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## In Pursuit of the MD: The Impact of Role Models, Identity Compatibility, and Belonging Among Undergraduate Women

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### Abstract

Women continue to face gender-related challenges in the medical field in places around the world where it has traditionally been male-dominated, including in the U.S. In an online experimental study with women attending a mid-sized public university in the Northeastern U.S. ( $N=55$ ) who were interested in pursuing a pre-medical track (being pre-med) as undergraduates, we explored the mechanisms involved in undergraduate women's pursuit of a career as a physician, focusing on three factors: exposure to successful female physician role models, perceived identity compatibility between being a woman and being pre-med, and sense of belonging in pre-med. Participants were randomly assigned to an experimental condition in which they were exposed to information about successful female physicians, or to a control condition in which no information about female physicians was provided. First, as hypothesized, participants exposed to successful female physicians reported higher perceived identity compatibility, sense of belonging, and interest in a medical career compared to those in the control condition. Second, also as hypothesized, perceived identity compatibility mediated the effect of role models on sense of belonging, and sense of belonging mediated the relationship between perceived identity compatibility and interest in a medical career. This study highlights three key factors in women's pursuit of a career as a physician and the process through which these factors may operate. Findings support the use of role models to set a positive psychosocial process in motion that can support women's persistence in medicine.

### Keywords

Belonging; Identity compatibility; Physicians; Role models; Women

## Introduction

Although the gender-gap has narrowed, women continue to face gender-related challenges in the medical field in places around the world where it has traditionally been male-dominated, including in the U.S. (e.g., see Riska 2011 for a review for North America and Western Europe). These gender-related challenges can affect women's engagement with and persistence in the medical field, and more research is needed to contribute to our understanding of factors and mechanisms that can buffer women from these experiences and contribute to their persistence in the field. To better understand the crucial ingredients or mechanisms involved in women's persistence in medicine, we examined three factors drawn from several lines of research and theory that are potentially key variables contributing to undergraduate women's sustained interest in pursuing a pre-medical track (hereafter referred to as "being pre-med"; a proximal outcome) and a career as a physician (a more distal outcome): exposure to successful female physician role models (e.g., Lockwood and Kunda 1997 in Canada; Marx and Roman 2002 in the U.S.), perceived identity compatibility between being a woman and being pre-med (e.g., London et al. 2011; Rosenthal et al. 2011a; Settles 2004 all in the U.S.), and sense of belonging in pre-med (e.g., Good et al. 2012 in the U.S.).

In an online experimental study at a mid-sized public university in the Northeastern U.S., with women undergraduates who were interested in being pre-med, participants were randomly assigned to an experimental condition in which they were exposed to information about successful female physicians (i.e., role models), or to a control condition in which they were not exposed to any information. Based on past theory and research, we expected that exposing women interested in pursuing a career as a physician to successful female physicians might set a positive psychosocial process in motion, first leading to increased perceived compatibility, in turn leading to greater sense of belonging, and finally leading to greater interest in being pre-med and pursuing a career as a physician. Thus, we tested two sets of hypotheses: 1) that participants exposed to female physician role models would report higher perceived identity compatibility between being a woman and being pre-med, sense of belonging in pre-med, and interest both in being pre-med and in pursuing a career as a physician, compared with those in the control condition; and 2) that perceived identity compatibility would mediate the relationship between exposure to role models and sense of belonging in pre-med, and that sense of belonging in pre-med would then mediate the relationships that perceived identity compatibility has with interest in being pre-med and interest in pursuing a career as a physician.

The current study was conducted in the U.S. and builds on research and theorizing mostly from prior work in North America and Western Europe. However, this study's findings are potentially informative to research and intervention in numerous countries where medicine has traditionally been or currently is a male-dominated field. Below, we provide some background on relevant research investigating women's experiences in pursuing an education and career in medicine, role models, perceived identity compatibility, and sense of belonging, in turn. All empirical studies cited throughout the rest of the paper were conducted in the U.S. unless otherwise noted.

