-against-them" attitude that is often prevalent in design juries reflects and reinforces "rigid, hierarchical, and patriarchal relationships between students and faculty" and leaves male and female students alike feeling "devastated," "humiliated" and "demoralized" (Ahrentzen and Anthony 1993:17). While some male students may be able to approach the jury process as a battle to be won, female students often have difficulty embodying this "warrior" attitude (Ahrentzen and Anthony 1993). In addition, Frederickson's (1993) study finds that when compared to their male counterparts, female students' design presentations are more

frequently interrupted and receive less critical attention and commentary from jurors. Finally, the inclusion of female jurors is a relative rarity due to their scarcity in the field (Ahrentzen and Anthony 1993). When women do serve jurors, they spend less time speaking than their male counterparts, a pattern of participation that reinforces rather than challenges architecture's existing gender hierarchy (Frederickson 1993).

It is clear that women's pursuit of careers in architecture has been constrained historically. Although positivist explanations for women's low rates of participation in traditionally male dominated occupations have been largely discredited, social norms and cultural values continue to create barriers to women's entry in architecture. Empirical exploration in STEM disciplines indicate that having access to role models may facilitate women's entry into nontraditional professions, however no such analysis exists for the field of architecture. As such, in the following analyses, I consider the following research question: Do role models positively impact architecture students' feelings about their potential for professional success in architecture? In addition, I predict that for architecture students, having an academic role model will be positively related to future career confidence.

CHAPTER FOUR

METHODS

4.1 Research Design and Subjects

Guided by the research discussed above which illustrates the benefit of role models for women in STEM fields, I developed a survey to explore the influence of role models on architecture students. In particular, I investigated the relationship between having a role model and students' confidence in securing a professional appointment in architecture upon graduation. Given that the design studio is the key element of any academic architecture program, the questions focused on students' experiences in this setting. In addition to exploring the influence of role models, the survey also gathered students' demographic information and included questions about academic confidence as well as questions about the importance of gender in students' academic experience.

During the fall semester of 2013, I distributed a digital link to the architecture students in an accredited architecture program at a Midwestern public university using the school's undergraduate and graduate student email listservs. The link directed students to an online survey hosted by the web survey company Survey Monkey. By the conclusion of the semester only 47 students had responded to the online survey. To increase this response rate, at the beginning of the spring semester of 2014, I acquired permission to visit design studio classrooms to administer paper surveys. With this combined effort, I collected 185 surveys of which 163 were valid on all of the variables utilized in the analyses presented below. The final participation rate is 59% of all architecture students, including undergraduate, on-campus graduate, and online graduate students.

4.2 Dependent Variable

Future Career Confidence. Because I am interested in why many women fail to make the transition into professional architecture after completing their degrees, I use students' future career confidence as the dependent variable. Respondents were asked to indicate whether they 1) disagree strongly, 2) disagree somewhat, 3) neither disagree or agree, 4) agree somewhat, or 5) agree strongly that: "After I have completed my degree, I feel confident that I will find a good job in architecture." Based on the frequency distribution of respondents' answers, I combined the categories 'disagree strongly' and 'disagree somewhat' into a single 'disagree' category for the final analyses.

4.4 Independent Variables

Gender. In light of women's historical and contemporary lack of representation in architecture, it is apparent that gender is significant in both the academic and professional realms. As such, it is important to consider the impact that gender has on students' future career confidence. I did so in the analyses by including a dummy variable for gender in which 0 – "male" and 1 – "female."

Gender Salience. Furthermore, I explored whether or not respondents view their gender as being an important factor in their academic experience by including a rounded mean composite of: "It is important to have someone who understands how my gender might affect my experiences as an architecture student" and "There is someone who understands how my gender might affect my experiences as an architecture student." Response options for these questions are 1) disagree strongly, 2) disagree somewhat, 3) neither disagree or agree, 4) agree somewhat, or 5) agree strongly. Respondents who answered at least one of these two questions were included in the final analyses.