### Women in Medicine

In recent decades, the gender gap in medicine has narrowed, such that in North America and Europe, women are no longer underrepresented on average as medical school students (e.g., Barzansky and Etzel 2008). Despite this advance in numeric representation at the entry level of medical education, women continue to experience substantial disadvantages in comparison to men in medicine, as is the case in many other fields (Pratto and Walker 2004 internationally; Ryan et al. 2009 in North America and Europe). For example, in the

Netherlands, men continue to hold the most senior medical positions (e.g., Pas et al. 2011), and in the U.S., men earn more than women do with comparable medical education and training (Lo Sasso et al. 2011). Female physicians report feeling a greater conflict between their work and home lives than do male physicians (e.g., Langballe et al. 2011 in Norway; Pas et al. 2011 in the Netherlands). And, female physicians and medical students report receiving less attention, support, and encouragement than their male peers, as well as experiencing sexual harassment and exposure to sexist jokes (e.g., Babaria et al. 2011; see Riska 2011 for a review for North America and Western Europe).

Less research has focused on perceptions of gender bias among undergraduate women pursuing a pre-med track, and indeed perceptions of bias may be less at this level, where women are well represented. However, there is some evidence that women undergraduates face greater challenges to pursuing a pre-med track than men do. For example, one study of pre-med undergraduates found that women experienced higher levels of burnout than men did, which was explained by higher levels of depression (Young et al. 2012). Another study of pre-med undergraduates found that women experienced a larger decline in their interest in continuing in pre-med from the beginning of their first to the end of their second year in college, at least partially due to negative experiences particularly in Chemistry courses (Barr et al. 2008). Also, a study of African American and Latino pre-med undergraduates found that women were significantly more likely to expect that gender discrimination would be a barrier in medical school and in a career as a physician than men did (Paul 2006).

Taken together, these gender-specific challenges can affect women's engagement with and persistence in the medical field, and much is still unknown about what can buffer women from these experiences and contribute to their persistence in the field. To better understand the crucial ingredients or mechanisms involved in women's sustained interest in medical careers, we examined three factors drawn from related lines of research that have not been previously considered together in relation to undergraduate women's experiences in pursuit of medical careers: exposure to successful female physicians (role models), perceived identity compatibility between being a woman and being pre-med, and sense of belonging in pre-med, discussed below.

### **Role Models, Identity Compatibility, and Belonging**

While women may be gaining in numeric representation at the entry level stages of medical education, the absence of women in positions of power and high status within this field limits exposure to successful female physicians, or role models. Role models—people who exemplify success and achievement in a field (e.g., Lockwood 2006 in Canada)—have been found to be key in supporting and motivating people especially in pursuing careers in fields in which their group (e.g., race or gender group) is underrepresented. For example, exposure to successful women in traditionally male-dominated fields, such as science, technology, engineering, and math (STEM), seems to improve women's general engagement in those fields, including their self-efficacy in, identification with, and commitment to the domain (e.g., Lockwood and Kunda 1997 in Canada; Marx and Roman 2002; Stout et al. 2011). Research also suggests that in all areas of study, female students are more inspired by female role models than they are by male role models, while the gender of the role model does not matter for male students (e.g., Gilbert et al. 1983; Lockwood 2006 in Canada; Marx and Roman 2002).

Exposure to female leaders (i.e., role models)—either through biographical information about famous female leaders, or through direct contact with female professors in courses — has been found to decrease female undergraduates' gender stereotyping (Dasgupta and Asgari 2004). However, research also suggests that female role models must be perceived by women as being similar to their ingroup and their self, as elite female leaders that women do

not identify with can have negative effects on women's aspirations, self-perceptions, and stereotypes (e.g., Asgari et al. 2012; Hoyt and Simon 2011; Lockwood and Kunda 1997 in Canada). Role models have been identified as being important for women pursuing a career in medicine specifically, such as for helping women set their career goals and providing support (see Riska 2011). Taken together, this literature on role models suggests that for women interested in pursuing a career as a physician, which in the U.S. and many other countries is traditionally and/or currently a male-dominated occupation like other STEM occupations, having exposure to other women who are successful physicians (i.e., role models) may help to keep them engaged in that pursuit. Importantly, the mechanisms through which female role models affect women's engagement in non-traditional fields are less well-studied. However, the research reviewed suggests that exposure to female role models affects self-perceptions, stereotypes, and other psychosocial variables that are related to women's sustained interest in non-traditional fields.

Female role models may in part be effective for women in non-traditional fields because by their very nature, these role models illustrate that women can fit in and prosper in those fields, demonstrating compatibility between being a woman and being in those fields or careers, and contradicting stereotypes of gender incompatibility. Building on the literatures showing the critical importance of identity for the self (e.g., social identity theory; see Hogg and Abrams 1988; Tajfel and Turner 1979), perceived compatibility between women's gender and career identities has been found to be a key variable that predicts better performance and greater interest in remaining in non-traditional fields (e.g., Settles 2004; also see Cheryan et al. 2009; Eccles 2005; Else-Quest et al. 2010 internationally; Good et al. 2008; Shapiro and Williams 2012). For example, results of a diary study of female undergraduates in STEM majors across the first 3 weeks of college demonstrated that on days when women felt their gender and STEM majors were more compatible, they were more motivated and less insecure as a woman in their major (London et al. 2011). Female STEM undergraduates perceiving greater compatibility between their gender and STEM major also have lower expectations of dropping out of their major before graduating (London et al. 2011; Rosenthal et al. 2011b), an indicator of sustained engagement. Moreover, undergraduate students, graduate students, and women working in STEM careers who feel their gender and scientist identities are more compatible experience fewer depressive symptoms and perform better in their fields concurrently and 2 years later (Settles et al. 2009). Thus, this literature suggests that perceived identity compatibility may be a key variable in predicting sustained interest for women pursuing a career as a physician as well. Further, exposure to successful female physicians may increase women's perceptions that being a woman and being a physician are compatible, thereby promoting continued interest in the pursuit of that career; however, research has not yet tested this link.

More recently, there is also evidence that among women in STEM fields, greater perceived identity compatibility predicts greater sense of belonging, or the feeling that one fits in or is accepted in an environment (London et al. 2011; Rosenthal et al. 2011a). To the extent that one feels that key aspects of their identity (their gender and their career goals) are compatible, then their sense of fit and comfort within environments where those identities are salient may be greater. In the diary study mentioned earlier of female STEM undergraduates (London et al. 2011), on days when women felt their gender and STEM majors were more compatible, they experienced greater sense of belonging in their major. In cross-sectional studies with undergraduate women, greater perceived identity compatibility between gender and STEM majors significantly predicted greater sense of belonging in STEM majors (London et al. 2011; Rosenthal et al. 2011a). Perceived identity compatibility, therefore, may be a mechanism through which female physician role models increase undergraduate women's sense of belonging in pre-med.

As well, sense of belonging in one's educational context has been found in many previous studies to be a key factor that facilitates academic engagement, interest, and achievement in numerous fields of study for diverse students (Eccles et al. 1993; Finn 1989; Ostrove and Long 2007; Walker and Greene 2009; Walton and Cohen 2007). For example, Good et al. (2012) found that among undergraduate women, greater sense of belonging to math was significantly associated with greater intent to pursue math in the future. This past work suggests that for women pursuing a career as a physician, the more they feel that being a woman and being a physician are compatible, the greater sense of belonging they may feel in their field of study, which may in turn lead to greater interest in pursuing that field. Sense of belonging, therefore, may be a mechanism through which perceived identity compatibility increases women's interest in pursuing a career as a physician.

Taken together, exposing undergraduate women interested in pursuing a career as a physician to successful female physicians may set a positive psychosocial process in motion, first leading to increased perceived compatibility between being a woman and being pre-med, in turn leading to greater sense of belonging in pre-med, and finally leading to greater interest in being pre-med and in pursuing a career as a physician. The psychosocial variables of perceived identity compatibility and sense of belonging may help to explain the mechanisms through which female role models can increase women's interest in pursuing a career as a physician.

### The Present Investigation

In the present investigation, we aimed to build upon and integrate the aforementioned lines of work on same-gender role models (e.g., Lockwood and Kunda 1997 in Canada; Marx and Roman 2002; Stout et al. 2011), perceived identity compatibility (e.g., London et al. 2011; Rosenthal et al. 2011a; Settles 2004), and sense of belonging (e.g., Eccles et al. 1993; London et al. 2011; Rosenthal et al. 2011a; Walton and Cohen 2007) to help elucidate the processes or mechanisms involved in women's pursuit of a medical career. We expected that exposure to female physician role models would increase perceived identity compatibility between being a woman and being pre-med, which would then lead to greater sense of belonging in pre-med, and finally to greater interest in being pre-med and in pursuing a career as a physician.