Role Model. As the literature above indicates, having a role model may promote students' confidence in their academic pursuits as well as their future career goals. As discussed, role models may be particularly important when individuals are members of an underrepresented group. Marx and Roman (2002:1184) explain that, "Individuals become role models when others choose to emulate them. The search for role models is generally a selective, social comparison process whereby...the attributes chosen will be ones that are also important to the chooser." Within the architectural design studio there are a wide range of interpersonal interactions that commonly take place including: instructive (student-instructor), cooperative (student-student), and emulative (student-professional or historical figure). As such, it is an ideal locale in which to explore role modeling relationships in architecture. In order to encompass the range of modeling relationships possible in design studios, I utilized the following broad definition of architectural role model for the purposes of this study:

Academic/professional architecture role models are individuals who can provide an example of the kind of success you may achieve in your architectural education/career. They may also provide and an example of the behaviors that are needed to achieve success academically/professionally (see also Lockwood 2006:36). For the final analyses, I created a dummy variable in which respondents are classified as 1 - "has a role model," if they reported that their academic role models were primarily: 1) other architecture students, 2) architecture faculty, 3) architecture professionals, or 5) other, please specify. Only students who responded: 4) I don't have any academic role models were categorized as 0 - "does not have a role model."

Role Model Importance. While I expected that students' future career confidence would be increased by having a role model, students without role models may not be negatively affected if they don't feel that having a role model is important. To account for this, I created a rounded

mean composite variable to measure the importance of having a model for academic success using responses to: "It is important for someone to show me how to be successful in architecture school" and "Having a role model is important for me to be successful in architecture school." Response options for both questions are 1) disagree strongly, 2) disagree somewhat, 3) neither disagree or agree, 4) agree somewhat, or 5) agree strongly, and respondents were included in the analyses as long as they responded to one of these two questions. Due to the frequency distribution of the composite variable, I combined the "disagree strongly" and "disagree somewhat" responses into a single "disagree" category for the final analyses.

Academic Confidence. Finally, students' academic confidence may be linked to their future career confidence. As such, I included a measure of academic confidence that incorporates students' self-reported academic success, confidence, and efficacy using a rounded mean composite of responses to: "I feel confident in my abilities in architecture design studio courses," "I feel as though my abilities in architecture design studio courses are," "I feel comfortable expressing my thoughts and ideas in design studio courses," and "I feel confident when I express my thoughts and ideas in design studio courses." The response options for each of these questions are based on similar five-point Likert scales in which "1" is the least positive response, "3" is neutral, and "5" is the most positive response. Respondents were included in the final analyses if they were valid on at least three of these four questions. Again, based on the frequency distribution of the resulting composite of academic confidence, I combined the two least confident response options into a single "not confident" category.

Because some role model literature highlights the importance of female role models for female students in traditionally male dominated fields, I explored this relationship as well. In the survey, students were asked: "How many of your architecture role models are male and how

many are female?" While I expected numerical responses to this question, students responded in a number of ways including "none" "alot," and "All but one very important one" among others. Due to the variety of responses, I created a dummy variable, coding respondents as 1 – "has at least one female role model" if they indicated that even one of their architecture role models were women. Students who clearly indicated that they had no female role models were coded 0 – "has no female role models." When I included this variable in the regression analyses it was not significant in any of the models and as a result it is not included in the final analyses. Given the empirical link between female role models and female success in male dominated fields, the non-significant findings in these analyses may be impacted by the phrasing of the question as well as the small sample size.

4.3 Control Variables

Age. Respondents' age is included in the final analyses as a control variable. The initial question regarding respondents' age included the following response options: 1) 18-20, 2) 21-23, 3) 24-26, 4) 27-30, 5) 31-40, and 6) 41 or older. Based on the frequency distribution of these responses, I collapsed the last four age categories into a single ' 24 or older' category and utilized this three category variable in the final analyses.

Degree Program. Architectural registration now requires an advanced or professional degree in most US jurisdictions. Therefore, architecture graduate students at this university may be more committed to pursuing a career in architecture and as a result might be expected to exhibit different levels of future career confidence than undergraduates. As such, whether or not respondents are undergraduate or graduate students is included in the final analyses. When manually entering the data from the paper surveys I collected, I noticed that in a few cases there were inconsistencies between the responses to: "What architecture degree program are you

currently enrolled in?" and "If you are an undergraduate, what is your current level in the program?" In particular, a few respondents indicated that they were enrolled in the Master of Architecture program in the first question, but that they were also undergraduates in the second question. It is likely that although these respondents intend to pursue a master's degree, they are currently undergraduate students. My conclusion is also supported by knowing the level of the classes in which I proctored paper surveys. In order to avoid miscategorizing these respondents or removing them from the analyses altogether, the dummy variable for degree program used in the final analyses is based on responses to the second question. Respondents are coded 0 - "undergraduate student" if they selected: 1) 1st year, 2) 2nd year, 3) 3rd year, or 4) 4th year. Respondents are coded 1 - "graduate student" if they selected: 5) I am not an undergraduate.

I also considered including race as a control variable, however, further inspection through bivariate analyses revealed that race was not significantly related to the dependent variable or any of the other variables included in the final models. This could be due to the lack of racial variation in the sample as well as in the architecture programs at this university as a whole. Of the 163 total respondents included in the analyses, 76% report that they are Caucasian. While the lack of racial diversity in architecture is also an important problem that warrants further exploration, this analysis exceeds the scope of the current project.

4.4 Statistical Procedures

As explained above, the final analyses include three rounded mean composite variables. Before selecting this method of aggregation, I first conducted factor analyses to assess the appropriateness of creating a factor for each case. For the measure of academic confidence, I began with the following eight questions: 1) I feel confident that architecture is the right field of study for me, 2) I feel confident in my abilities in architecture design studio courses, 3) I feel as

though my abilities in architecture design studio courses are, 4) I feel comfortable expressing my thoughts and ideas in design studio courses, 5) I feel confident when I express my thoughts and ideas in design studio courses, 6) I often speak during in-class discussions, 7) I often speak during design critiques or juries, and 8) In my design studio courses, I typically earn grades of. For all but the last question, response options are based on a five-point Likert scale, ordered from 1 – "low" to 5 – "high" where 3 – "neutral." For the question about studio grades, response options included: "A," "B," "C," "D," "F," and "I have not taken a design studio course yet." I coded the question about studio grades to correspond with the five-point Likert scale used in the related questions: 1 - "F," 2 – "D," 3 – "C," 4 – "B," and 5 – "A." Because participation in architectural design studio is critical to my analyses, I did not include students who had not taken a design studio course.

Creating a factor from the eight questions gauging academic confidence was not appropriate as evidenced by the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (KMO = 0.76, 28 df, $p < .01$). Furthermore, the solution only accounted for 59% of the variation in the model and used two factors. Forcing the analysis to produce a one factor solution reduced the amount of variation explained by the model to 42% (KMO = 0.76, 28 df, $p < .01$) which is also unsatisfactory. By analyzing the rotated component matrix, I was able to determine which individual variables loaded on each of the two factors in the initial analysis. As a result of these loadings, I conducted factor analysis again using questions 2, 3, 4, and 5 (KMO = 0.73, 6 df, $p < .01$) which produced a solution explaining 63% of the variance in the factor with individual component loadings ranging from 0.73 to 0.85. Reliability testing produced a Cronbach's Alpha statistic of 0.80 which would have been reduced to between 0.70 and 0.78 if any of the variables were removed from the factor. While this combination of variables met the minimum

benchmarks for creating a factor, in the final analyses, I utilized a rounded mean composite of these four items instead.

I underwent the same process for the following eight academic role model questions: 1) It is important for someone to show me how to be successful in architecture school, 2) There is someone I am trying to be like in my educational pursuits, 3) It is important to have someone who understands my experiences as an architecture student, 4) There is someone who understands my experiences as an architecture student, 5) It is important to have someone who understands how my gender might affect my experiences as an architecture student, 6) There is someone who understands how my gender might affect my experiences as an architecture student, 7) Having a role model is important for me to be successful in architecture school, and 8) Having a role model of my gender is important to my success in architecture school. Similar to the result from the eight academic confidence variables, this analysis produced a two factor solution (KMO = 0.76, 28 df, $p < .01$) and explained only 56% of the variation, making it an unsatisfactory factor.

Because these questions address the importance of having a role model in addition to the perceived importance of gender in respondents' academic experience, I decided to consider these concepts separately. The factor analysis for the questions concerning the importance of having a role model (1, 2, 3, and 7) produced a factor explaining only 52% of the variation in the factor with individual component loadings ranging from 0.62 to 0.81 (KMO = 0.71, 6 df, $p < .01$), making it an unsatisfactory factor. By analyzing the individual component loadings, I determined that creating a rounded mean composite from questions 2 and 7 made the most sense. This is the variable for role model importance I used in the final models.

Similarly, the factor analysis of the questions assessing the importance of gender in one's academic experience (5, 6, and 8) produced a factor in which 76% of the variance was explained (KMO = 0.65, 3 df, $p < .05$). Although this is a high value (the component loadings ranging from 0.80 to .93 are also high), the individual questions address different issues: 1) the importance of having a same gender role model, 2) the salience of gender in one's academic experience. Because of the theoretical difference in these questions, I created a rounded mean composite from questions 5 and 6 to gauge the salience of gender in one's academic experience which I included in the final analyses.