Specifically, we tested two sets of hypotheses in an online experimental study with undergraduate women attending a mid-sized public university in the Northeastern U.S., who were interested in being pre-med. First, we used a multivariate analysis of variance to test the hypothesis that participants exposed to same-gender role models would report higher perceived identity compatibility between being a woman and being pre-med, sense of belonging in pre-med, and interest both in being pre-med (proximal outcome) and in pursuing a career as a physician (more distal outcome), compared with those in the control condition. Second, we used bootstrapping analyses to test hypotheses about mediation: that perceived identity compatibility would mediate the relationship between exposure to role models and sense of belonging in pre-med, and that sense of belonging in pre-med would then mediate the relationships of perceived identity compatibility with interest in being pre-med and interest in pursuing a career as a physician.

## Method

### Participants

Participants were 55 undergraduate women at a mid-sized public university in the Northeast U.S. (mean age=18.42,  $SD=0.83$ ). Participants were racially/ethnically diverse, reflecting the composition of the campus population (19 White/European American, 16 Asian American,

10 Latino American, 5 Black/African American, 5 Mixed/Other). Participants were also socioeconomically diverse (family income: 2 reported less than \$10,000; 18 reported \$10,001–\$50,000; 18 reported \$50,001–\$100,000; 14 reported \$100,001–200,000; 3 reported more than \$200,001).

Using a multivariate analysis of variance and a chi-square test, we examined whether participants randomly assigned to the Role Model condition varied significantly on any demographic variables (age, race, family income) from those randomly assigned to the Control condition, and there were no significant differences.

## Procedure

After female students in an introductory psychology course were prescreened for interest in pre-med, they were invited to participate in an online study about the medical field for course credit. Participants logged onto the secure study website to complete the survey and were randomly assigned to either the Exposure to Role Model ( $n=28$ ) or Control (no role models;  $n=27$ ) condition. Participants in the control condition only completed dependent variable measures.

Consistent with past successful methods of presenting role models (e.g., Lockwood and Kunda 1997; also see O'Connell and Russo 1980), participants in the Role Model condition were exposed to brief biographical descriptions of five successful female physicians from diverse racial/ethnic backgrounds. The content of the biographies were adapted from Internet postings of biographies of successful female physicians. While attempting to keep the biographies brief (232–381 words), we aimed to highlight information about these physicians that would draw attention to how these physicians were *similar to our* participants, and how these physicians were *inspiring* and *self-relevant*, which are three key features of effective role models demonstrated in previous studies (Lockwood and Kunda 1997 in Canada; Wohlford et al. 2004). As a cover story, participants were told that they would be reading brief sections from newspaper articles about physicians and were asked to pay attention to the content and journalistic style.

Forty-five female students interested in pre-med had previously evaluated these biographies, rating them on a scale from 1 to 10 on the extent to which the role models were perceived as similar to them ( $M=6.93$ ,  $SD=1.99$ ), inspiring ( $M=8.40$ ,  $SD=2.05$ ), and self-relevant ( $M=6.42$ ,  $SD=2.38$ ), which as noted above are three key features of effective role models that our biographies were aimed to target (see Lockwood and Kunda 1997 in Canada; Wohlford et al. 2004). The mean scores for each of these items were significantly greater than the midpoints of the scales, suggesting that they contained these key features of role models,  $t(44)=4.82$ ,  $p<.001$  for similar;  $t(44)=9.49$ ,  $p<.001$  for inspiring;  $t(44)=2.60$ ,  $p=.013$  for self-relevant. All participants were debriefed with no reports of suspicion about the experiment.

## Measures

All participants completed the following measures in the order listed below. Role Model condition participants additionally rated how similar, relevant, and inspirational they found the biographies, on scales from 1 to 10.

**Perceived Identity Compatibility**—Participants completed the “Inclusion of Other in the Self” single-item measure, which has been used across many domains (e.g., Aron et al. 1992; Tropp and Wright 2001), including with women in STEM fields (London et al. 2011; Rosenthal et al. 2011a). Participants were asked to select one pair of progressively overlapping circles out of seven choices (scored 1 to 7, with higher scores indicating greater

compatibility) that represent the compatibility between their gender (in one circle) and being pre-med (in the other circle). This measure has excellent test–retest reliability and convergent and predictive validity, and is easy for participants to understand (e.g., Aron et al. 1992; Tropp and Wright 2001).