Prior to conducting regression analyses, I ensured that there was not multicollinearity among variables by verifying that the variance inflation factors (VIFs) were within acceptable ranges (none of the VIFs exceed 1.5). Because the dependent variable is an ordinal, categorical measure of future career confidence, PLUM (polytomous universal model) ordinal regression is the most appropriate regression procedure and is utilized in the following analyses. In Model 1, I regressed respondents' future career confidence on their gender, including age and degree program as controls. In the subsequent four models, Models 2-5, I entered each of the remaining independent variables (gender salience, role model importance, whether or not respondents have a role model, and academic confidence) individually in order to assess their effects on the dependent variable separately. In Models 6-8, each of the independent variables are added to Model 2 in a stepwise procedure. Model 8 is the complete model and includes all controls and independent variables. Finally, in the supplementary PLUM ordinal regression analyses, I analyzed the relationship between future career confidence and the independent and control variables for women and men separately.

CHAPTER FIVE

RESULTS

5.1 Univariate Results

As the descriptive statistics in Table 1 illustrate, the mean for respondents' age is 1.87 indicating that on average students fall within the upper end of the 18 - 20 year old category. In addition, 32% of the sample is female, 76% is Caucasian, and 20% are graduate students. Only 21% of the sample indicated that they *did not* have a role model. Most respondents feel that having a role model is important for their academic success with 39% "strongly agreeing," 44% "agreeing somewhat," 12% "neither agreeing or disagreeing," and only 4% "disagreeing." The importance that gender plays in one's academic experience is more varied with 11% "strongly agreeing," 21% "agreeing somewhat," 44% "neither agreeing nor disagreeing," 14% "disagreeing somewhat," and 10% "strongly disagreeing." The majority of respondents also report high levels of academic confidence with 23% reporting "very confident" feelings, 59% reporting "somewhat confident" feelings, 14% reporting "neutral" feelings, and only 4% reporting "not confident" feelings. Finally, most respondents also express high levels of future career confidence. Specifically, 19% "strongly agree," 48% "agree somewhat," 23% are "neutral" and only 10% "disagree" that they will find a good job in architecture after they finish their degrees.

Table 1: *Descriptive Statistics for Variables*

	Variables	N	M	SD	Possible Range
Dependent	Future career confidence	163	2.77	0.88	1-4
Controls	Age	163	1.87	0.71	1-3
	Degree program (1 = MA)	163	0.20	0.40	0-1
Independent	Gender (1 = Female)	163	0.32	0.47	0-1
	Gender salience	163	3.08	1.10	1-5
	Role model importance	163	3.18	0.81	1-4
	Role model (1 = Has a role model)	163	0.79	0.41	0-1
	Academic confidence	163	3.01	0.72	1-4

5.2 Bivariate Results

The bivariate results shown in Table 2 demonstrate that neither of the control variables (age and degree program), nor the independent variables (respondents' gender, gender salience, or role model importance) are significantly related to the dependent variable, future career confidence. However, having a role model is significantly related to the dependent variable ($t = -2.99$, 161 df, $p < .01$, $X^2 = 8.7$, 3 df, $p < .05$, Cramer's V = .23). Of students who have role models, 23% “strongly agree” that they will find a good job in architecture whereas only 6% of respondents without role models feel the same. Respondents’ self-reports of academic confidence are also related to future career confidence ($X^2 = 26.09$, 9 df, $p < .01$, Cramer's V = .23). Importantly, of the students who “strongly agree” that they will find a good job in architecture, none report that they are *not* confident academically, 4% are neutral about their academic confidence, 19% say they are somewhat confident academically, and 35% are very confident in their academic pursuits. Despite the non-significant bivariate relationships noted

above, existing empirical research in traditionally male dominated disciplines makes the inclusion of these variables important in the PLUM ordinal regression analyses presented below.

Table 2: *Bivariate Relationships Between Control / Independent Variables and Dependent Variables*

Variables	% (f)	M	SD	Test
Age				
18 – 20	32.5 (53)	2.92	0.87	X^2 = 7.61, 6 df, n.s.
21 – 23	47.9 (78)	2.73	0.82	
24 or older	19.6 (32)	2.63	1.00	
Degree program				
Undergraduate	79.8 (130)	2.73	0.88	t = -1.22, 161 df, n.s.
Graduate	20.2 (33)	2.94	0.86	
Gender				
Male	68.1 (111)	2.82	0.92	t = 1.00, 161 df, n.s.
Female	31.9 (52)	2.67	0.79	
Gender salience				
Strongly disagree	10.4 (17)	2.47	1.07	
Somewhat disagree	14.1 (23)	2.61	0.89	
Neutral	43.6 (71)	2.92	0.79	X^2 = 14.60, 12 df, n.s.
Somewhat agree	20.9 (34)	2.76	0.82	
Strongly agree	11.0 (18)	2.72	1.07	
Role model importance				
Disagree	4.3 (7)	1.86	0.90	
Neutral	12.3 (20)	2.55	0.89	X^2 = 15.33, 9 df, n.s.
Somewhat agree	44.8 (73)	2.75	0.85	
Strongly agree	38.6 (63)	2.97	0.84	
Role model				
Rs has no role model(s)	20.9 (34)	2.38	0.85	t = -2.99, 161 df, p < .01
Rs has a role model(s)	79.1 (129)	2.88	0.86	
Academic confidence				
Not Confident	3.7 (6)	1.83	0.75	
Neutral	14.1 (23)	2.30	0.76	X^2 = 26.09, 9 df, p < .01,
Somewhat Confident	59.5 (97)	2.84	0.83	Cramer's V = .23
Very Confident	22.7 (37)	3.04	0.91	

N = 163

In addition to the statistically significant relationships that exist between some of the independent variables and the dependent variable, there are also important relationships between independent variables. Perhaps unsurprisingly, respondents' gender is strongly related to the salience of gender in their academic experience (X^2 = 25.07, 4 df, p < .01, Cramer's V = .39). Specifically, 56% of female respondents "somewhat" or "strongly agree" that gender is

important in their academic experience whereas only 21% of male respondents do. Respondents' gender is also moderately related to their self-reported academic confidence (X^2 = 7.22, 9 df, p < .10, Cramer's V = .21). In particular, 28% of male respondents report that their academic confidence is very high, but only 12% of female respondents do. These findings support the conclusion that gender has an impact on the academic experience in architecture and may also be an indication that stereotype threat is present in the design studios at this institution.

Critical to this study, whether or not architecture students have a role model is significantly related to several other variables. As might be expected, having a role model is strongly related to the importance respondents place on having a role model (X^2 = 16.40, 3 df, p < .01, Cramer's V = .32). Specifically, 43% of students with a role model "strongly agree" that role models are important for academic success versus 21% of students without a role model. In addition, having an academic role model is also moderately related to the salience of gender in one's academic experience in architecture (X^2 = 11.27, 4 df, p < .05, Cramer's V = .26). Of the students who "somewhat" or "strongly agree" that gender is important in their architectural education, 37% have role models and 15% do not. Finally, having a role model is moderately related to respondents' self-reports of academic confidence (X^2 = 9.34, 3 df, p < .05, Cramer's V = .24). For instance, only 11% of the students who have role models are neutral about their academic confidence, whereas 27% of those without role models report neutral levels of academic confidence. The relationships discussed here are an indication that academic role models positively impact architecture students' academic experience.

5.3 PLUM Ordinal Regression Results

As shown in Table 3, Model 1 is a statistically significant model (X^2 = 10.73, 3 df, p < .05, Nagelkerke = .07). In addition, the goodness-of fit and parallel line measures are not

significant indicating a well-fitting model. In the subsequent four procedures in which the remaining independent variables (gender salience, role model importance, whether or not respondents have a role model, and academic confidence) are entered independently, the resulting models are also statistically significant: Model 2 (X^2 = 14.10, 4 df, p < .01, Nagelkerke = .09), Model 3 (X^2 = 22.69, 4 df, p < .01, Nagelkerke = .14), Model 4 (X^2 = 20.08, 4 df, p < .01, Nagelkerke = .13), Model 5 (X^2 = 20.75, 4 df, p < .01, Nagelkerke = .19). In each case, the goodness-of-fit and test of parallel line statistics are non-significant, again indicating that the models are a good fit. In Models 6 – 8, role model importance, whether or not respondents have a role model, and respondents' academic confidence are added in steps to Model 2. Again, the goodness-of-fit and parallel line measures are non-significant[1], indicating well-fitting models. The addition of the independent variables in each of these steps produces a model that is significantly related to the dependent variable: Model 6 (X^2 = 23.89, 5 df, p < .01, Nagelkerke = .15), Model 7 (X^2 = 27.98, 6 df, p < .01, Nagelkerke = .17), Model 8 (X^2 = 41.68, 7 df, p < .01, Nagelkerke = .25).