**Sense of Belonging in Pre-med**—Participants completed an established measure of sense of belonging developed with underrepresented groups (Mendoza-Denton et al. 2002), which has been used previously with women in STEM (London et al. 2011; Rosenthal et al. 2011a). The measure includes eight questions on scales from 1 to 10 concerning several facets of belonging in pre-med in general, with pre-med professors, and with pre-med classmates. As an example, one item read, “How do you feel about being pre-med?” and participants answered on the scale ranging from 1 (I feel very uncomfortable) to 10 (I feel very comfortable). The mean of all 10 items was calculated (Cronbach’s  $\alpha=.84$ ).

**Interest in a Career in Medicine**—Participants answered on a scale of 1 (Not at all interested) to 10 (Very interested) the following two questions: 1) “How interested are you in being pre-med?” (proximal outcome); and 2) “How interested are you in pursuing a career in medicine as a doctor?” (distal outcome). These two items were used as separate single-item outcome measures.

## Results

Role Model condition participants rated the female physicians as similar ( $M=6.75$ ,  $SD=2.10$ ), inspiring ( $M=8.61$ ,  $SD=1.79$ ), and self-relevant ( $M=6.86$ ,  $SD=2.12$ ). The mean scores for each of these items were significantly greater than the midpoints of the scales, supporting that the role models used in this study had the key, established features of effective role models (Lockwood and Kunda 1997 in Canada),  $t(27)=3.15$ ,  $p=.004$  for similar;  $t(27)=9.18$ ,  $p<.001$  for inspiring;  $t(27)=3.39$ ,  $p=.002$  for self-relevant.

Correlations, means, and standard deviations for study measures are presented in Table 1. Participants on average rated their perceived compatibility between their gender and being pre-med just above the midpoint of the scale, which refers to the two circles representing being a woman and being pre-med partially overlapping. Participants on average reported sense of belonging in pre-med just above the midpoint of the scale (e.g., slightly higher than “sort of fit in”). Participants on average reported their interest in being pre-med and their interest in pursuing a career as a physician as more than a full point above the midpoints of those scales (higher than “somewhat interested”). As expected, perceived identity compatibility, sense of belonging, interest in being pre-med, and interest in pursuing a career as a physician were all significantly correlated with each other, with the exception of the positive association between perceived identity compatibility and interest in pursuing a career as a physician being only marginal ( $p=.10$ ).

### Testing Effects of Role Model Exposure

Correlations, means, and standard deviations for study measures are presented separately by condition in Table 2. First, we used a multivariate analysis of variance to test the first set of hypotheses that participants exposed to same-gender role models would report higher perceived identity compatibility between being a woman and being pre-med, sense of belonging in pre-med, and interest both in being pre-med (proximal outcome) and in pursuing a career as a physician (more distal outcome) compared with those in the control condition. Role Model condition (relative to control condition) participants reported significantly greater perceived identity compatibility, sense of belonging, interest in being pre-med, and interest in pursuing a career as a physician,  $F(1,53)=7.38$ ,  $p=.009$  for

perceived identity compatibility;  $F(1,53)=4.32, p=.042$  for sense of belonging;  $F(1,53)=5.12, p=.028$  for interest in being pre-med;  $F(1,53)=4.35, p=.042$  for interest in pursuing a career as a physician.

### Testing Mediation

Second, we used bootstrapping analyses (MEDIATE macro; Preacher and Hayes 2008) to test the second set of hypotheses about mediation: that perceived identity compatibility would mediate the relationship between exposure to role models and sense of belonging in pre-med, and that sense of belonging in pre-med would then mediate the relationships of perceived identity compatibility with interest in being pre-med and interest in pursuing a career as a physician. Results of these analyses can be found in Table 3. Results supported that perceived identity compatibility mediates the relationship between exposure to role models and sense of belonging in pre-med. We also tested whether the opposite direction of mediation, with sense of belonging in pre-med mediating the relationship between exposure to role models and perceived identity compatibility, was possible. This model fit less well than the hypothesized direction; notably, the confidence intervals for this model included 0.