[1] In Model 8, the Pearson goodness-of-fit measure was significant (p < .01), however the Deviance goodness- of-fit statistic was non-significant (p > .05). Because the model does not violate both measures of fit, I conclude that it is appropriate to include this model in the analysis.

Table 3: *PLUM Ordinal Regression Models*

Variables	M 1	M 2	M 3	M 4	M 5	M 6	M 7	M 8
	B (SE)	**B (SE)**	**B (SE)**	**B (SE)**	**B (SE)**	**B (SE)**	**B (SE)**	**B (SE)**
Age	-.66** (.24)	-.61** (.24)	-.62** (.24)	-.71** (.24)	-.72** (.25)	-.64** (.25)	-.62** (.25)	-.69** (.25)
Degree program	1.02** (.43)	1.29** (.43)	1.09** (.43)	1.06** (.43)	1.05** (.43)	1.29** (.44)	1.29** (.44)	1.27** (.44)
Gender	-.51[a] (.32)	-.54** (.32)	-.58* (.32)	-.79* (.35)	-.52* (.32)	-.71* (.35)	-.71* (.35)	-.68* (.35)
Gender salience		.28* (.15)				.17 (.15)	.12 (.15)	.09 (.16)
Role model importance			.66** (.19)			.62** (.20)	.53** (.20)	.41* (.21)
Role model				1.11** (.37)			.78* (.39)	.68* (.40)
Academic confidence					.93** (.22)			.80** (.23)
X^2 (df)	10.73* (3)	14.10** (4)	22.69** (4)	20.08** (4)	20.75** (4)	23.89** (5)	27.98** (6)	41.68** (7)
Nagelkerke pseudo R^2	.07	.09	.14	.13	.19	.15	.17	.25

N = 163 Significance tests for all coefficients *except* gender salience are one tailed:
[a] = p < .10, * = p < .05, ** = p < .01

In Model 1, each of the variables, age, degree program, and gender are statistically significant ($p < .01$, $p < .01$, and $p < .10$ respectively). Importantly, simply being a woman decreases confidence in finding a good job in architecture by 40%. As explained above, in Models 2, 6, 7 and 8 the independent variables are individually added to Model 1 in a stepwise procedure in order to construct the final model. This permits me to assess the impact of the independent variables at each step in the process.

In Model 2 the variable measuring gender salience is significantly related to future career confidence ($p < .05$). While the significance levels of the control variables, age and degree program, are maintained, the addition of this variable increases the significance level of gender

($p < .01$) which was only marginally significant in Model 1 ($p < .10$). In this model, a one unit increase in the salience of gender in one's academic experience corresponds with a 33% increase in future career confidence.

The next step, shown in Model 6, illustrates that role model importance is significantly related to future career confidence ($p < .01$). In this model, a one unit increase in the importance of having a model of academic success increases confidence in finding a good job in architecture by 85%. While the significance of most of the other variables remains intact, the addition of role model importance in this model decreases the effect of gender ($p < .05$ versus $p < .01$ in Model 2) and gender salience becomes non-significant. This is an indication that gender salience could affect career confidence through thinking that a role model is important, thus rendering it non-significant.

In the third step, shown in Model 7, whether or not respondents have a role model is significantly related to the dependent variable ($p < .05$). Importantly, this model shows that having a role model increases respondents' future career confidence by 119%. In addition, the significance of the relationships between each of the other variables and respondents' future career confidence is maintained although their effects are reduced somewhat. For instance, the effect of the importance of having a role model is reduced to 69% when having a role model is included in the model. This is an indication that some of the effect of role model importance is seen through actually having a role model.

Finally in the last step, shown in Model 8, the variable measuring academic confidence is significantly related to respondents' future career confidence ($p < .01$). For the most part the significance of each of the other variables is maintained with the inclusion of this variable. The

one exception is the significance level of role model importance with is reduced ($p < .05$) as compared to Model 7 ($p < .01$).

The combination of variables in Model 8 provides some important information about the factors that influence respondents' confidence in finding a good job in architecture. For instance, a one category increase in age reduces future career confidence by 50% ($p < .01$). In addition, whether or not respondents are graduate students is significantly related to future career confidence. In fact, graduate students are 255% more confident ($p < .01$) that they will find a good job in architecture than undergraduate students.[2] Because a master's or professional degree is now required to pursue professional registration in most US jurisdictions, having taken this step might be an indication of a student's commitment to the profession and thus their career confidence. Also highly significant is the effect of academic confidence. A one unit increase in this variable corresponds with a 122% increase in future career confidence ($p < .01$). Simply stated, feelings of comfort, confidence, and efficacy in one's academic pursuits may logically translate into higher levels of perceived future professional success. This may be particularly true in architecture given that the education system is designed to simulate the professional experience. Respondent's gender and whether or not they have role models are also marginally related to the dependent variable. Specifically, being a woman reduces future career confidence by 49% ($p < .05$) which may be an indication that female architecture students are negatively influenced by the impact of stereotype threat at this institution. Finally, having a role model increases future career confidence by 97% ($p < .05$). While this is an encouraging finding, the addition of the academic confidence variable reduces the effect of having a role model in this

[2] Although this effect seems very high, the small sample size which includes only 33 graduate students, makes exploring this outcome in greater depth unfeasible.

model as compared to Model 7. This is an indication that some of the effect of having a role model is seen through respondents' academic confidence.

5.4 Supplementary PLUM Regression Results

In addition to the analyses described above, I also conducted supplementary regression analyses that explore Model 8 for men and women separately the results for which are presented in Table 4. While these analyses are affected by the small sample size, the exploratory results provide valuable information and illustrate that men and women's future career confidence is influenced differently by the variables included in these analyses. For example, for women, degree program ($p < .01$) and the importance of having a role model ($p < .01$) are most significantly related to future career confidence whereas men's age ($p < .01$) and academic confidence ($p < .01$) have the most statistical significance. That women's academic confidence is only marginally related to future career success may be further evidence that their academic pursuits are impacted by stereotype threat. In addition, while marginally significant ($p < .10$ for both), having a role model increases future career confidence for female and male respondents. However, similar to the gendered differences discussed above, the effect of having a role model is different for men and women. For women, having a role model increases future career confidence 159% whereas for men, having a role model only increases future career confidence by 83%. This finding aligns with similar conclusions in STEM analyses and provides further evidence that role models may be particularly important for promoting women's transition into professional architecture.

Table 4: *Supplementary PLUM Ordinal Regression Models*

	Women	**Men**
Variables	**B (SE)**	**B (SE)**
Age	-.68[a] (.48)	-.73** (.30)
Degree program	2.29** (.86)	.92* (.54)
Gender salience	-.20 (.32)	.14 (.19)
Role model importance	1.04** (.42)	.24 (.24)
Role model	.95[a] (.79)	.60[a] (.47)
Academic confidence	.79[a] (.53)	.79** (.25)
X^2 (df)	18.42** (6)	25.84** (6)
Nagelkerke pseudo R^2	.33	.23
N	52	111

Significance tests for all coefficients *except* gender salience are one tailed:
[a] = p < .10, * = p < .05, ** = p < .01

CHAPTER SIX

DISCUSSION AND CONCLUSION

6.1 Discussion

Since it's professionalization in the 1850s, the field of architecture has been dominated by men. Today, even conservative estimates only place women's professional rates of participation at approximately 24%. Although some progress has been made in architectural education as evidenced by women's enrollment and graduation rates, this has done little to narrow the gender gap in professional practice. Research in STEM fields indicates that role models may facilitate women's entry into, and success in, traditionally male dominated occupations by mitigating the negative effects of stereotype threat and preventing women from leaking out of the gender pipeline. This study contributes to this discourse, illustrating that having a role model is related to architecture students' self-reported academic confidence and feelings of future career confidence. In addition, these findings have specific implications for female students' confidence and are an indication that having role models may help decrease the gender gap in professional architecture.

The main analyses presented above illustrate that in architecture gender is related to future career confidence and that being a women corresponds with lower levels of confidence. Furthermore, the supplementary findings indicate that for women, academic confidence is less related future career confidence than it is for men. These findings align with results from STEM studies and support the conclusion that stereotype threat is present in the architecture programs at this university. Unfortunately, it seems that whether explicitly or implicitly perpetuated, the historical stereotype of the male architect has a negative effect on women's confidence in finding a good job in architecture. This finding may be exacerbated by women's low rates of enrollment

in the architecture department in which this study was conducted where women account for only about one quarter of all architecture students, a number far lower than the national average. Unfortunately, the low number of female architecture students at this university may covertly reinforce the perception that architecture is a field for men.