Using additional bootstrapping analyses, we then tested the hypothesis that sense of belonging mediated the relationships of perceived identity compatibility with interest in being pre-med and interest in pursuing a career as a physician. Results supported the hypothesis that sense of belonging in pre-med mediates the relationship between perceived identity compatibility and interest in being pre-med. Similarly, results supported the hypothesis that sense of belonging in pre-med mediates the relationship between perceived identity compatibility and interest in pursuing a career as a physician. We also tested whether the opposite direction of mediation was possible, with interest in being pre-med and/or interest in pursuing a career as a physician mediating the relationship between perceived identity compatibility and sense of belonging in pre-med. Results did suggest that interest in being pre-med significantly mediated the relationship between perceived identity compatibility and sense of belonging, but the size of the indirect effect was smaller, and the confidence intervals came closer to including 0 than for the direction of mediation hypothesized. Results also did not support that interest in pursuing a career as a physician mediates the relationship between perceived identity compatibility and sense of belonging, with the confidence intervals including 0.

### Discussion

In many countries, including the U.S., women are increasingly pursuing previously male-dominated fields of study such as medicine; yet, women continue to face gender-specific challenges that threaten their interest and advancement in this field (e.g., see Riska 2011 for a review for North America and Western Europe). In the present investigation, we integrated several related lines of research on three factors that are hypothesized to promote the sustained engagement of women in nontraditional fields despite the challenges they face. Specifically, we tested hypotheses about the processes contributing to engagement with pursuing a career as a physician among a group of undergraduate women interested in pre-med, attending a mid-sized public university in the Northeastern U.S. Findings support the hypotheses that exposing undergraduate women interested in medicine to information about successful female physicians (role models) sets in motion a positive process involving the mechanisms of perceived identity compatibility and sense of belonging, leading to increases in or sustainment of women's interest in medicine, despite continued gender-specific challenges. Consistent with our first set of hypotheses, successful female physician role models who were perceived as inspiring yet self-relevant and similar to the self heightened undergraduate women's perceived compatibility between being a women and being pre-



med, their sense of belonging in pre-med, and their interest in being pre-med and in pursuing a career as a physician compared to the control condition. Additionally, findings supported our second set of hypotheses that perceived identity compatibility between gender and pre-med mediates the relationship between exposure to role models and sense of belonging in pre-med, and that sense of belonging in pre-med mediates the relationships of perceived identity compatibility with interest in being pre-med and in pursuing a career as a physician. The opposite directions of mediation effects were not well supported in analyses. In one case the opposite direction of mediation was supported, with results suggesting that interest in being pre-med significantly mediated the relationship between perceived identity compatibility and sense of belonging; however even in this case, the size of the indirect effect was smaller, and the confidence intervals came closer to including 0 than for the direction of mediation hypothesized (with sense of belonging mediating the relationship between perceived identity compatibility and interest in being pre-med).

These findings make several important contributions to the existing literature and can help inform future basic and applied research on this topic. Most previous work has tended to focus on one key variable that predicts individual differences in women's pursuit of male-dominated fields or the relationship between two key variables, such as greater perceived identity compatibility predicting greater sense of belonging for women in non-traditional fields (e.g., London et al. 2011; Rosenthal et al. 2011a). However, the present investigation takes a step toward integrating several lines of research and provides evidence of some of the mechanisms or processes that contribute to women's sustained engagement with a non-traditional field like medicine. This work builds on previous research demonstrating that female role models perceived as similar to women can positively affect psychosocial variables such as self-perceptions and stereotypes (e.g., Dasgupta and Asgari 2004), and helps us to better understand the psychological processes explaining why these role models can have such a positive effect on women's sustained interest in non-traditional fields. This work also extends prior research demonstrating the importance of perceived identity compatibility and sense of belonging (e.g., Settles 2006; Good et al. 2012) by identifying role models as a way of boosting these psychological factors that play an important role in women's engagement with non-traditional fields.

### Limitations and Future Directions

The current investigation involved a sample of undergraduate women in the U.S. interested in being pre-med from one university; thus, further research is needed to examine the generalizability of our findings. While findings suggest that exposure to same gender role models has a positive impact on undergraduate women's interest in pre-med, future work is needed to examine whether other types of role models could be effective for undergraduate women interested in medicine. For example, perhaps successful female role models from other fields of study in which women are under-represented might also be perceived as self-relevant and inspiring to women in medicine and thereby have a positive effect on them. As noted earlier, past work suggests that for women, female roles models are more effective than male role models, and that for men, both male and female role models can be effective (e.g., Gilbert et al. 1983; Lockwood 2006 in Canada; Marx and Roman 2002). However, the current study did not compare female role models to male role models or female to male participants. Thus, future work may want to expand upon this study by including undergraduate men pursuing pre-med in addition to women as participants, as well as including other exposure conditions, such as exposure to successful male physician role models in addition to female physician role models, and exposure to successful female and/or male role models from other fields. To obtain a fuller picture, future work could also examine female and male participants in a variety of fields of study in order to pinpoint the

circumstances under which same gender or different gender role models are more or less effective.

It would also be fruitful in future work to study the mechanisms examined in the present investigation among girls and women at different levels in their educational and career paths, as well as to replicate these findings with undergraduate women at other universities, among women in other non-traditional fields of study, and among men in fields that are non-traditional for them (e.g., nursing in the U.S). Particularly as female students are now better represented in medical schools but still not at parity in higher-status roles within medicine, it is important to know whether exposure to role models can not only have a positive effect on engagement of pre-med undergraduate women, but also on the aspirations and persistence of female medical school students and female physicians for reaching higher-status positions in the field of medicine. Small differences in access and environmental climate at each phase of pursuing a non-traditional career can build up an *accumulation of disadvantage* that contributes to gender disparities in professional work (cf. Valian 2007), underscoring the importance of understanding these dynamics and improving women's engagement at all levels, including undergraduate pre-medical training. Additionally, the way these psychosocial variables and processes may operate for other underrepresented groups (e.g., African American and Latino American students) in medicine and other fields warrants investigation and raises important questions. For example, is perceived compatibility between one's racial/ethnic group and one's field a mechanism through which exposure to same-race role models can affect interest in a field? Among women of color, who have multiple marginalized identities in some non-traditional fields, in what ways do levels of perceived compatibility of both gender and race with field of study interact or affect each other (cf. Blake-Beard et al. 2011; Settles 2006)?

Our study included brief exposure to role models and brief follow-up; how long-lasting the effects are remains unclear. Also unclear is the necessary duration of exposure to sustain a beneficial effect. If brief exposure to role models has long-term effects, it would be an especially cost- and time-effective means of promoting engagement for women pursuing careers as physicians or potentially other non-traditional fields. A question for future research is what the effects are of longer-term exposure to inspirational, relevant, and successful individuals in one's field of interest. In addition to research on role models (successful exemplars whom individuals may choose to emulate), a distinct but related line of research on mentors (relevant people in one's field who provide guidance and advice) suggests that mentors can help retain women and members of underrepresented racial/ethnic groups in non-traditional fields (e.g., Blake-Beard et al. 2011; Phinney et al. 2011). The current investigation suggests that enhanced perceived identity compatibility and sense of belonging may be two of the mechanisms through which mentoring programs are successful, and may be useful factors in studying and evaluating such programs. The continued study of role models remains timely because other resources such as mentors may not be sufficiently available for women in non-traditional fields. For example, a recent study in Switzerland found that female physicians were less likely to have a mentor than male physicians, but having a mentor was associated with greater career success (Stamm and Buddeberg-Fischer 2011).

In the current study, we also did not measure participants' perceptions of gender bias or stereotyping in the pre-med domain. Past work does suggest that undergraduate women face greater challenges to pursuing a pre-med track than men do, and that they do expect gender-based discrimination to affect their pursuit of a career in medicine (e.g., Barr et al. 2008; Paul 2006; Young et al. 2012). However, some research has also found female undergraduates not to perceive structural barriers such as discrimination to pursuing a career as a physician, expect to experience conflicts between pursuing a career as a physician and

having a family, or expect negative reactions to this career choice because of gender stereotypes (Fiorentine and Cole 1992). Further, research suggests that even in the same context or situation, there are individual differences in the extent to which women perceive and expect gender bias (e.g., London et al. 2012). Thus, future work might examine differences in perceptions of gender bias among undergraduate women in pre-med, and whether the impact of role models varies based on those individual differences in perceptions. Are role models more effective among women who perceive gender bias or those who do not? If role models do have the same effect regardless of perceived bias, might the mechanisms involved still differ?