Despite the discouraging, though perhaps unsurprising findings regarding female architecture students' future career confidence, there is also evidence that it may be possible to mitigate the impact of stereotype threat. For example, as this study illustrates, cognizance of the influence of gender in one's academic experience in architecture increases future career confidence. This is an important finding given that higher proportions of female architecture students report that gender is a salient factor in their academic pursuits. In addition, recognizing the importance of having an academic role model also improves future career confidence. Most importantly however, is the positive effect that having a role model has on future career confidence. While both men and women benefit from having academic role models, the supplementary analysis illustrates that the effect of having a role model increases career confidence at a higher rate for women than for men. As such, although stereotype threat may persist in architecture, women's confidence may be bolstered by having a role model which in turn may help mend the leaky architecture pipeline.

The results of this study are particularly important given the persistent gender gap that plagues architecture, and indicate that having role models may facilitate women's transition into professional practice and promote gender equality in the field. Empirical investigation in other traditionally male dominated fields illustrates that role model relationships can be developed between peers (Griffith 2010, Robst et al 1998, Stout et al 2011) as well as with faculty (Basow and Howe 1979, Gilbert et al 1983, Gilbert 1985, Quimby and DeSantis 2006, Rask and Bailey

2002, Robst et al 1998, Sonnert et al. 2007). As such, the findings presented above support the conclusion that efforts to increase the number of female students and faculty in architecture programs and encourage role modeling relationships may help reduce the gender gap in professional architecture. Such measures may be particularly important for the architecture programs included in this study where only 26% of the students are female and only two of the 11 instructors teaching architectural design studio classes are women. In addition, developing teaching strategies that work against the "mastery-mystery syndrome" common in architectural education may make developing modeling relationships with instructors easier for female students. Finally, highlighting the achievements of female architects in architecture curriculum may provide female students with additional models of success, particularly when women are absent in their programs. Taken together, efforts to provide female architecture students with a wide range of role models may be important steps toward promoting gender equity in the profession.

6.2 Conclusion

Over the years, concerned scholars and professionals have undergone efforts to improve women's participation in professional architecture. For example, exhibitions such as *Women in Architecture, and Historical and Contemporary Perspective* which opened in 1977 (Stephens 2006) and *That Exceptional One: Women in American Architecture, 1888-1988* which premiered in 1988 (American Architectural Foundation 1988) highlighted the work of female architects. In addition, several texts have helped to foreground women's historical contributions to the profession (see for example Adams and Tancred 2000; Agrest, Conway and Weismann 1996; American Architectural Foundation 1988; Berkeley and McQuaid 1989; Torre 1977; Warren 2001; Wright 1977). In each case, the efforts to rewrite women into architecture history

work against the dominant male-as-architect model, providing aspiring female architects with important counter-stereotypical role models.

In addition, in 2009, the National Council of Architectural Registration Boards (NCARB) introduced a significant revision to the IDP process intended "to more closely align with the practice of architecture today" (NCARB 2011:2). The amendments are expected to expedite the registration process by facilitating participants' completion of the program requirements in a shorter timeframe. This may be beneficial for some women who under the old system may have decided to take time off from their careers in order to have children, thus halting the architectural registration process. Perhaps over time these revisions will begin break down some of the barriers that women face en route to becoming registered architects. However, efforts such as these may do little to mitigate the impact of architecture's historical legacy of male domination.

Unfortunately, the models of professional success in architecture have, and continue to be, male "starchitects." In fact the profession's two most prestigious awards, the Pritzker Prize and the AIA Gold Medal Award, have only been awarded to three women in their combined 144 years of recognition. In 2004, Zaha Hadid became the first woman architect to be awarded the Pritzker Prize, Kazuyo Sejima received her Pritzker in 2010, although she shares it with her male design partner Ryue Nishizawa (The Hyatt Foundation 2013), and finally, Julia Morgan, 2014 AIA Gold Medal awardee, received the recognition over fifty years after her death (The American Institute of Architects 2014). Although there are many influential female architects, the paucity of awards bestowed upon them is one indication that the stereotypical ideal of the male practitioner remains intact. Deamer (2006) laments, "The models we have now are oriented to a male ideal of success (even Zaha), and it's pretty limited and depressing'" (Quoted in Stephens 2006:68).

If "*The built environment reflects our culture, and vice-versa"* (Anthony 2008:14, emphasis in original), the importance of promoting women's participation in professional architecture extends beyond seeking equality. As society continues to evolve, the built environment must adapt with it and as such, the architectural workforce must also change. The findings presented above indicate that ensuring that female architecture students have role models may achieve just that by encouraging their entry into, and persistence in, architectural practice.

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