Additionally, while the small sample size did not allow for path analysis or structural equation modeling, future work using these techniques with larger samples would be worthwhile to replicate and extend current findings on the process through which role models sustain interest in pursuing a non-traditional field, and provide further support for the direction of effects involved.

## Conclusion

In conclusion, this investigation pinpoints three factors that may help explain individual differences in undergraduate women's engagement in a career that has been male-dominated in many places in the world, including in the U.S., and that continues to have gender-specific obstacles. Further, study findings offer some evidence for the process through which these factors may operate, that is, one in which successful female role models increase perceived compatibility between being a woman and being pre-med, in turn increasing sense of belonging in pre-med, finally resulting in greater interest in being pre-med and in pursuing a career as a physician. As gender-specific challenges continue to affect women's engagement with, representation in, and advancement in the medical field in the U.S. and other countries around the world, we look forward to future work that continues to investigate factors contributing to women's persistence in pursuing a career in medicine.

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**Table 1**Bivariate correlations, means, and standard deviations for study variables ( $N=55$ )

	1	2	3	4
1. Perceived identity compatibility between gender and pre-med	–			
2. Sense of belonging in pre-med	.34*	–		
3. Interest in being pre-med	.27*	.58**	–	
4. Interest in pursuing a career as a physician	.22	.48**	.83**	–
Means	4.87	5.91	6.75	6.78
Standard deviations	1.63	1.46	2.49	2.95

Perceived Identity Compatibility measured on a scale ranging from 1 to 7; all other variables measured on a scale of 1–10

\*  $p < .05$ ;

\*\*  $p < .01$

**Table 2**

Bivariate correlations, means, and standard deviations for study variables separately by role model ( $N=28$ ) and control ( $N=27$ ) conditions

	1	2	3	4
1. Perceived Identity Compatibility between Gender and Pre-Med	–	.47*	.02	.13
2. Sense of Belonging in Pre-Med	.15	–	.17	.14
3. Interest in Being Pre-Med	.30	.81**	–	.82**
4. Interest in Pursuing a Career as a Physician	.15	.67**	.81**	–
Means Role Model Condition	5.43 <sup>a</sup>	7.30 <sup>a</sup>	7.46 <sup>a</sup>	7.57 <sup>a</sup>
Standard Deviations Role Model Condition	1.32	1.29	2.24	2.71
Means Control Condition	4.30 <sup>b</sup>	6.51 <sup>b</sup>	6.00 <sup>b</sup>	5.96 <sup>b</sup>
Standard Deviations Control Condition	1.75	1.54	2.56	3.01

Correlations for the Role Model condition are above the diagonal; correlations for the Control condition are below the diagonal.

<sup>a/b</sup> Means for Role Model versus Control conditions that are significantly different from each other are noted with different superscripts

\*  
 $p < .05$ ;

\*\*  
 $p < .01$



**Table 3**

Results of mediation testing using bootstrapping analyses (MEDIATE macro; Preacher and Hayes 2008)  
( $N=55$ )

	<b>B</b>	<b>SE</b>	<b>95 % Confidence intervals</b>
Hypothesized mediation relationship (indirect effect) tested			
Role model (vs control) → perceived identity compatibility between gender and pre-med → sense of belonging in pre-med	.28	.18	.01 and .71
Perceived identity compatibility between gender and pre-med → sense of belonging in pre-med → interest in being pre-med	.28	.13	.07 and .56
Perceived identity compatibility between gender and pre-med → sense of belonging in pre-med → interest in pursuing a career as a physician	.28	.14	.06 and .58
Reverse mediation relationship (indirect effect) tested			
Role model (vs control) → sense of belonging in pre-med → perceived identity compatibility between gender and pre-med	.24	.17	-.02 and .64
Perceived identity compatibility between gender and pre-med → interest in being pre-med → sense of belonging in pre-med	.12	.07	.01 and .28
Perceived identity compatibility between gender and pre-med → interest in pursuing a career as a physician → sense of belonging in pre-med	.08	.06	-.02 and .21

Arrows indicate direction of effects for each mediation relationship (indirect effect) tested